

UTAH BIG GAME RANGE TREND STUDIES 2001 Volume 1



Photo courtesy of Lynn Chamberlain

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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 1**

Written and Edited by

James Davis
Mark Farmer
Ashley Green

Range Trend Program Coordinator
Asst. Range Trend Program Leader
Asst. Range Trend Program Leader

Tables and Maps prepared by

Daniel Summers
Emily Keller

Range Technician
Range Technician

Field Work

Jennifer Coleman
James Davis
Trent Draper
Daniel Eddington
Mark Farmer

Ashley Green
Melissa Hawkins
Emily Keller
Daniel Summers
Chris Tuttle

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

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

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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, 1994, 1995, and 1996, 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
 Pony Express Resource Area

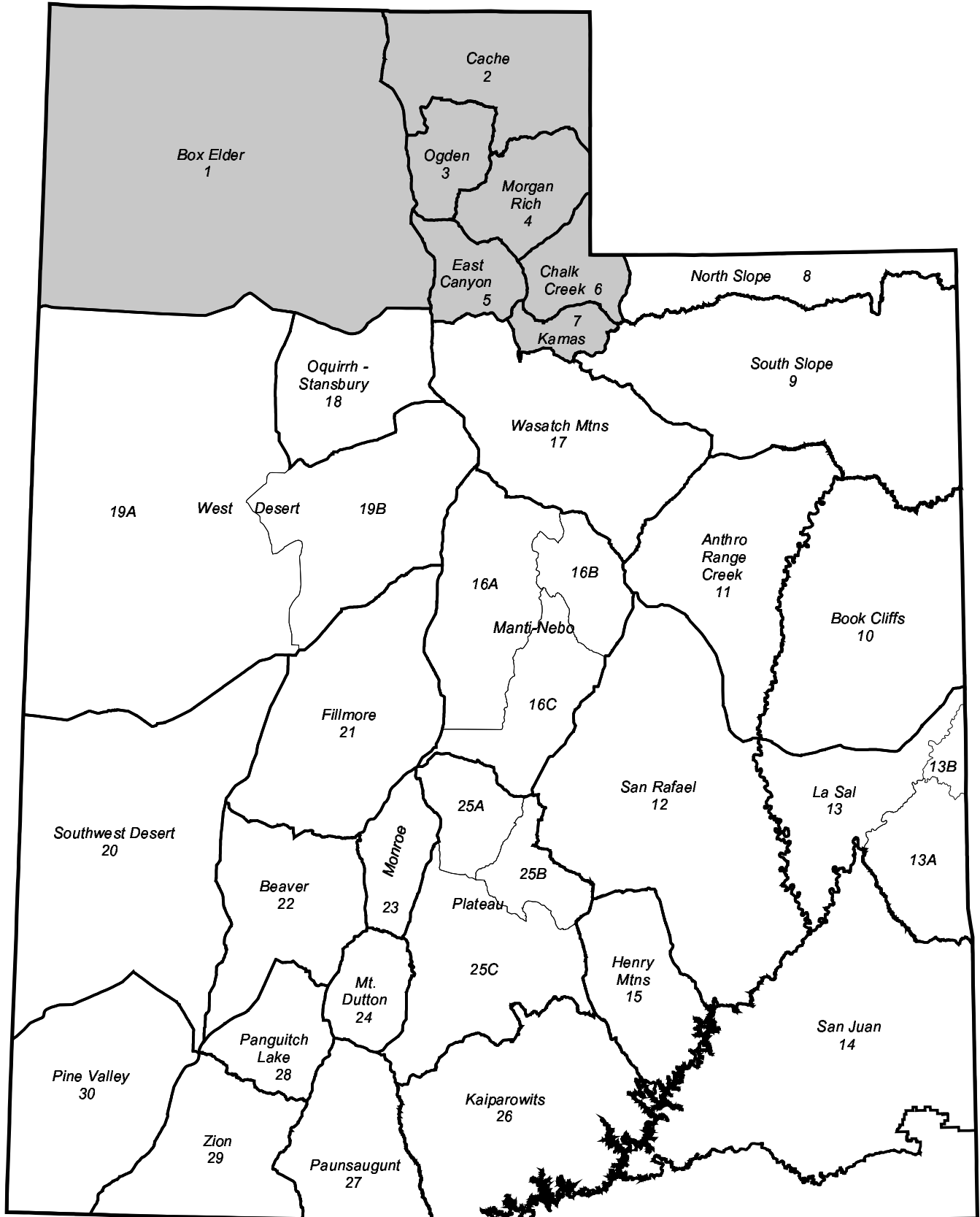
Sawtooth National Forest
 Burley Ranger District

Wasatch-Cache National Forest
 Logan Ranger District
 Ogden Ranger District

Utah Division of Parks and Recreation
 Antelope Island State Park

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.

Utah Management Units Surveyed in 2001



RANGE TREND STUDY METHODS

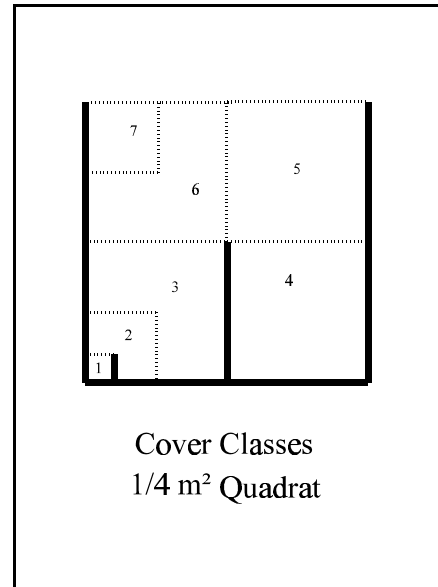
Studies monitoring range trend depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetative or habitat types within a unit, it is necessary to concentrate on specific sites and/or “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

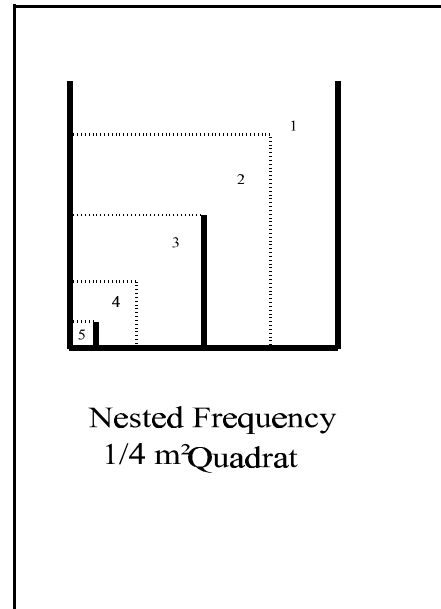
Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 ft baseline transects in the area of interest. This 500 ft line is the baseline and one, 100 ft belt is placed perpendicular to each 100 ft section of the baseline at random foot marks and centered 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:

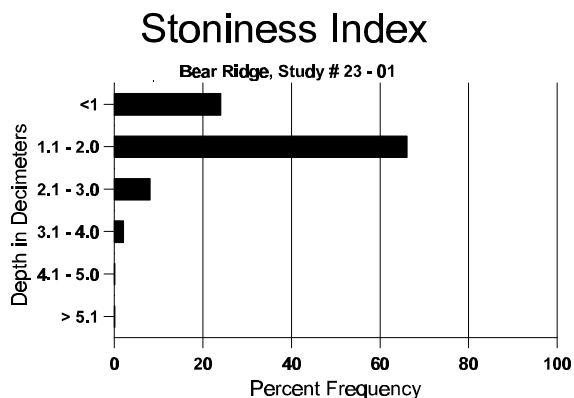
Ultra acid	<3.5
Extremely acid	3.5-4.4
Very strongly acid	4.5-5.0
Strongly acid	5.1-5.5
Moderately acid	5.6-6.0
Slightly acid	6.1-6.5
Neutral	6.6-7.3
Slightly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strongly alkaline	>9.1

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.

REFERENCES

- Bailey, A. W. & C. E. Poulton. 1968. Plant communities and environmental interrelationships in a portion of the Tillomook burn, Northwest Oregon. *Ecology*. Vol 49, No. 1. pp. 1-13.
- Conover, W. J. 1980. *Practical Nonparametric Statistics* (second edition). John Wiley & Sons, New York. 493pp.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. Reveal and P. Holmgren. 1977. *Intermountain Flora* (volume six). Columbia University Press, New York. 584pp.
- Daubenmire, R. 1959. A canopy coverage method of vegetational analysis. *Northwest Science* 33:43-66.
- Giunta, B. C. 1983. Utah interagency big game range trend plant species list. Utah Dept. Of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah. 283 pp.
- Mosley, J. C., S. C. Bunting, and M. Hironaka. 1986. Determining range condition from frequency data in mountain meadows of central Idaho. *J. Range Manage.* 39:561-565.
- Smith, S. D., S. C. Bunting, and M. Hironaka. 1987. Evaluation of the improvement in sensitivity of nested frequency plots to vegetational change by summation. *Great Basin Naturalist*. 47(2): 299-307.
- Smith, S. D., S. C. Bunting, and M. Hironaka. 1986. Sensitivity of frequency plots for detecting vegetation change. *Northwest Science*. 60:279-286.
- ¹U.S. Department of Interior Bureau of Land Management. 1996. Utilization Studies and Residual Measurements, Interagency Technical Reference, BLM/RS/ST-96/004+1730.
- ²U.S. Department of Interior Bureau of Land Management. 1996. Sampling vegetation attributes, Interagency Technical Reference, BLM/RS/ST-96/002+1730.
- Welsh, S. L., N.D. Atwood, S. Goodrich and L. C. Higgins. 1987. A Utah Flora. *Great Basin Naturalist* Memoirs No. 9. Brigham Young University. 894 pp.

REPORT FORMAT

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

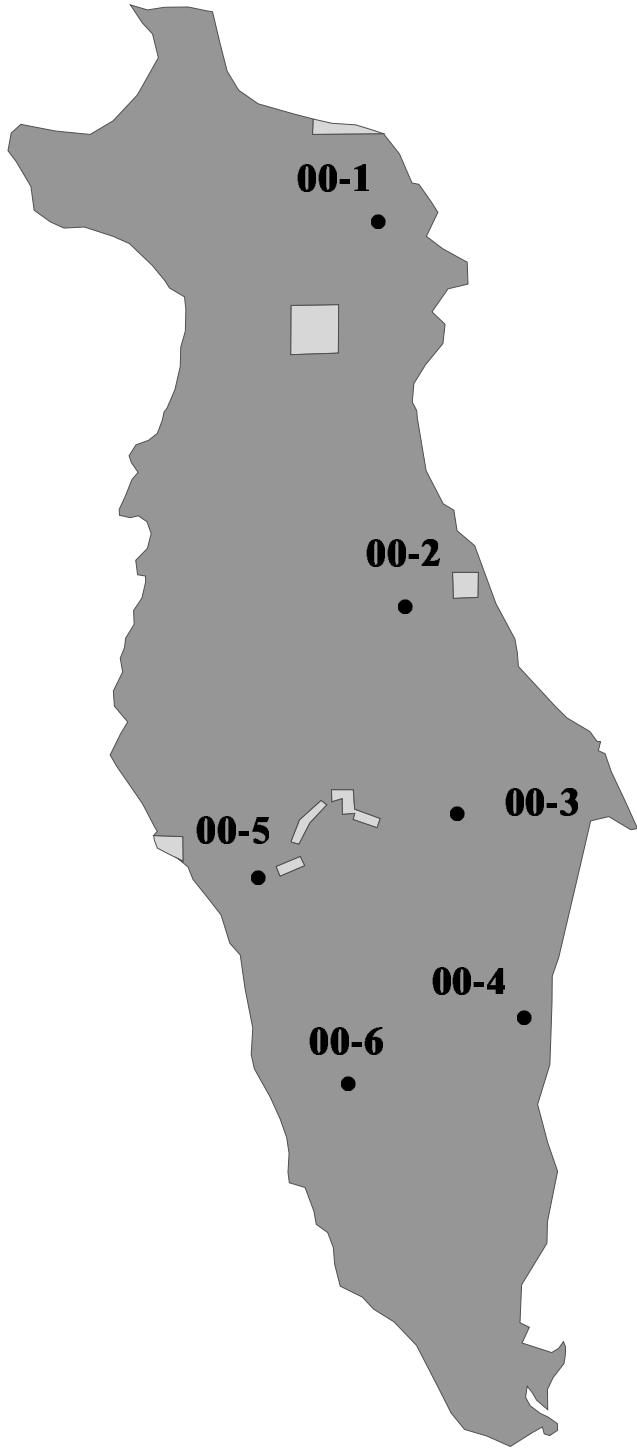
The name of the site and directions for locating the site are given on the location page. Also included on this page are the vegetation type, arrangement and diagrammatic sketch of the baseline, and the location on a topographical map. The 7.5 minute topographical map name and public land survey description 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.

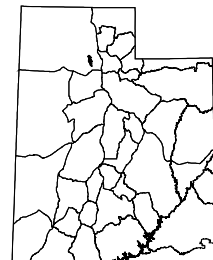
Management Unit 0 (Antelope Island)



- Transect Location
- BLM
- State of Utah



Unit Location



MANAGEMENT UNIT 00 - ANTELOPE ISLAND

Antelope Island is currently managed by the Utah Division of State Parks and Recreation. It is the largest island in the Great Salt Lake and can be reached via a 7.5 mile-long causeway. The island encompasses 28,463 acres with elevations ranging from 4,200 feet to 6,597 feet. Campsites are located on the northwest side of the island with trails scattered throughout the area.

HISTORY

In 1845, John C. Fremont and Kit Carson made the first European exploration of Antelope Island. They shot two antelope and Fremont wrote "in grateful supply of the meat they furnished, I gave their name to the island." By the 1930's, the island's namesake had disappeared from Antelope Island. In 1993, a cooperative effort between the Utah Division of Wildlife Resources and the Utah Division of State Parks and Recreation resulted in the re-introduction of 24 pronghorn antelope. By the 1995 fawning season, the population had nearly doubled in size. It is hoped that predation from coyotes, bobcats and eagles will act as population control for the pronghorn on the island.

Fielding Garr was quick to recognize Antelope Island's potential as livestock range. He began construction of a ranch house in 1848. He not only tended his own herds, but those of other stockmen as well. In 1849, Brigham Young asked Garr to manage the LDS Church's Tithing Herd, which was kept on the island until 1871. During this time, the LDS Church also invested thousands of dollars in valuable stallions and brood mares which were turned loose on the island. Antelope Island was also used as a base camp for a government funded survey of the Great Salt Lake by Captain Howard Stansbury during the years of 1849-50.

On February 15, 1893, twelve head of bison were transported to Antelope Island. John Dooly and George Frary loaded the bison into a small sailboat that nearly capsized as they sailed to the island. The Island Improvement Company owned most of the island from 1884 thru 1972. Cattle and sheep were the company's primary ranching commodity, although buffalo and horses were always on the island. In the 1930's, Antelope Island was the largest private sheep sheering operation west of the Mississippi. Recognizing the recreation potential of the island, the northern 2,000 acres were acquired by the state in 1969. In 1981, the state purchased most of the remainder of the island thus preserving it as a state park for all people to enjoy.

The Great Salt Lake is the largest natural lake west of the Mississippi River. The Great Salt Lake is 75 miles long and about 35 miles wide. Located in several wide flat basins, a slight rise in water level expands the surface area of the lake considerably. The first scientific measurements were taken in 1849. Since then, the lake level has varied by 20 feet, shifting the shoreline in some places as much as 15 miles. The Great Salt Lake is salty because it does not have an outlet. Tributaries are constantly bringing in small amounts of salt dissolved in their fresh water flow. Once in the Great Salt Lake, much of the water evaporates leaving the salt behind.

The Great Salt Lake is the remnant of Lake Bonneville; a great ice age lake that rose dramatically from a small saline lake 30,000 years ago. The most conspicuous reminders of Lake Bonneville are the ancient terraces etched into the landscape along the lakes former shorelines. The terraces were eroded by wave action and are relatively flat areas which follow a contour line. After the ice age, the earth's climate became drier and Lake Bonneville gradually receded to form the Great Salt Lake.

The ever fluctuating Great Salt Lake has frustrated attempts to develop its shoreline. As a result, much of the lake is ringed by extensive wetlands making the Great Salt Lake one of the most important resources for migrating and nesting birds.

WILDLIFE

The island has a bison herd that fluctuates between 550 and 700, making it one of the largest publicly owned bison herds in the nation. The Antelope Island bison herd is also recognized as one of the oldest in the country and possesses unique genetic characteristics making it of interest to breeders. Other mammals found on the island include mule deer, pronghorn antelope, bighorn sheep, coyotes, bobcats, badgers, porcupines, jackrabbits and several species of rodents. Antelope Island and the Great Salt Lake attract numerous migrating and nesting birds.

TREND STUDIES

Trend studies were first established on Antelope Island in 1994. Two studies were set up that year with four additional studies put in the next year. In 1996 and 2001, all studies were reread and the results are reported here.

Trend Study 00-1-01

Study site name: Tin Lambing Shed.

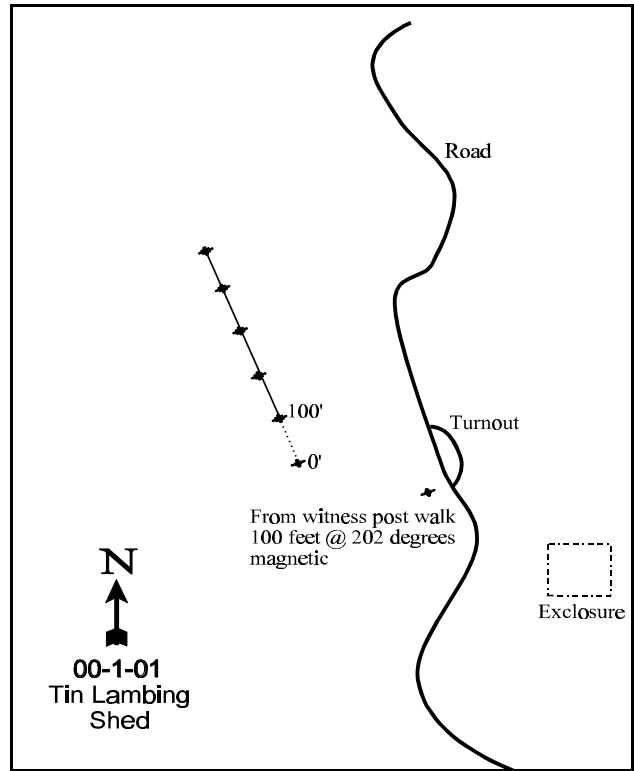
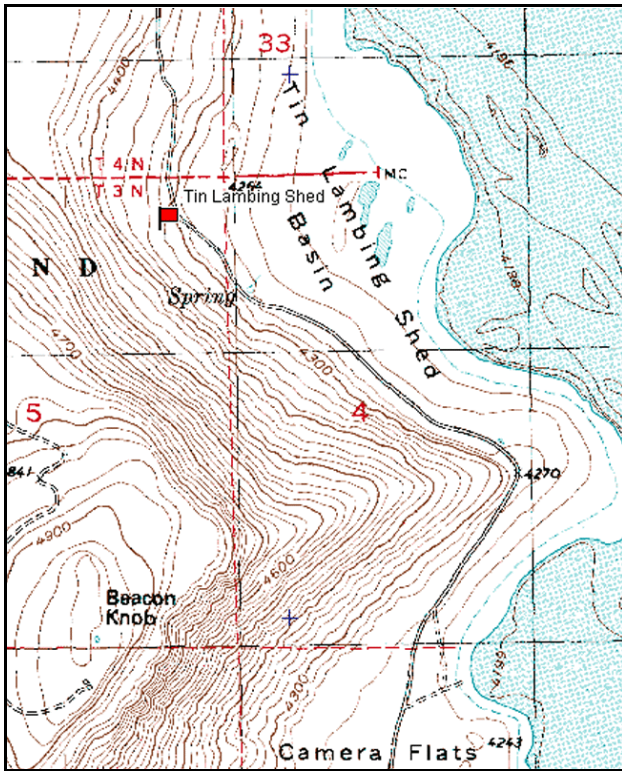
Vegetation type: Annual Grass.

Compass bearing: frequency baseline 307 degrees magnetic.

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

LOCATION DESCRIPTION

From the main gate on Antelope Island, travel south for approximately 2.0 miles to a witness post on the right hand side of the road. From the witness post walk 105 ft. at a bearing of 202 degrees magnetic to the 0-foot baseline stake. The baseline runs in a direction of 307 degrees magnetic.



Map Name: Antelope Island North

Diagrammatic Sketch

Township 3N, Range 3W, Section 5

UTM 4542374 N 398851 E

DISCUSSION

Trend Study No. 00-1

The Tin Lambing Shed study is located in a small basin on the northeast side of Antelope Island. The site is about 1/4 mile from the shoreline and about 200 feet above the main road. Slope is very slight at an elevation of about 4,360 feet. The site burned sometime prior to site establishment in 1994. Fire continues to be a threat to the area due to the dominance of weeds and annual species. A pellet group transect read parallel to the vegetation transect showed 17 bison days use/acre (43 bison days use/ha).

Soils are derived from alluvial deposits from Lake Bonneville. Textural analysis indicates a sandy loam with a slightly acidic pH (6.2). Effective rooting depth (see methods) is nearly 18 inches with a soil temperature of 61°F. Potassium may be a limiting factor in the soil at only 8 ppm as values less than 10 ppm have been shown to limit plant growth and development. Vegetation cover has changed very little since site establishment in 1994. Litter cover increased in 1996, but decreased in 2001 to levels similar to that found in 1994. Bare ground has been low in all years, currently ('01) estimated at 6%. Cheatgrass brome provides the majority of the vegetation and litter cover in all sampling years.

Broom snakeweed and Wyoming big sagebrush are the only shrubs encountered on the site. Broom snakeweed has an estimated density ranging from 240 plants/acre in 2001 to 380 plants/acre in 1994. The population appears to be stable with no young plants being sampled in 2001. Wyoming big sagebrush was not sampled in the shrub strips in any year, but a few do exist on the site. In 1996, a small Wyoming big sagebrush plant was measured on the site with a height of 7 inches and width of 9 inches.

The herbaceous understory is dominated by one species, cheatgrass brome. Cheatgrass occurs in every quadrat in 1996 and 2001, and has increased in nested frequency since site establishment in 1994. Cheatgrass provides at least 60% of the total vegetation cover for all years. Other annual grass species sampled at lower frequencies include rattail fescue and six weeks fescue. Both warm and cool season perennial grasses occur on the site. Warm season species, purple three-awn and sand dropseed, remained at stable frequencies in 2001. Cool season grasses include salt grass, mutton bluegrass, Sandberg bluegrass, bulbous bluegrass and needle-and-thread. Mutton bluegrass and Sandberg bluegrass both declined significantly in nested frequency between 1994 and 1996, and remain at low frequencies in 2001. As a group, sum of nested frequency for perennial grasses declined by 40% in 1996, but increased by 19% in 2001.

Forbs are dominated by weedy species. Storksbill, wooly plantain and yellow salsify are the most abundant species by frequency. Prickly lettuce was abundant and significantly increased between 1994 and 1996, but was rarely sampled in 2001. Perennial forb sum of nested frequency decreased by 73% in 2001 due to the extremely dry conditions in the winter and spring of 2000-2001.

1996 TREND ASSESSMENT

Soil trend is slightly upward with abundant vegetative and litter cover that prohibit erosion. Bare ground cover has declined since 1994, likely due to the increase in litter cover. Browse trend is stable with very few broom snakeweed plants encountered. Annual weeds will provide competition for browse species and prohibit the population from expanding. The herbaceous understory is dominated by annual and weedy species. Cheatgrass dominates the site, although there are some perennial species still in the community. Even if fire is suppressed on the site, it will be extremely difficult to change the composition of the community. Herbaceous trend is stable at this time but with very poor composition.

TREND ASSESSMENT

soil - slightly upward (4)

browse - stable (3)

herbaceous understory - stable but with very poor composition (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover are abundant and well disbursed minimizing erosion. Browse is not important to the vegetative component on this site due to the loss of all species to fire. Snakeweed is present, but is not very abundant and does not appear to be increasing. Trend for the herbaceous understory is stable and remains in very poor condition. Cheatgrass still dominates the site, although other annual and/or weedy species are present. Sum of nested frequency for perennial grasses increased due mostly to the increase in salt grass and bulbous bluegrass. Sum of nested frequency for perennial forbs dramatically decreased due to the loss of prickly lettuce and tansyaster. However, forbs were already infrequent. This site has little chance of becoming productive in the future without the input of considerable resources.

TREND ASSESSMENT

soil - stable (3)

browse - n/a

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 00 , Study no: 1

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'94	'96	'01	'94	'96	'01	'94	'96	'01
G	Aristida purpurea	110	75	76	41	30	35	4.31	2.28	4.93
G	Bromus tectorum (a)	_a 448	_b 479	_b 482	98	100	100	29.99	44.62	43.94
G	Distichlis spicata	_a 92	_b 138	_c 175	27	48	54	3.07	1.15	2.88
G	Festuca myuros (a)	_a -	_b 228	_b 184	-	62	53	-	4.78	3.04
G	Poa bulbosa	_b 56	_a 6	_b 81	18	3	27	.78	.04	3.82
G	Poa fendleriana	_a 37	_b 4	_{ab} 18	15	2	8	.44	.01	.09
G	Poa secunda	_b 221	_a 51	_a 46	57	22	19	4.47	.33	.51
G	Sporobolus cryptandrus	56	59	38	28	25	17	.97	.91	.72
G	Stipa comata	_b 58	_{ab} 45	_a 35	23	16	16	1.93	1.39	1.28
G	Vulpia octoflora (a)	_c 136	_a 17	_b 49	37	6	14	1.06	.05	.19
Total for Annual Grasses		584	724	715	135	168	167	31.06	49.46	47.18
Total for Perennial Grasses		630	378	469	209	146	176	15.99	6.13	14.26
Total for Grasses		1214	1102	1184	344	314	343	47.05	55.59	61.44

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'94	'96	'01	'94	'96	'01	'94	'96	'01
F	Agoseris heterophylla	5	1	-	2	1	-	.03	.00	-
F	Calochortus nuttallii	-	1	7	-	1	3	-	.00	.02
F	Epilobium brachycarpum (a)	2	-	11	1	-	3	.00	-	.01
F	Erodium cicutarium (a)	_a 137	_b 284	_b 316	35	81	86	1.25	4.18	9.41
F	Helianthus annuus (a)	_b 26	_a -	_a -	10	-	-	.60	-	-
F	Holosteum umbellatum (a)	_b 14	_a -	_a 5	8	-	2	.04	-	.03
F	Lactuca serriola	_a 11	_b 145	_a 7	4	45	3	.04	2.07	.01
F	Machaeranthera canescens	_a -	_b 89	_a -	-	29	-	-	3.75	-
F	Medicago sativa	-	-	-	-	-	-	-	.00	-
F	Plantago patagonica (a)	_b 86	_a 52	_a 45	25	18	17	.46	.16	.21
F	Sisymbrium altissimum (a)	3	6	-	2	2	-	.01	.01	-
F	Sphaeralcea coccinea	_a -	_a -	_b 12	-	-	7	-	-	.74
F	Tragopogon dubius	_a -	_c 93	_b 63	-	38	28	-	1.67	1.41
F	Verbascum blattaria	-	13	2	-	5	2	-	.94	.06
Total for Annual Forbs		268	342	377	81	101	108	2.38	4.36	9.67
Total for Perennial Forbs		16	342	91	6	119	43	0.07	8.46	2.25
Total for Forbs		284	684	468	87	220	151	2.46	12.82	11.92

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

BROWSE TRENDS --

Herd unit 00 , Study no: 1

T y p e	Species	Strip Frequency			Average Cover %		
		'94	'96	'01	'94	'96	'01
B	Gutierrezia sarothrae	3	3	2	.01	.18	.03
Total for Browse		3	3	2	0.00	0.17	0.03

BASIC COVER --
Herd unit 00 , Study no: 1

Cover Type	Nested Frequency			Average Cover %		
	'94	'96	'01	'94	'96	'01
Vegetation	497	496	483	67.72	63.46	67.59
Rock	58	13	-	.16	.04	0
Pavement	92	114	70	.58	.74	1.13
Litter	495	500	488	54.37	73.58	50.65
Cryptogams	69	103	23	2.53	2.34	1.04
Bare Ground	125	154	215	5.24	1.79	6.78

SOIL ANALYSIS DATA --
Herd Unit 00, Study no: 01, Tin Lambing Shed

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
17.6	61.0 (18.6)	6.2	76.92	9.08	14.0	1.2	8.1	124.8	.3

PELLET GROUP FREQUENCY --
Herd unit 00 , Study no: 1

Type	Quadrat Frequency		
	'94	'96	'01
Rabbit	2	8	-
Elk	-	1	-
Deer	1	3	-
Bison	1	6	4

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
-	-
-	-
208	17 (43)

BROWSE CHARACTERISTICS --

Herd unit 00 , 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				
<i>Artemisia tridentata wyomingensis</i>																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	9	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'94		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	0	Dec:	-			
												'96	0		-			
												'01	0		-			
<i>Gutierrezia sarothrae</i>																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	94	11	-	-	-	-	-	-	-	-	11	-	-	-	220	7	8	11
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260	9	9	13
	01	11	-	-	-	-	-	-	-	-	11	-	-	-	220	14	19	11
D	94	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	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>							
'94		00%			00%			11%			-26%							
'96		00%			00%			00%			-14%							
'01		00%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	380	Dec:	11%			
												'96	280		0%			
												'01	240		8%			

Trend Study 00-2-01

Study site name: Frary Homestead.

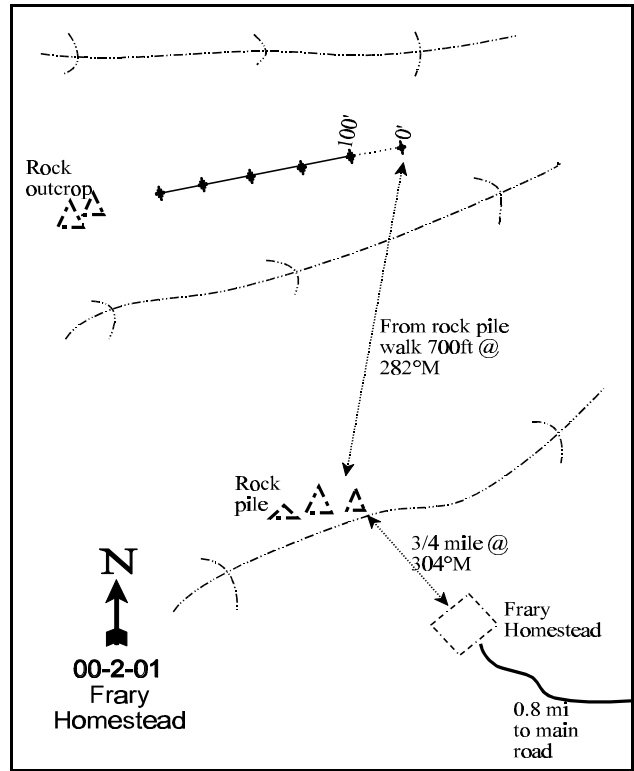
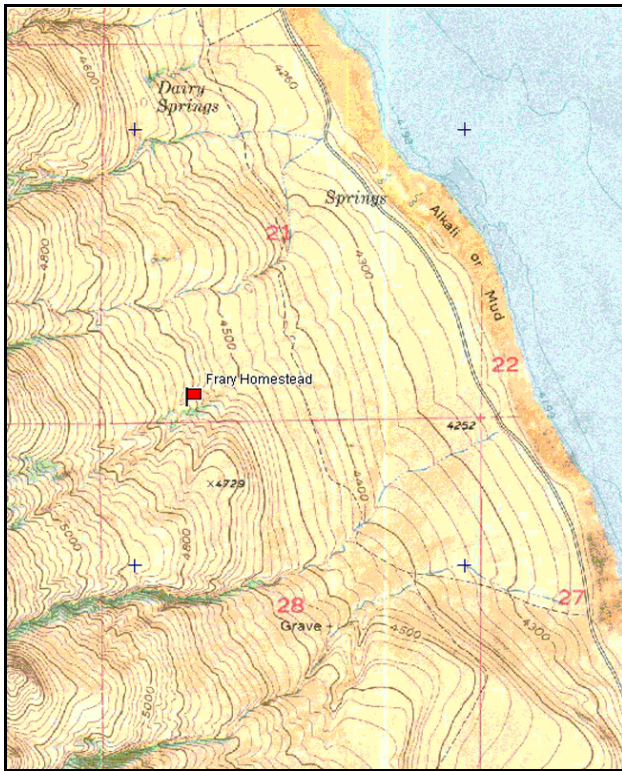
Vegetation type: Annual Grass.

Compass bearing: frequency baseline 208 degrees magnetic.

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

LOCATION DESCRIPTION

From the main gate on Antelope Island, travel south for approximately 6.9 miles. Turn west and travel 0.8 miles to the Frary homestead and gravesite. From the Frary gravesite, walk 3/4 mile at a bearing of 304 degrees magnetic to the left most rock on the end of the ridge. From the left most rock walk 15 paces at a bearing of 295 degrees magnetic to a rock pile. From the rock pile walk 700 feet at a bearing of 282 degrees magnetic to the 0-foot baseline stake. The baseline runs 208 degrees magnetic towards some rock outcrops.



Map Name: Antelope Island

Diagrammatic Sketch

Township 3N, Range 3W, Section 21

UTM 4536210 N 399242 E

DISCUSSION

Trend Study No. 00-2

The Frery Homestead study is located on the east side of Antelope Island north of the Frery Homestead grave site. The site is on an alluvial fan with drainages on both sides (north and south). Slope is approximately 8% with a northeast aspect. Elevation is about 4,800 feet and water is flowing in a creek about ½ mile to the south. The ridge, where the site was placed, has burned several times in the past, resulting in the presence of very little browse. Some surrounding ridges and drainages are still covered with sagebrush. Bison use of the area has been moderate. Numerous bedding sites and buffalo pats were noted in 1996. A pellet group transect read along the baseline in 2001 showed 28 bison days use/acre (68 bison days use/ha). Bighorn sheep pellet groups were also found on the transect in low numbers.

Soil textural analysis indicates a sandy loam with a slightly acidic pH (6.1). Soils are moderately deep with an estimated effective rooting depth of nearly 27 inches. They are well drained with very little gravel in the profile. Moisture was apparent in the profile while digging. Vegetation and litter cover are abundant and cover nearly all of the ground surface with very low amounts of bare soil.

Browse does not play an important role at this study due to recurring fire. Broom snakeweed and Wyoming big sagebrush are encountered on the site, but at low to very low densities. The estimated density for broom snakeweed was 260 plants/acre in 1996 and 2001. The majority of plants are mature and the population appears to be stable. Wyoming big sagebrush density had an estimated density of 20 plants/acre in 1996 and 2001. No young or seedling sagebrush plants have been sampled in any of three sampling periods. This will likely continue due to high competition with annual weeds in the understory. No utilization is apparent on either species.

Grass composition is dominated by cheatgrass, which is thick and uniformly distributed over the site. Cheatgrass was sampled in all quadrats in both 1996 and 2001 with a correspondingly very high nested frequency value in all sampling years. Other annual grass species include Japanese brome and rattail fescue, both of which significantly increased in nested frequency in 1996. In 2001, rattail fescue significantly decreased in nested frequency, and Japanese brome increased in nested frequency, but not significantly. Six perennial grass species have been sampled on the site. Purple three-awn is the most abundant perennial grass followed by Sandberg bluegrass and bulbous bluegrass. These three perennial species all significantly increased in nested frequency in 2001. Sum of nested frequency of all perennial grasses combined increased by 20% in 2001.

The forb composition is dominated by weedy annual species. Storksbill is the dominate forb providing over 95% of the total forb cover in 1996 and 2001. Yellow salsify and annual agoseris were both fairly common in 1996, but significantly decreased in nested frequency in 2001 with the drier conditions. Sum of nested frequency for all perennial forbs decreased by 53% in 2001 as a result of extremely dry conditions in Northern Utah during the winter and spring of 2000-2001.

1996 TREND ASSESSMENT

Soil trend is stable. Although vegetative cover has declined slightly since 1995, there is still adequate cover to prohibit erosion. Bare ground cover has slightly declined while litter cover is nearly the same. The browse trend is stable with very few broom snakeweed plants encountered. Herbaceous weedy species, primarily annuals, will provide competition to browse species and prohibit the population from expanding. The herbaceous understory is dominated by annual and weedy species. Cheatgrass dominates the site, although there are some perennial species still in the community. Even if fire is suppressed on the site, it will be

extremely difficult to change the community composition. Herbaceous trend is stable at this time but with a very poor composition.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable but with very poor composition (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Although the vegetative composition is dominated by annuals, vegetation and litter cover are abundant. Together they cover nearly the entire ground surface. Browse is unimportant on this study due to the recurrence of fire at short intervals. Snakeweed and sagebrush both remain at low, but identical densities compared to 1996 estimates. There is still no sagebrush recruitment at the present time. This will likely continue in the future with the dominance of annuals, especially cheatgrass. Trend for the herbaceous understory is stable, but remains in extremely poor condition. Perennial grasses increased in sum of nested frequency as a group, however, perennial forbs decreased as a group. Desirable perennial species are in low abundance. Cheatgrass remains dominant.

TREND ASSESSMENT

soil - stable (3)

browse - n/a

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 00 , Study no: 2

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01	'95	'96	'01
G	Aristida purpurea	_a 185	_b 220	_c 279	71	81	86	5.05	9.79	19.31
G	Bromus japonicus (a)	_a 17	_b 47	_b 71	7	16	26	.03	.46	.89
G	Bromus tectorum (a)	_b 482	_b 480	_a 463	98	100	100	43.42	34.31	28.07
G	Elymus cinereus	-	-	3	-	-	1	-	-	.15
G	Festuca myuros (a)	_a 29	_c 126	_b 68	9	45	27	.26	1.58	.41
G	Poa bulbosa	_a 6	_a 8	_b 115	3	4	43	.01	.02	2.95
G	Poa fendleriana	_b 37	_c 84	_a 3	17	38	1	.28	.42	.00
G	Poa secunda	_c 181	_a 54	_b 120	64	27	45	1.16	.13	.88
G	Sporobolus cryptandrus	_a 24	_b 81	_a 39	11	37	15	.08	.87	.78
Total for Annual Grasses		528	653	602	114	161	153	43.72	36.36	29.38
Total for Perennial Grasses		433	447	559	166	187	191	6.59	11.24	24.09
Total for Grasses		961	1100	1161	280	348	344	50.31	47.60	53.47
F	Agoseris heterophylla	_c 137	_b 74	_a -	53	31	-	.63	.18	-
F	Aster spp.	-	10	-	-	3	-	-	.01	-
F	Cirsium undulatum	-	-	-	-	-	-	.00	.15	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01	'95	'96	'01
F	Delphinium nuttallianum	1	-	-	1	-	-	.00	-	-
F	Descurainia pinnata (a)	_c 190	_a -	_a 8	60	-	2	.42	-	.01
F	Draba nemorosa (a)	_c 261	_a -	_b 56	71	-	21	1.25	-	.22
F	Erodium cicutarium (a)	_{ab} 257	_a 246	_b 313	67	81	90	5.39	2.84	8.91
F	Erigeron divergens	_a 2	_b 51	_b 42	1	20	20	.00	.90	.59
F	Heterotheca villosa	-	-	-	-	-	-	-	-	.00
F	Holosteum umbellatum (a)	_b 21	_a -	_b 14	7	-	6	.20	-	.08
F	Lactuca serriola	_c 106	_b 70	_a 9	47	29	3	.41	.32	.01
F	Lychnis drummondii	-	-	27	-	-	15	-	-	.07
F	Machaeranthera spp	9	-	-	3	-	-	.01	-	-
F	Polygonum douglasii (a)	-	3	-	-	1	-	-	.00	-
F	Ranunculus testiculatus (a)	_b 184	_a 2	_a -	53	1	-	1.48	.00	-
F	Sisymbrium altissimum (a)	12	2	7	5	1	4	.02	.00	.19
F	Taraxacum officinale	6	9	11	3	4	6	.05	.07	.13
F	Tragopogon dubius	_a 12	_b 96	_c 37	5	46	16	.02	.51	.37
F	Verbascum blattaria	_a -	_c 61	_b 48	-	27	28	.01	.93	2.96
Total for Annual Forbs		925	253	398	263	84	123	8.78	2.86	9.42
Total for Perennial Forbs		273	371	174	113	160	88	1.16	3.09	4.15
Total for Forbs		1198	624	572	376	244	211	9.94	5.95	13.57

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

BROWSE TRENDS --

Herd unit 00 , Study no: 2

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01
B	Artemisia tridentata wyomingensis	0	1	1	-	.03	.63
B	Gutierrezia sarothrae	6	7	10	.01	.19	.45
Total for Browse		6	8	11	0.00	0.22	1.07

BASIC COVER --
Herd unit 00 , Study no: 2

Cover Type	Nested Frequency			Average Cover %		
	'95	'96	'01	'95	'96	'01
Vegetation	497	495	489	70.77	62.96	65.87
Rock	71	6	6	.36	.03	.01
Pavement	-	115	46	0	1.22	.11
Litter	499	500	478	76.29	76.46	60.50
Cryptogams	11	19	3	.02	1.03	.00
Bare Ground	41	63	39	1.21	.78	.44

SOIL ANALYSIS DATA --
Herd Unit 00, Study no: 02, Frary Homestead

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
26.9	58.4 (19.7)	6.1	69.7	15.0	15.3	1.7	21.2	179.2	.3

PELLET GROUP FREQUENCY --
Herd unit 00 , Study no: 2

Type	Quadrat Frequency		
	'95	'96	'01
Bighorn Sheep	-	-	1
Deer	-	-	4
Bison	5	15	9

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
96	N/A
87	7 (17)
331	28 (68)

BROWSE CHARACTERISTICS --

Herd unit 00 , 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>Artemisia tridentata wyomingensis</i>																		
M	'95	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	10	12	1
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	23	43	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'95		00%			00%			00%										
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'95	0	Dec:	-			
												'96	20		-			
												'01	20		-			
<i>Chrysothamnus viscidiflorus</i>																		
M	'95	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	12	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'95		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'95	0	Dec:	-			
												'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				
Gutierrezia sarothrae																		
S	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	95	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	95	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	11	3
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260	11	11	13
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100	8	10	5
D	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	6	-	-	1	-	-	-	-	-	3	-	-	4	140		7	
X	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'95		00%			00%			00%			+15%							
'96		00%			00%			00%			+ 0%							
'01		00%			00%			31%										
Total Plants/Acre (excluding Dead & Seedlings)												'95	220	Dec:	0%			
												'96	260		0%			
												'01	260		54%			

Trend Study 00-3-01

Study site name: Garden Springs Flat South.

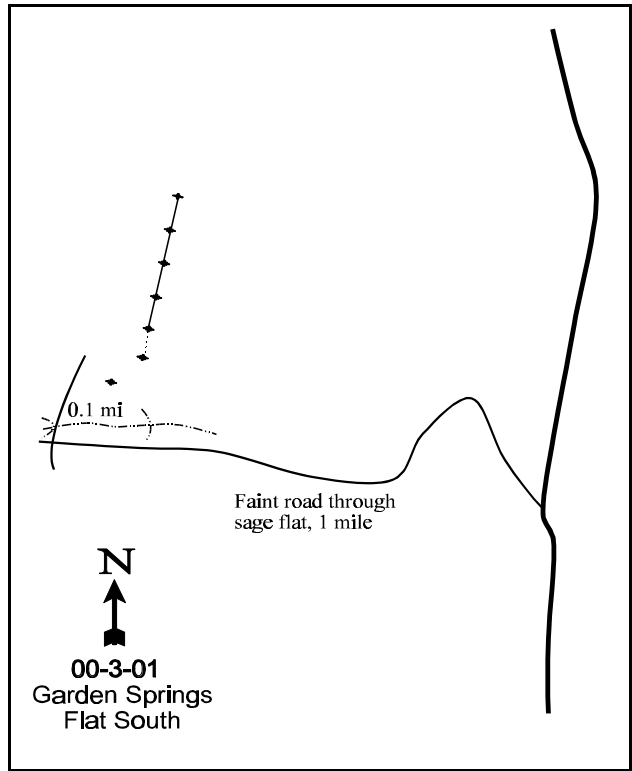
Vegetation type: Annual Grass.

Compass bearing: frequency baseline 14 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (35ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar at 1ft on all belts.

LOCATION DESCRIPTION

From the main gate on Antelope Island, travel south for 9.1 miles to a faint road on the right, walk up the road for 1.0 mile to where a road crosses the gully. Travel 0.1 mile from the gully to the witness post on the east side of the road. The baseline runs 14 degrees magnetic. The 0 foot stake is marked with browse tag number 172.



Map Name: Antelope Island

Diagrammatic Sketch

Township 2N, Range 3W, Section 4

UTM 4532576 N 400161 E

DISCUSSION

Trend Study No. 00-3

The Garden Springs Flat South study is located about 1/4 mile south of Garden Creek on the east side of Antelope Island about 1 mile east of the shoreline. The site slopes gently (5-10%) to the northeast at an elevation of about 4,640 feet. A fire burned through the site between the 1995 and 1996 readings. A pellet group transect read in association with the vegetation transect in 2001 estimated 44 bison days use/acre (109 bison days use/ha). There was also an indication of light use by bighorn sheep.

Soil textural analysis indicates it to be a sandy clay loam with a neutral pH (6.6). The soil is moderately deep and dark with an estimated effective rooting depth of 23 inches. Very little rock was encountered within the soil profile. Average soil temperature was 57°F at 20 inches. Erosion is not a problem with vegetation and litter covering nearly the entire soil surface.

As with most of the other range trend studies on the island, fire has eliminated nearly all the browse in this area. Only broom snakeweed was encountered in any sampling period. This species is in low abundance with an estimated density of less than 100 plants/acre in all years.

Grass composition has been dominated by two annual species in the past, cheatgrass and rattail fescue. Both species combined to provide nearly half of the total vegetation cover in 1995 and 1996. In 2001, rattail fescue dramatically decreased in nested frequency, quadrat frequency and percent cover. Although cheatgrass showed a decrease in nested frequency in 2001, it still remains abundant and was sampled in nearly every quadrat (98%). Perennial grasses are dominated by 2 low value species, purple three-awn and bulbous bluegrass, both of which increased in nested frequency in 2001. Two desired perennial grasses, Sandberg bluegrass and sand dropseed, are present but infrequent.

Forbs are also dominated by weedy annual and perennial species. Storksbill is the dominant forb in both frequency and cover in 2001. Other weedy species, such as prickly lettuce, yellow salsify and moth mullein were abundant in previous readings, but due to low precipitation in 2000-2001, these species have greatly reduced abundances. Sum of nested frequency of all perennial forbs declined by 81% in 2001. Some utilization of yellow salsify was apparent in 1996. Few desirable perennial species are present at this time.

1996 TREND ASSESSMENT

Soil trend is stable with no erosion apparent. Vegetative cover has declined slightly since 1995, while all other cover values have remained relatively the same. The browse trend is stable with few plants encountered and little change in their respective densities. Annual weeds provide rigorous competition with browse species and will likely prohibit the population from expanding. The herbaceous understory is dominated by annual and weedy species. Cheatgrass and rattail fescue dominate the grasses on the site, although there are some perennial species still in the community. Forb composition is shifting but still remains poor. Even if fire is suppressed on the site, it will be extremely difficult to change the composition of the community. Herbaceous trend is stable at this time but composition is very poor.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable but with very poor composition (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover remain high, and erosion is minimal. Browse is nearly non-existent on this study due to short fire intervals. Therefore, a trend is not applicable at the present time. Broom snakeweed is the only shrub species sampled on the site and has an estimated density of less than 100 plants/acre in all years. Desirable shrubs, primarily sagebrush, have very little chance to establish and persist on this site due to the extreme fire hazard and high competition with annual species. Trend for the herbaceous understory is slightly up, but remains in poor condition. Perennial grasses increased in sum of nested frequency, although much of this increase is due to purple three-awn and bulbous bluegrass, both lower value species. Sum of nested frequency of annual grasses decreased which is also a positive step. Perennial forbs decreased in sum of nested frequency. However, forbs are much less abundant than grasses and most of the perennial forbs are weeds.

TREND ASSESSMENT

soil - stable (3)

browse - n/a

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 00 , Study no: 3

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01	'95	'96	'01
G	<i>Aristida purpurea</i>	_a 203	_b 266	_c 303	73	90	92	6.98	9.07	26.89
G	<i>Bromus japonicus</i> (a)	-	-	4	-	-	1	-	-	.00
G	<i>Bromus tectorum</i> (a)	_{ab} 436	_b 463	_a 416	96	99	98	18.07	20.18	19.46
G	<i>Festuca myuros</i> (a)	_b 270	_c 379	_a 153	67	88	45	14.43	18.01	1.11
G	<i>Poa bulbosa</i>	_a 157	_a 120	_b 271	49	36	77	2.10	3.58	12.21
G	<i>Poa secunda</i>	_b 65	_a 43	_c 103	24	21	35	.14	.28	1.01
G	<i>Sporobolus cryptandrus</i>	_a 49	_b 139	_a 37	19	54	15	.11	.69	.10
G	<i>Vulpia octoflora</i> (a)	8	-	2	2	-	1	.01	-	.00
Total for Annual Grasses		714	842	575	165	187	145	32.52	38.19	20.58
Total for Perennial Grasses		474	568	714	165	201	219	9.35	13.62	40.24
Total for Grasses		1188	1410	1289	330	388	364	41.88	51.82	60.83
F	<i>Agoseris heterophylla</i>	_b 123	_b 126	_a 9	46	45	3	.43	.35	.01
F	<i>Ambrosia psilostachya</i>	-	-	6	-	-	2	-	-	.06
F	<i>Astragalus cibarius</i>	-	3	-	-	1	-	-	.01	-
F	<i>Aster</i> spp.	_b 8	_c 17	_a -	2	5	-	.03	.07	-
F	<i>Calochortus nuttallii</i>	_b 34	_a 4	_b 37	17	1	23	.08	.00	.11
F	<i>Cirsium undulatum</i>	1	4	8	1	3	5	.01	.33	.39
F	<i>Descurainia pinnata</i> (a)	_b 24	_a -	_a -	9	-	-	.04	-	-
F	<i>Draba nemorosa</i> (a)	_b 115	_a 3	_a -	37	1	-	.26	.00	-
F	<i>Erodium cicutarium</i> (a)	_c 459	_a 311	_b 388	99	92	94	26.47	3.29	13.95

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01	'95	'96	'01
F	Erigeron divergens	a-	b25	a3	-	13	1	-	.11	.15
F	Grindelia squarrosa	a-	b18	a-	-	9	-	-	.15	-
F	Heterotheca villosa	a-	b8	ab3	-	5	1	-	.05	.03
F	Holosteum umbellatum (a)	b31	a-	c2	10	-	2	.07	-	.03
F	Lappula occidentalis (a)	b13	a-	a-	5	-	-	.02	-	-
F	Lactuca serriola	b54	c116	a-	24	44	-	.17	1.37	-
F	Lychnis drummondii	-	-	3	-	-	1	-	-	.03
F	Machaeranthera spp	b15	b18	a-	7	11	-	.03	.08	-
F	Tragopogon dubius	b60	c263	a12	21	83	5	.11	3.10	.07
F	Verbascum blattaria	a5	b134	a23	4	49	15	.02	2.40	1.25
F	Zigadenus paniculatus	50	46	48	23	25	24	.62	.62	2.33
Total for Annual Forbs		642	314	390	160	93	96	26.88	3.29	13.98
Total for Perennial Forbs		350	782	152	145	294	80	1.53	8.67	4.45
Total for Forbs		992	1096	542	305	387	176	28.41	11.97	18.44

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

BROWSE TRENDS --

Herd unit 00 , Study no: 3

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01
B	Gutierrezia sarothrae	2	1	2	-	.00	.06
Total for Browse		2	1	2	0	0.00	0.06

BASIC COVER --

Herd unit 00 , Study no: 3

Cover Type	Nested Frequency			Average Cover %		
	'95	'96	'01	'95	'96	'01
Vegetation	498	497	496	69.59	64.01	72.55
Rock	34	11	-	.09	.02	0
Pavement	-	89	60	0	.50	.12
Litter	499	500	467	69.98	69.05	42.34
Cryptogams	1	45	-	.00	.18	0
Bare Ground	68	126	108	.98	1.14	2.08

SOIL ANALYSIS DATA --

Herd Unit 00, Study no: 03, Garden Spring Flat South

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
23.0	57.2 (19.7)	6.6	54.7	24.0	21.3	1.8	13.4	185.6	.4

PELLET GROUP FREQUENCY --

Herd unit 00 , Study no: 3

Type	Quadrat Frequency			Pellet Transect	
	'95	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Bighorn Sheep	-	-	-	9	N/A
Deer	-	5	-	-	-
Bison	5	12	7	531	44 (109)

BROWSE CHARACTERISTICS --

Herd unit 00 , Study no: 3

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>Gutierrezia sarothrae</i>																		
S	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	95	3	-	-	-	-	-	-	-	-	3	-	-	-	60	6	9	3
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	11	14	4
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	9	10	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>						<u>%Change</u>				
'95		00%			00%			00%						+50%				
'96		00%			00%			00%						-50%				
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'95	60	Dec:	-			
												'96	80		-			
												'01	40		-			

Trend Study 00-4-01

Study site name: Alfalfa Seeding.

Vegetation type: Alfalfa Seeding.

Compass bearing: frequency baseline 295 degrees magnetic.

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

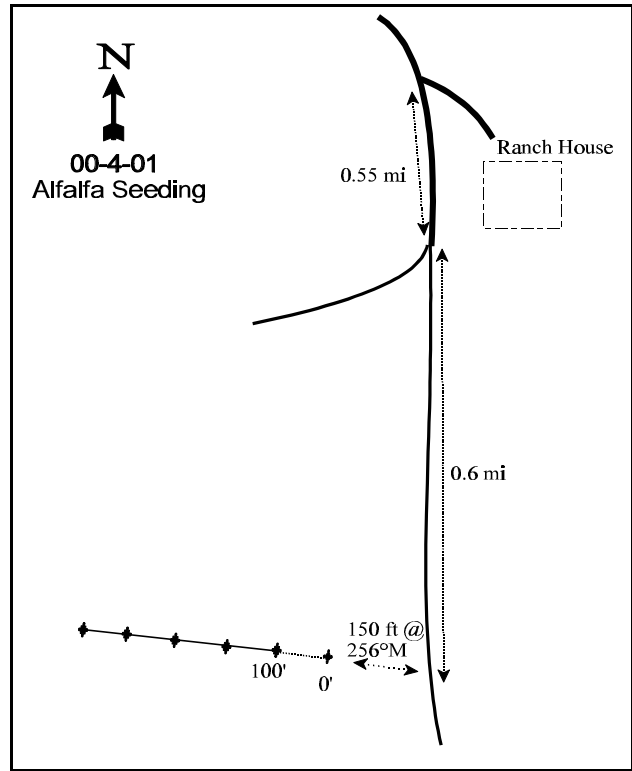
LOCATION DESCRIPTION

From the ranch house, travel south for 1.15 miles to a witness post on the right hand (west) side of the road. From the witness post walk 150 feet at 256 degrees magnetic to the 0-foot baseline stake. The baseline runs 295 degrees magnetic. The 0 foot stake is marked with browse tag number 171.



Map Name: Antelope Island

Township 2N, Range 3W, Section 15



Diagrammatic Sketch

UTM 4529216 N 401284 E

DISCUSSION

Trend Study No. 00-4

The Alfalfa Seeding study is located south of the old ranch house and northeast of Blackburn Spring. The site was placed in a burn that was seeded primarily with alfalfa, intermediate wheatgrass and crested wheatgrass. The study lies on a slight northeast aspect at an elevation of about 4,300 feet. Bison use is heavy at this study. In 2001, a pellet group transect read in association with the vegetation transect showed 121 bison days use/acre (299 bison days use/ha). Deer use of the area is very low at an estimated 2 deer days use/acre (5 ddu/ha).

The soil is shallow with a layer of gravel about 4 inches below the soil surface. Soil textural analysis indicates it to be a sandy loam with a slightly alkaline pH (7.7). Soil temperature averaged 61°F at a depth of 11 inches. Effective rooting depth (see methods) is estimated at less than 11 inches. Potassium may be limiting factor for this site as there was only 7.6 ppm. It has been demonstrated that values less than 10 ppm can limit plant growth and development. Cover from vegetation and litter are abundant and well disbursed, except for a few patches where bison have used them for wallowing, erosion is minimal.

Only one browse species was encountered on the site, white rubber rabbitbrush. Rabbitbrush density is estimated at only 20 plants/acre. In 2001, some utilization had occurred as evidenced by the decrease in average height and crown from the previous 2 readings.

Cheatgrass is the dominant grass on this site, even with the seeding of intermediate and crested wheatgrass. Cheatgrass provided over 75% of the total grass cover in 1994 and 1996. In 2001, cheatgrass significantly decreased in nested frequency, but was still sampled in nearly every quadrat. Cheatgrass was small statured in 2001 due to the dry winter and spring preceding the date of sampling. Cheatgrass currently ('01) contributes 50% of the grass cover and 16% of the total vegetation cover at the site. Intermediate wheatgrass is the most abundant perennial species followed by bulbous bluegrass and crested wheatgrass. Intermediate wheatgrass and bulbous bluegrass both significantly increased in nested frequency in 2001, while crested wheatgrass remained at a stable level. Moderate to heavy use was noted on intermediate and crested wheatgrass in 2001.

The dominate forb is alfalfa, contributing nearly 28% average cover in 2001. These plants are very robust and healthy and displayed some use in 2001. Storksbill was found in low abundance in 1994 and 1996, but sharply increased in 2001. Storksbill had an estimated cover of nearly 24% in 2001. All other forbs were infrequent and insignificant in 2001.

1996 TREND ASSESSMENT

Soil trend is stable with no noticeable erosion reported in 1996. Vegetation cover has declined slightly, while litter cover has increased slightly. The browse trend is stable with white rubber rabbitbrush being the only species encountered. Although cheatgrass is the dominate grass, other seeded grass species will compete for resources to help keep it in check. Alfalfa is large and vigorous providing cover and forage. Herbaceous trend is stable with very little change from 1994.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil continues to be stable. Vegetation and litter cover are high, and except for some bison wallowing areas, bare ground is low and erosion is minimal. Browse is unimportant on the site with only white rubber rabbitbrush being sampled in a very low density. Trend for the herbaceous understory is slightly up. Perennial grasses increased in sum of nested frequency and cheatgrass significantly decreased in nested frequency. Alfalfa, which maintained a stable nested frequency, remains the dominant forb.

TREND ASSESSMENT

soil - stable (3)

browse - n/a

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 00 , Study no: 4

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'94	'96	'01	'94	'96	'01	'94	'96	'01
G	Agropyron cristatum	98	77	76	35	26	31	2.75	1.09	1.47
G	Agropyron intermedium	_b 116	_b 156	_a 230	37	51	67	6.19	5.06	5.57
G	Bromus tectorum (a)	_b 427	_b 455	_a 393	96	98	98	29.17	23.51	12.03
G	Elymus cinereus	1	-	-	1	-	-	.03	.00	.03
G	Festuca myuros (a)	_a -	_b 21	_c 38	-	7	14	-	.43	1.21
G	Poa bulbosa	_a -	_a 3	_b 81	-	1	29	-	.15	3.42
G	Poa fendleriana	1	-	-	1	-	-	.00	-	-
G	Poa secunda	5	-	4	1	-	2	.15	.00	.30
G	Vulpia octoflora (a)	-	-	10	-	-	3	-	-	.04
Total for Annual Grasses		427	476	441	96	105	115	29.17	23.95	13.29
Total for Perennial Grasses		221	236	391	75	78	129	9.14	6.31	10.80
Total for Grasses		648	712	832	171	183	244	38.31	30.27	24.09

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'94	'96	'01	'94	'96	'01	'94	'96	'01
F	<i>Draba nemorosa</i> (a)	-	-	8	-	-	4	-	-	.02
F	<i>Erodium cicutarium</i> (a)	_a 33	_b 102	_c 379	11	37	96	.22	.58	23.91
F	<i>Holosteum umbellatum</i> (a)	_{ab} 5	_a 2	_b 16	2	1	7	.01	.00	.11
F	<i>Lappula occidentalis</i> (a)	-	-	1	-	-	1	-	-	.00
F	<i>Medicago sativa</i>	211	209	182	69	76	66	21.29	32.47	27.95
F	<i>Polygonum douglasii</i> (a)	-	2	-	-	1	-	-	.00	-
F	<i>Salsola iberica</i> (a)	3	-	-	2	-	-	.03	-	-
F	<i>Sisymbrium altissimum</i> (a)	-	-	8	-	-	3	-	-	.01
F	<i>Tragopogon dubius</i>	-	-	-	-	-	-	-	-	.03
Total for Annual Forbs		41	106	412	15	39	111	0.27	0.59	24.06
Total for Perennial Forbs		211	209	182	69	76	66	21.29	32.47	27.98
Total for Forbs		252	315	594	84	115	177	21.57	33.06	52.05

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

BROWSE TRENDS --

Herd unit 00 , Study no: 4

T y p e	Species	Strip Frequency			Average Cover %		
		'94	'96	'01	'94	'96	'01
B	<i>Chrysothamnus nauseosus</i> <i>hololeucus</i>	1	1	0	.15	.03	.00
Total for Browse		1	1	0	0.15	0.03	0.00

BASIC COVER --

Herd unit 00 , Study no: 4

Cover Type	Nested Frequency			Average Cover %		
	'94	'96	'01	'94	'96	'01
Vegetation	484	486	484	69.76	62.37	68.24
Rock	75	39	51	1.02	.61	1.77
Pavement	62	38	76	.39	.14	.19
Litter	491	498	461	60.32	69.96	46.87
Cryptogams	15	8	7	.23	.04	.18
Bare Ground	76	44	115	1.83	.78	3.91

SOIL ANALYSIS DATA --

Herd Unit 00, Study no: 04, Alfalfa Seeding

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.7	61.4 (11.3)	7.7	72.7	14.0	13.3	1.1	7.6	259.2	.8

PELLET GROUP FREQUENCY --

Herd unit 00 , Study no: 4

Type	Quadrat Frequency			Pellet Transect	
	'94	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Rabbit	1	-	-	9	N/A
Deer	1	-	-	26	2 (5)
Bison	3	10	29	1453	121 (299)
Antelope	-	1	-	-	-

BROWSE CHARACTERISTICS --

Herd unit 00 , 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.		
Chrysothamnus nauseosus hololeucus																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	25	38	0
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20	23	44	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	15	0
D	94	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	0				0
	01	-	-	-	-	-	-	-	-	-	-	-	-	0				0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'94		100%			00%			00%				+ 0%						
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'94	20	Dec:	100%			
												'96	20		0%			
												'01	0		0%			

Trend Study 00-5-01

Study site name: Buffalo Scaffold Cyn.

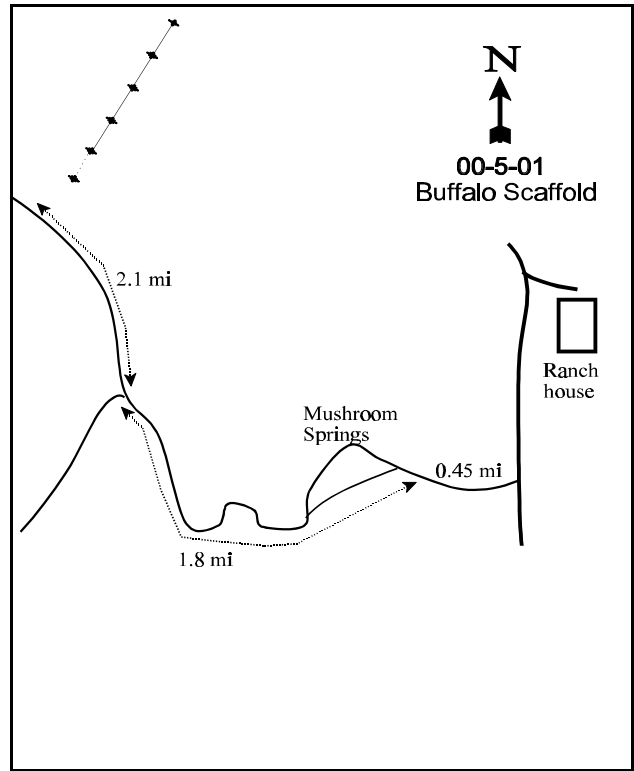
Vegetation type: Annual Grass

Compass bearing: frequency baseline 110 degrees magnetic.

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

LOCATION DESCRIPTION

From the ranch house, drive 0.5 miles to a fork. Turn right and drive another 0.45 miles to a fork. Turn right, and drive 1.4 miles to a fork by the Sentry Mountain Peak. Stay right, and drive 2.1 miles to witness post on the right side of the road at the bottom of a hill in a meadow. From the witness post walk 34 steps at a bearing of 110 degrees magnetic to the 0-foot baseline stake. The baseline runs in a direction of 340 degrees magnetic.



Map Name: Antelope Island

Diagrammatic Sketch

Township 2N, Range 3W, Section 6

UTM 4531522 N 396874 E

DISCUSSION

Trend Study No. 00-5

The Buffalo Scaffold study is located on the west side of Antelope Island about ½ mile south of Buffalo Scaffold Canyon. The site lies at an elevation of approximately 4,480 feet and slopes gently (3-5%) to the west. The shoreline of the Great Salt Lake is about ¾ of a mile to the west. Fire burned the site sometime prior to establishment in 1995. The site is now dominated by annual herbaceous species. Bison pats and bighorn sheep pellets were sampled by a pellet group transect read in 2001. Use by bighorn sheep was light, while that of bison was estimated at 12 days use/acre (30 days use/ha).

Soil textural analysis indicates a sandy loam with a neutral pH (6.8). Effective rooting depth (see methods) is estimated at under 13 inches. Average soil temperature at 12 inches below the surface was 64°F. There is a slight color change in the soil profile about 8 inches below the soil surface. Organic matter is very low at less than 1%. Very little rock was encountered within the soil profile. Vegetation and litter cover have been high in all sampling years with most of this provided by annual species. The cover value for bare soil has been low at less than 1%. Erosion remains minimal even with the decline in litter cover.

No browse species were encountered on the site. Frequent fire intervals have effectively removed the browse component entirely off the site and most of the surrounding area.

In 1995 and 1996, nearly 90% of the grass cover was contributed by cheatgrass and rattail fescue. Due to the extremely dry conditions in Northern Utah in 2000-2001, these species decreased in cover and nested frequency in 2001. Currently ('01), cheatgrass and rattail fescue contribute to just over half of the grass cover, or about 40% of the total vegetation cover on the site. Perennial grasses nearly doubled in sum of nested frequency in 2001. This increase is due mainly to the increase in purple three-awn and bulbous bluegrass, both low value species. Sand dropseed is present in low abundance, but did slightly increase in nested frequency in 2001.

Storksbill is the dominate forb followed by moth mullein. It was noted in 1996 that there were many old stalks from annual sunflower, but no plants were present from the current season. Other species encountered include prickly lettuce, yellow salsify and sego lily. Segoe lily significantly increased in nested frequency in 2001.

1996 TREND ASSESSMENT

Soil trend is stable with no erosion apparent in 1996. Vegetative cover has declined but all other cover values have remained constant. Rattail fescue and cheatgrass dominate the site providing much competition for perennial species. Herbaceous trend is stable but with very poor composition.

TREND ASSESSMENT

soil - stable (3)

browse - n/a

herbaceous understory - stable (3) but with very poor composition

2001 TREND ASSESSMENT

Trend for soil continues to be stable. Vegetation and litter cover are abundant and well disbursed. Bare ground is very low at less than 1% cover. Browse remains non-existent on the site. Trend for the herbaceous understory is slightly up with an increase in sum of nested frequency of perennial grasses. Both cheatgrass and rattail fescue significantly decreased in nested frequency as well. Although the increase in perennial grass frequency comes primarily from two low value species, purple three-awn and bulbous bluegrass, these species are better than cheatgrass.

TREND ASSESSMENT

soil - stable (3)

browse - n/a

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 00 , Study no: 5

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01	'95	'96	'01
G	Aristida purpurea	_a 74	_b 147	_c 216	29	61	82	3.39	4.82	17.06
G	Bromus tectorum (a)	_b 483	_b 484	_a 448	100	100	100	41.41	27.39	22.23
G	Festuca myuros (a)	_b 458	_b 465	_a 315	100	100	82	29.28	32.27	6.05
G	Poa bulbosa	_b 35	_a 6	_c 120	14	2	42	.17	.01	5.44
G	Poa fendleriana	_b 20	_a -	_a -	6	-	-	1.59	-	-
G	Sporobolus cryptandrus	67	64	84	28	24	31	1.31	.96	2.21
G	Vulpia octoflora (a)	_b 156	_a 37	_a 26	36	11	12	7.74	.98	.08
Total for Annual Grasses		1097	986	789	236	211	194	78.44	60.66	28.36
Total for Perennial Grasses		196	217	420	77	87	155	6.47	5.78	24.71
Total for Grasses		1293	1203	1209	313	298	349	84.92	66.45	53.08
F	Agoseris heterophylla	9	-	-	5	-	-	.02	-	-
F	Calochortus nuttallii	_b 37	_a 9	_c 62	21	3	34	.10	.01	.19
F	Draba nemorosa (a)	-	-	6	-	-	2	-	-	.01
F	Erodium cicutarium (a)	_c 407	_a 265	_b 342	100	86	93	8.93	2.24	11.95
F	Fritillaria spp.	3	-	-	1	-	-	.00	-	-
F	Lactuca serriola	1	5	1	1	2	1	.00	.01	.00
F	Tragopogon dubius	-	11	1	-	4	1	-	.02	.03
F	Veronica biloba (a)	-	-	2	-	-	2	-	-	.06
F	Verbascum blattaria	_a 20	_c 190	_b 149	11	78	59	.40	2.74	5.78

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01	'95	'96	'01
Total for Annual Forbs		407	265	350	100	86	97	8.93	2.24	12.02
Total for Perennial Forbs		70	215	213	39	87	95	0.54	2.78	6.01
Total for Forbs		477	480	563	139	173	192	9.48	5.03	18.04

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

BASIC COVER --

Herd unit 00 , Study no: 5

Cover Type	Nested Frequency			Average Cover %		
	'95	'96	'01	'95	'96	'01
Vegetation	499	499	494	79.72	62.80	75.09
Rock	61	3	1	.45	.00	.03
Pavement	1	56	91	.00	.69	.25
Litter	499	500	461	78.74	79.65	38.20
Bare Ground	37	29	75	.18	.10	.47

SOIL ANALYSIS DATA --

Herd Unit 00, Study no: 05, Buffalo Scaffold

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.7	64.4 (12.4)	6.8	56.7	24.0	19.3	.9	10.8	208.0	.7

PELLET GROUP FREQUENCY --

Herd unit 00 , Study no: 5

Type	Quadrat Frequency		
	'95	'96	'01
Bighorn Sheep	-	-	-
Deer	-	2	1
Bison	2	1	3

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
17	N/A
-	-
148	12 (30)

Trend Study 00-6-01

Study site name: Timely Gull Ridge.

Vegetation type: Annual Grass.

Compass bearing: frequency baseline 260 degrees magnetic.

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

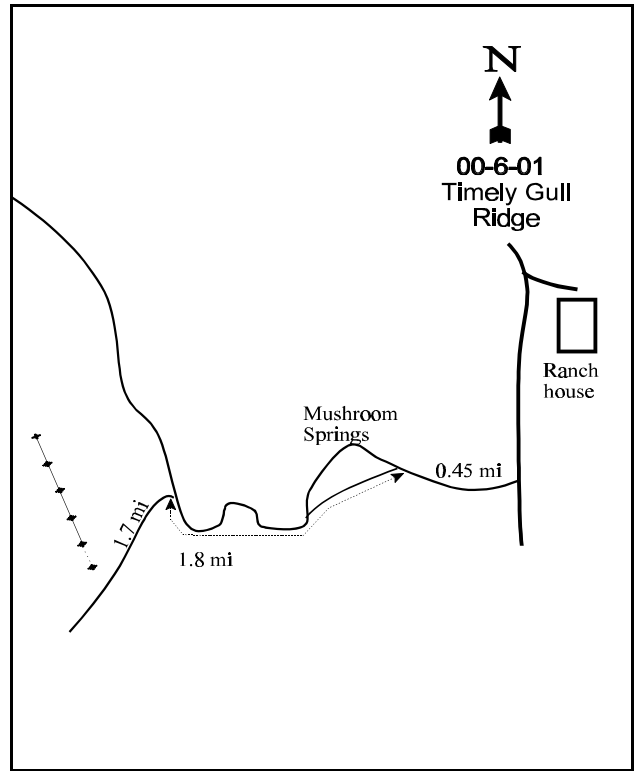
LOCATION DESCRIPTION

From the Ranch House drive 0.4 miles and take a right turn. Travel 0.45 miles where the road forks. Stay left and travel 1.8 miles to another fork in the road. Stay left, from the fork travel 1.7 miles to a witness post which is 30 feet off the right hand side of the road. From the witness post walk 5 paces at a bearing of 260 degrees magnetic to the 0-foot baseline stake. The baseline runs in a direction of 260 degrees magnetic.



Map Name: Timely Gull Ridge

Township 2N, Range 3W, Section 20



Diagrammatic Sketch

UTM 4528112 N 398365 E

DISCUSSION

Trend Study No. 00-6

The Timely Gull Ridge study is located on the west side of Antelope Island about ½ mile above the shoreline. Slope is 13% with a south, southwest aspect. Elevation is approximately 4,400 feet. To the east is a large gully with scattered pinyon and juniper on the opposite slope. A moderately sized group of bison were observed near the site in 2001. A pellet group transect read in conjunction with the vegetation baseline in 2001 noted light use by both deer and bighorn sheep. Bison use was determined to be 19 days use/acre (47 days use/ha).

Soil textural analysis indicates a sandy loam with a neutral pH (6.6). Effective rooting depth was estimated at just over 18 inches, with an average soil temperature of 66°F at a depth of 17 inches. Potassium may be a limiting factor in the soil at only 6 ppm as values less than 10 ppm have been shown to affect plant growth and development. Organic matter is low at less than 1%. Vegetative cover and litter have been abundant and effective at limiting erosion on the site. Due to the extremely dry conditions prior to sampling in 2001, litter cover had decreased and bare ground slightly increased in 2001. However, litter remains well disbursed over the site as evidenced by its high nested frequency value.

No browse species were encountered on the site in any sampling year due to short, intense, recurring fire intervals.

Cheatgrass is the dominate grass species for all years. In 1995 and 1996, cheatgrass provided 94% and 90% of the grass cover respectively. With the extremely dry conditions of 2000-2001 in Northern Utah, cheatgrass cover was greatly reduced in the 2001. Nested frequency and quadrat frequency for cheatgrass still remained high, yet sixweeks and rattail fescue both decreased in nested frequency in 2001. Perennial grasses nearly quadrupled in sum of nested frequency in 2001, due to the increase in purple three-awn. Sand dropseed also increased in nested frequency in 2001, although the increase was not significant.

Forb cover was scant in 1995 and 1996. In 2001 however, storksbill increased to more than 26% average cover. Perennial forbs are rare, with moth mullein being the dominant species.

1996 TREND ASSESSMENT

Soil trend is stable with no erosion apparent in 1996. Although vegetation cover declined slightly, litter cover increased leaving little bare ground. Cheatgrass, rattail fescue and six weeks fescue are the dominate herbaceous species providing the bulk of the vegetative cover. Even if fire is suppressed on the site, it will be extremely difficult to change the composition of the community. Herbaceous trend is stable at this time but with a very poor composition.

TREND ASSESSMENT

soil - stable (3)

browse - n/a

herbaceous understory - stable but with very poor composition (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Litter cover decreased in 2001 due to the dry conditions, but litter is still well disbursed over the site as evidenced by it's high nested frequency value. Vegetation cover remains high and erosion is minimal. Browse remains non-existent and will likely never play an important role on this site. Trend for the herbaceous understory is slightly up. Sum of nested frequency of annual grasses decreased and the most abundant perennials, purple three-awn and sand dropseed both increased in nested frequency. Storksbill increased in both cover and frequency in 2001. The increases in perennial grasses are encouraging.

TREND ASSESSMENT

soil - stable (3)

browse - n/a

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 00 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %		
		'95	'96	'01	'95	'96	'01	'95	'96	'01
G	Aristida purpurea	_a 25	_a 11	_b 142	10	5	58	.32	.12	4.08
G	Bromus tectorum (a)	_b 499	_b 499	_a 471	100	100	100	61.79	63.37	13.82
G	Festuca myuros (a)	_a 75	_b 163	_b 135	21	51	52	.69	3.75	.56
G	Poa fendleriana	3	-	-	2	-	-	.01	-	-
G	Sporobolus cryptandrus	55	47	67	26	27	36	.88	1.51	1.22
G	Vulpia octoflora (a)	_c 344	_b 257	_a 66	83	68	24	1.99	1.85	.34
Total for Annual Grasses		918	919	672	204	219	176	64.47	68.98	14.72
Total for Perennial Grasses		83	58	209	38	32	94	1.21	1.63	5.31
Total for Grasses		1001	977	881	242	251	270	65.68	70.62	20.03
F	Agoseris heterophylla	8	-	-	4	-	-	.02	-	-
F	Calochortus nuttallii	-	-	3	-	-	2	-	-	.01
F	Draba nemorosa (a)	12	23	24	3	6	8	.01	.03	.04
F	Erodium cicutarium (a)	_b 430	_a 342	_c 456	100	94	96	3.79	2.78	26.70
F	Tragopogon dubius	-	1	-	-	1	-	-	.00	-
F	Verbascum blattaria	_a -	_b 29	_c 94	-	12	38	-	1.58	8.14
Total for Annual Forbs		442	365	480	103	100	104	3.80	2.81	26.74
Total for Perennial Forbs		8	30	97	4	13	40	0.01	1.59	8.15
Total for Forbs		450	395	577	107	113	144	3.82	4.41	34.90

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

BASIC COVER --
Herd unit 00 , Study no: 6

Cover Type	Nested Frequency			Average Cover %		
	'95	'96	'01	'95	'96	'01
	Vegetation	500	500	491	73.59	68.52
Rock	269	36	4	2.95	.18	.03
Pavement	-	131	385	0	1.54	10.95
Litter	500	495	465	66.70	79.70	32.95
Cryptogams	51	20	-	.52	.35	0
Bare Ground	40	11	160	.12	.05	1.85

SOIL ANALYSIS DATA --
Herd Unit 00, Study no: 06, Timely Gull Ridge

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.2	65.8 (16.5)	6.6	76.9	10.1	13.0	.9	6.0	89.6	.4

PELLET GROUP FREQUENCY --
Herd unit 00 , Study no: 6

Type	Quadrat Frequency		
	'95	'96	'01
Bighorn Sheep	-	-	2
Deer	-	-	5
Bison	1	1	8

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
26	N/A
70	5 (13)
226	19 (47)

SUMMARY

MANAGEMENT UNIT - 00 - ANTELOPE ISLAND

Six trend studies were reread in the spring of 2001.

A common trend throughout all sampling periods is the abundance of annual, weedy species. Most of the sites remain dominated by annual grasses and forbs, primarily cheatgrass and storksbill. Due to the extremely dry conditions in 2000-2001 in Northern Utah, cheatgrass actually decreased in cover on 4 sites, and decreased in nested frequency on 5 sites. Rattail and six weeks fescue both decreased in cover and nested frequency on most of the studies as well. Decreases in cheatgrass cover and nested frequency resulted from individual plants being slightly less abundant and smaller in stature due to the dry winter and spring prior to sampling. However, even with these decreases, cheatgrass remains very abundant as shown by the fact that it was sampled in nearly every quadrat on all of the studies on Antelope Island. Unlike cheatgrass, storksbill increased in cover and nested frequency on all 6 studies in 2001. It is the most abundant forb on all of the trend studies in 2001, except at the Alfalfa Seeding study.

Perennial grasses increased in both cover and sum of nested frequency on all 6 studies in 2001. Most of the increase in both cover and frequency is due to the increase in 2 low value species, purple three-awn and bulbous bluegrass. Perennial forbs decreased in sum of nested frequency on 4 studies, increased on 1 study and remained stable on the another. The forb component on these studies consists almost entirely of infrequent, weedy increasers so the loss of perennial forbs is not key.

Due to short, intense, recurring fire intervals on the island, browse is virtually non-existent on all of the trend studies. Browse species will likely never play an important role in the vegetative make-up of these studies because reproduction will be difficult without a lot of resource input. Remnant browse populations, primarily big sagebrush, have very little chance of reproducing naturally due to very low densities, high competition with annual weeds, and short fire intervals.

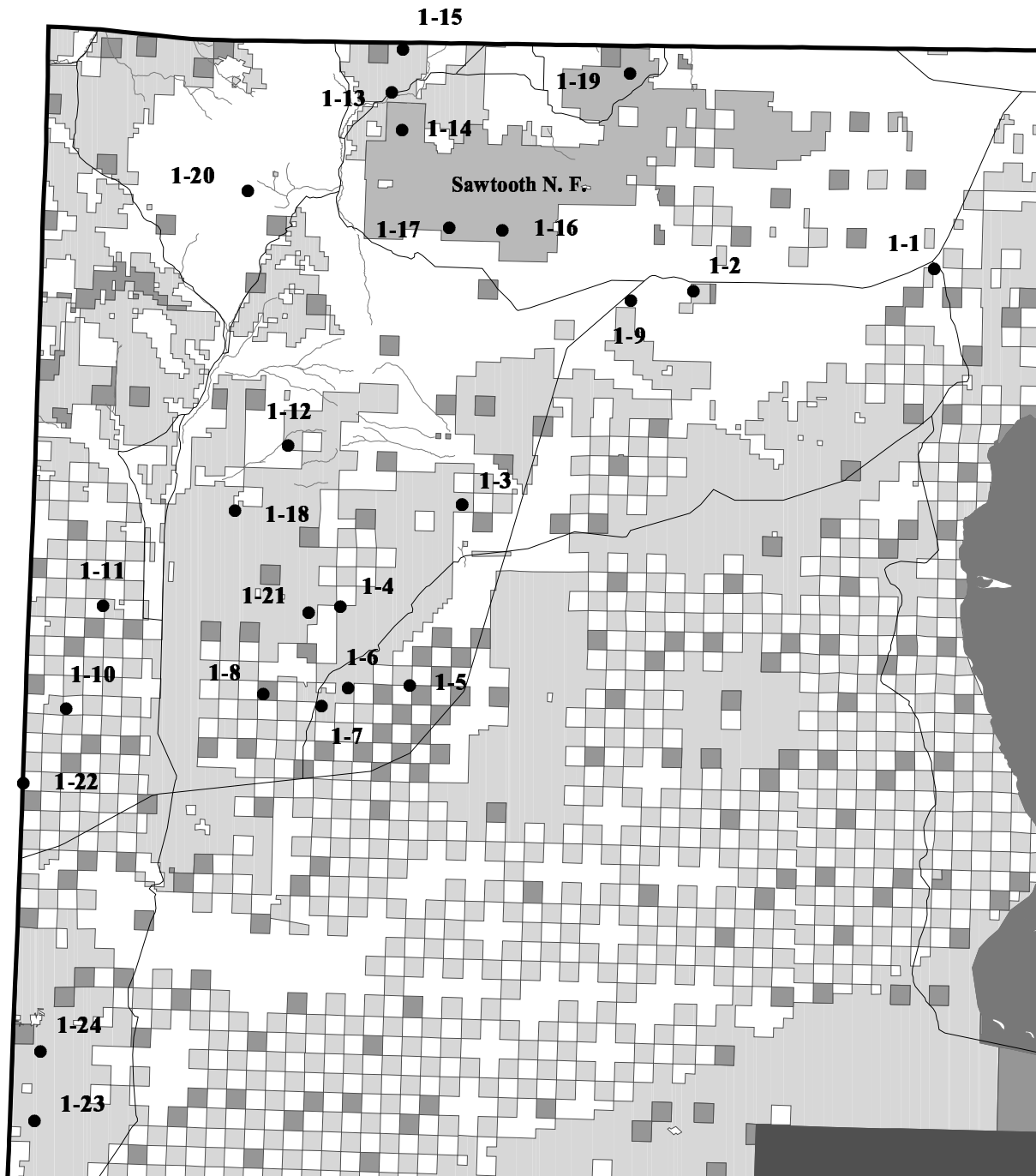
A summary table with trends follows.

Trend Summary

	Category	1994	1996	2001
00-1 Tin Lambing Shed	soil	est	4	3
	browse	est	3	n/a
	herbaceous understory	est	3	3
	Category	1995	1996	2001
00-2 Frery Homestead	soil	est	3	3
	browse	est	3	n/a
	herbaceous understory	est	3	3
00-3 Garden Springs Flat South	soil	est	3	3
	browse	est	3	n/a
	herbaceous understory	est	3	4
	Category	1994	1996	2001
00-4 Alfalfa Seeding	soil	est	3	3
	browse	est	3	n/a
	herbaceous understory	est	3	4
	Category	1995	1996	2001
00-5 Buffalo Scaffold	soil	est	3	3
	browse	est	n/a	n/a
	herbaceous understory	est	3	4
00-6 Timely Gull Ridge	soil	est	3	3
	browse	est	n/a	n/a
	herbaceous understory	est	3	4

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
 (est) = established, (n/a) = no trend

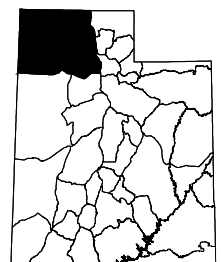
Management Unit 1



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



Unit Location



WILDLIFE MANAGEMENT UNIT 1 - BOX ELDER

Boundary Description

Box Elder, Tooele, Salt Lake, Davis and Weber counties - Boundary begins at the Utah-Idaho state line and Interstate 15; then west along this state line to the Utah-Nevada state line, south along this state line to Interstate 80, east on I-80 to I-15, north on I-15 to the Utah-Idaho state line.

Herd Unit Description

Covering approximately 3,475,200 acres (King and Muir 1971), Wildlife Management Unit 1 is one of the largest in the state. However, big-game range accounts for less than one-third of the unit. The Box Elder subunit 1B (Promontory region) is located in the east side and consists primarily of private land and was considered unsuitable for permanent trend studies. The Pilot Mountain subunit 1C is made up of the most southern portion of the unit and Pilot Mountain. The Raft River subunit 1A (western portion of the unit), where studies have been established, is dominated by the Raft River, Grouse Creek and Goose Creek Mountains. Here again, private land accounts for almost 70% of what is considered "normal" winter range (King and Muir 1971) and is arranged in a checkerboard pattern with public lands. Towns located within this area are Etna, Grouse Creek, Lynn, Yost, and Park Valley.

The Raft River Mountains run parallel to the Utah-Idaho border, are moderately steep on the south and east, and more gentle on the north and west. The highest point is 9,925 feet on an unnamed peak at the head of the Clear Creek drainage. The Grouse Creek Mountains are relatively narrow and steep and run north-south. At 9,000 feet, Red Butte is the highest point in the Grouse Creek Range. The topography of the Goose Creek Mountains is generally more nominal, the highest point being 8,584 feet on Twin Peaks. The Dove Creek Mountains are more rough, but the terrain becomes more gentle near the Three Corners area.

Normal winter range covers 588,898 acres in subunits 1A and 1B. The upper limits range between 6,000 and 8,000 feet depending on aspect. Winter concentration areas include: the Raft River Narrows, Devils Playground, Bovine, Kimber Ranch, Red Butte Basin, Black Hills, Hardister Creek, and Mud Springs Basin. During severe winters, the normally available winter range can be reduced as much as 74% (King and Muir 1971).

Seasonal migration consists mainly of elevational, and north to south migrations from summer range to winter range. A significant number of deer which spend their summers in Idaho, migrate south onto unit 1 winter ranges.

King and Muir (1971) estimated that the summer range was restricted to 194,612 acres (only 17% of the range) located in the upper portions of the Raft River, Goose Creek and Grouse Creek Mountains. They considered this quality summer range to be critical to the unit's big-game herds, especially for deer. Areas specifically listed as summer concentration areas for deer are the uppermost elevations of the Raft River Mountains, Johnson Creek Drainage, the head of Lynn Valley, the crest of the Grouse Creek Mountains, and Hardister Creek Plateau. Fawn production estimates from 1975 through 1990 have averaged a little more than 74 fawns/100 does (Jense et al. 1985, Jense et al. 1991). Between 1990 and 1995 the average was nearly 60. This would indicate that the summer range appears to be of sufficient quantity and quality to maintain a healthy herd, at least at present levels. But, if one examines a regression of trend on the fawn/doe ratios, it shows a declining trend through this same 15 year period (1975-90) with the ratios going from almost 86 down to 46. This is reflective of periods of drought that are so detrimental to summer ranges, especially if they are already a limiting factor. Climate data from Grouse Creek show below normal precipitation for 13 out of the past 25 years (1975 to 2000). Four consecutive dry years occurred between 1976 and 1979 with

another 3 consecutive dry years from 1988-90. Nine years during the past 25 showed above normal precipitation including 2 consecutive wet years in 1983-84 and 4 consecutive wet years from 1995 through 1998.

King and Muir (1971) also describe seven general vegetation types which appear to dominate this big-game range. Sagebrush makes up 55% of the winter range and 58% of the summer range. With an estimated production of 2,010 lbs/acre and 3,033 lbs/acre on the winter and summer ranges respectively, the big sagebrush type produces the most forage of any type. Black sagebrush occupies ridge tops within the summer range and the upper reaches of the winter range. On the summer range, the black sagebrush type has the highest abundance of grasses and forbs. Within the summer range, the browse type is dominated by curlleaf mountain mahogany on the drier sites and by maple on the more mesic sites. This type provides a good variety of spring-fall forage, yet makes up less than 1% of the winter range. The sagebrush-juniper and juniper types together account for 31% of the winter range. Juniper are more important for the thermal cover they provide in this type. Although small amounts of the aspen-timber and forb-grass types are found along the upper edges of winter range, their primary value is as summer range. A more detailed description and vegetation maps of the different vegetative types for deer herd unit 1 can be found in the 1970 Range Inventory Report published in 1971 by King and Muir.

The Box Elder herd unit was divided into two areas in the 1970 inventory, the western segment had 588,898 acres of useable big-game range with the eastern segment having 342,567 acres of useable big-game range. The average vegetative production for each vegetative type and their respective acreages for each range type were determined as follows:

Black sagebrush 1,940 lbs/acre on 26,188 acres; sagebrush 2,010 lbs/acre on 511,744 acres; mixed browse 1,842 lbs/acre on 5,767 acres; sagebrush-juniper 1,863 lbs/acre on 134,167 acres; juniper 1,556 lbs/acre on 154,912 acres; aspen-timber 384 lbs/acre on 5,056 acres; forb-grass 1,164 lbs/acre on 7,564 acres; and maple-sagebrush 1,086 lbs/acre on 21,203 acres (this last type is located only on the eastern segment of the unit). The remainder of the acreage was made up of non-range and agricultural land types.

These average production figures were determined by sampling a total of 404 one-hundred-foot transect lines during the range inventory in 1970.

Big Game Trends

Pratt (1983) gave a brief history of the recent management of this unit's deer populations. In 1950, the season was primarily buck only with a few special permits. Between 1951 and 1970, regulations allowed either sex hunting with some special permits and season extensions. During 1971 and 1972, the first three days were either sex, followed by eight days of buck only hunting. From 1973 to the present, hunts have been buck only with a few special antlerless permits to help lower the population because of depredation to agricultural lands.

The 1990 management objectives were to maintain the population necessary to sustain a yearly harvest of 2,250 bucks from subunits A and B and 1,100 for subunit C. Current objectives are to manage for a modeled target winter population of 24,000 deer with an annual buck harvest of about 2,800 animals, achieve post season ratio of 15 bucks/100 does, and to maintain and protect 588,000 acres of winter range and 194,000 acres of summer range.

Between 1950 and 1981, the buck harvest for the western portion of the unit ranged between 508 and 3,022, with an average of 1,302 bucks per year (Pratt 1983). However, the harvest has been increasing in recent years. In 1982, there were 2,891 bucks taken and 3,364 and 2,233 were taken respectively in 1983 and 1984

(Jense et al. 1985). Harvests peaked in 1988 and 1991 when 4,454 and 4,323 bucks were harvested respectively. Harvests dropped significantly after the severe winter of 1992-93. Only 503 bucks were taken in 1993 increasing to 1,081 by 1994. Anterless permits have been issued each year averaging 1,418 does per year between 1986 and 1992. Numbers dropped to only 583 in 1993, 39 in 1994 and 117 in 1995.

A regression trend line of buck harvest for the 40-year period of 1950-1990 shows an increasing trend from 838 in 1950 to 3,014 by 1990. While the regression of fawn-doe ratios have decreased from 86 to 46 from 1975-1990. This would suggest that the harsh winters of 1982-84 and a 3-year period of drought from 1988-89 have had a detrimental effect on the fawn population. Between 1991-92 and 1994-95 the fawn/doe ratio has averaged 64 fawns/100 does. Since the severe winter of 1992-93, numbers have increased from 54 fawns/100 does in 1992-93 to 70 in 1994-95.

Elk herd unit 1 boundary coincides with Deer herd unit 1. The Pilot Mountain elk unit population had been relatively stable from 1984 to 1990, with two aerial counts (1989 and 1990) showing totals of 302 and 327 animals. The calve-cow ratios have bounced around a lot since 1984 and have gone from a low of 24 to a high of 51 in 1990. Between 1991-92 and 1995-96 the calves/100 cow ratio has averaged only 39. The regressed trend for calve-cow ratios has shown a slightly downward trend since 1984, following the downward trend of the fawn-doe ratios.

Pratt (1983) listed several concerns about the increasing pressure on the unit's range and deer herd. A livestock owners group called the "Park Valley Improvement Association" is attempting to rehabilitate the range (for livestock use) by burning or chaining sagebrush and juniper on private lands. Much of this range is then seeded to monotypic stands of crested wheatgrass. This results in reductions in important wintering areas, and thermal-hiding cover. It has changed migration routes and concentration areas and has resulted in increased agricultural depredation problems. Other problems mentioned were: access problems resulting in uneven harvests and increasing hunter pressure in more open vegetation types, which could result in over-harvests. More importantly, these monotypic grass stands are more susceptible to catastrophic events, such as drought, insect outbreaks, disease, and also limits the season of use for this type. The more diverse a plant community is, the more resilient it is, especially in it's recovery from periods of drought. Community diversity also extends season of use for both wildlife and livestock.

When interpreting the data, it should be recalled that the 1984 studies were read in a period of above average precipitation. In fact both 1983 and 1984 were well above normal. The 1990 readings were conducted after several successive years of drought (1988-1990). The 1996 readings occurred in a year of above normal precipitation. These conditions must be considered when evaluating long-term trend data, especially pertaining to herbaceous vegetation. Since the studies sample mostly winter range where browse, most often sagebrush, is the key forage, the following study site discussions focus more on trends related to browse condition, composition and availability.

Trend Study Summary

Twenty-four studies were read in 1996 on unit 1. Fifteen of the study sites were rereads from sites established in 1984 and read again in 1990, 1996, and 2001. Twelve study sites sampled winter ranges on sagebrush-grass range types with two sites placed in the pinyon-juniper type and one in mixed mountain brush. Nine new trend studies were established in 1996 to provide data in other areas of concern. These include mixed mountain brush sites at Nut Pine Hills (#1-16), Clark's Basin (#1-17), and Keg Spring (#1-21). A high elevation black sagebrush site was added on Bally Mountain (#1-19) and an aspen site was established at Cotton Thomas (#1-10). Due to the increasing elk numbers on the Pilot Range, two studies, Patterson Pass (#1-23) and Sheep Range Spring (#1-24) were also established. An additional site was established at Dake Pass (#1-22) to monitor a black sagebrush wintering area for elk north of the Pilot mountains.

Trend Study 1-1-01

Study site name: Kelton.

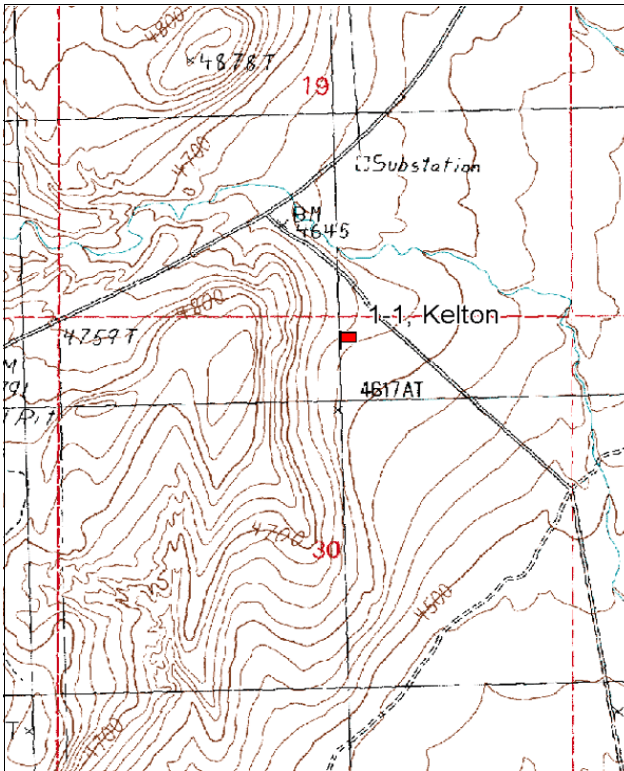
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

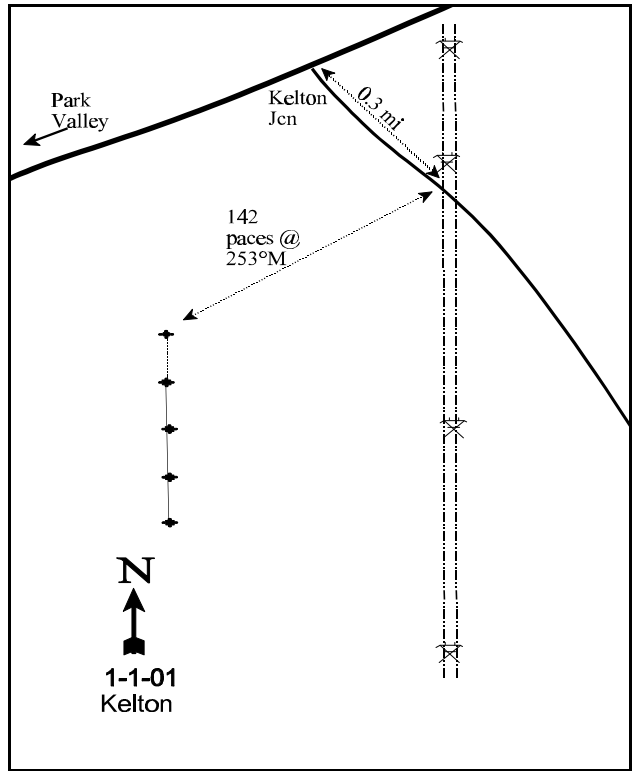
LOCATION DESCRIPTION

Proceed on U-30 to the Kelton Junction and turn southeast off U-30. Proceed 0.3 miles to a point where the telephone pole line crosses the road. Stop here. From the power pole on the west side of the road, take a compass bearing of 253 degrees magnetic (directly west) and walk 142 paces to the 0-foot stake of the frequency baseline. This is a green steel fence post wired with browse tag #7905. The baseline runs 165 degrees magnetic.



Map Name: Black Butte

Township 13N, Range 11W, Section 30



Diagrammatic Sketch

UTM 4633170 N, 322004 E

DISCUSSION

Trend Study No. 1-1

The Kelton trend study is located approximately one-half mile south of the Kelton Junction on Highway U-30. Identified as an important deer and antelope winter range, the study area often has concentrations of both animals. Antelope and deer pellet groups were abundant in the past but since a fire burned the area prior to the 1990 reading, there is little use wildlife. Elevation is approximately 4,640 feet on nearly level to gently sloping terrain with a slight east or east-southeast aspect. Before the fire, the range type was basin big sagebrush with an extensive understory of cheatgrass.

Soil is alluvial in origin and basalt derived. Soil is a loam in texture and is relatively deep. Apart from a few basalt outcrops and boulders, surface rockiness is minimal. Organic matter content is lacking (1.6%) and is primarily derived from a nearly uniform understory cover of dead cheatgrass. Shrubs in the past comprised the primary vegetative cover in combination with cheatgrass. Litter and rock provide a nearly continuous ground cover. Fire before 1990 has reduced shrub cover to less than 3% in 1996 and 2001. Soil erosion is minimal and the soil erosion condition class was determined to be stable in 2001.

Browse composition in the past was dominated by basin big sagebrush with small numbers of white rubber rabbitbrush. During the 1984 reading, total browse density was estimated at 2,565 plants/acre. At that time the sagebrush showed evidence of heavy to moderate use, but exhibited good vigor and a stable age structure. Between 1984 and 1990, a fire burned the area reducing the sagebrush to only 132 plants/acre. By 2001, density of basin big sagebrush has increased to only 220 plants/acre due in part to drought and the competition with cheatgrass.

Currently, understory vegetation is depleted and consists almost entirely of annuals, primarily cheatgrass which accounted for 95% of the total vegetative cover in 2001. Cheatgrass forms a dense uniform cover of "fine fuel" that poses a severe fire hazard when it is dry. Perennial grasses are limited to isolated individuals of bottlebrush squirrel-tail and Sandberg bluegrass. Annual and biennial forbs such as prickly lettuce, annual stickseed, tansy-mustard, and tumble mustard are fairly common. Perennial forbs are limited to a few individuals of gooseberry leaf globemallow and longleaf phlox.

1984 APPARENT TREND ASSESSMENT

This site appears essentially stable, although subjected to very heavy deer and antelope use. As a result, overall vegetative condition is below optimum, but not apparently deteriorating further. The browse component is dominant and will remain so. Understory condition is poor but stable. Soil trend appears stable. Litter and vegetative cover are high and the site is nearly level, resulting in almost negligible soil erosion. The greatest threat to the site is the high fire hazard because of the dense annual grass cover. With the right conditions, one fire could eliminate most of the basin big sagebrush that is so important to deer and antelope.

1990 TREND ASSESSMENT

A fire on the study site since 1984 has dramatically changed the species composition and eliminated over 95% of the sagebrush population. The area is currently dominated by cheatgrass and Russian thistle, both with 100% quadrat frequency values. Annuals were not inventoried in 1982, so no comparison can be made. Photo point comparisons with 1984 show that much of the understory consisted of cheatgrass before the burn.

TREND ASSESSMENT

soil - stable (3)

browse - down after fire (1)

herbaceous understory - down after fire, dominated by annuals (1)

1996 TREND ASSESSMENT

The soil trend has improved slightly since 1990. Percent bare ground has declined while litter cover has increased. Erosion is not a problem on this site due to the lack of slope and abundant herbaceous vegetation cover, but more than 90% is provided by annual species. The browse trend has slightly improved since the fire. Estimated density of basin big sagebrush has increased. The number of seedling and young plants have also increased. On the negative side, broom snakeweed was sampled in the 1996 reading. It currently numbers only 320 plants/acre but has an age class distribution of an expanding population. The herbaceous trend is in stable yet poor condition. Cheatgrass brome still dominates the site, providing 96% of the herbaceous vegetation cover. Perennial grasses are nearly absent. The forb composition is also dominated by annuals. Sum of nested frequency of forbs declined considerably since 1990 due to a major reduction in Russian thistle. Currently, the dominant forbs consist of tumble mustard, prickly lettuce, and scarlet globemallow.

TREND ASSESSMENT

soil - improved slightly (4)

browse - slightly up but still depleted (4)

herbaceous understory - stable but dominated by annuals (3)

2001 TREND ASSESSMENT

The soil trend has remained stable. Percent bare ground has remained almost the same, while litter cover has decreased slightly. Erosion is not a problem on this site due to the lack of slope and abundant herbaceous vegetation cover, but more than 95% is provided by annual species. The browse trend is slightly down with a 61% decline in density and an increase in the dead to live ratio (from 1:9.3 to 1:2.2). The number of seedling and young plants have also decreased. The population is still at very low numbers since the fire. Broom snakeweed has decreased substantially since the 1996 reading. It currently numbers only 160 plants/acre with 75% classified as decadent. Cheatgrass brome still dominates the site, providing 95% of the total vegetative cover. Perennial grasses continue to be nearly absent. The forb composition is also dominated by annuals. Sum of nested frequency for forbs declined considerably since 1990 due to a major reduction in Russian thistle. Currently the dominant forbs consist of tumble mustard, prickly lettuce, and scarlet globemallow.

TREND ASSESSMENT

soil - stable but poor (3)

browse - slightly down and depleted (2)

herbaceous understory - stable but still dominated by annuals (3)

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 1

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Bromus tectorum (a)	-	_a 360	_b 380	_b 380	-	100	98	97	33.03	58.69
G	Poa secunda	_b 5	_a -	_b 17	_b 6	2	-	7	3	.10	.04
G	Sitanion hystrix	14	16	3	14	8	7	1	7	.03	.09
G	Unknown grass - perennial	3	-	-	-	1	-	-	-	-	-
Total for Annual Grasses		0	360	380	380	0	100	98	97	33.03	58.69
Total for Perennial Grasses		22	16	20	20	11	7	8	10	0.13	0.13
Total for Grasses		22	376	400	400	11	107	106	107	33.17	58.82
F	Chaenactis douglasii	-	-	3	-	-	-	1	-	.00	-
F	Descurainia pinnata (a)	-	_b 13	_a -	_b 4	-	7	-	4	-	.02
F	Erigeron spp.	-	-	3	-	-	-	1	-	.00	-
F	Euphorbia spp.	-	-	5	-	-	-	2	-	.01	-
F	Euclidium syriacum	-	2	-	-	-	1	-	-	-	-
F	Gilia spp. (a)	-	-	1	1	-	-	1	1	.00	.00
F	Halogeton glomeratus (a)	-	24	-	-	-	9	-	-	-	-
F	Holosteum umbellatum (a)	-	-	3	-	-	-	1	-	.00	-
F	Lappula occidentalis (a)	-	-	-	3	-	-	-	1	-	.00
F	Lactuca serriola	_a -	_a 5	_b 22	_a -	-	2	9	-	.21	-
F	Phlox longifolia	_a 5	_a -	_b 17	_a -	3	-	9	-	.07	-
F	Salsola iberica (a)	-	_b 369	_a 15	_a 21	-	100	7	8	.06	.09
F	Sisymbrium altissimum (a)	-	-	_b 103	_a 14	-	-	49	5	.81	.02
F	Sphaeralcea grossulariaefolia	2	9	4	3	1	5	2	2	.15	.15
F	Tragopogon dubius	3	-	1	-	1	-	1	-	.00	-
F	Unknown forb-perennial	3	-	-	-	1	-	-	-	-	-
Total for Annual Forbs		0	406	122	43	0	116	58	19	0.88	0.14
Total for Perennial Forbs		13	16	55	3	6	8	25	2	0.46	0.15
Total for Forbs		13	422	177	46	6	124	83	21	1.34	0.30

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

BROWSE TRENDS --
Herd unit 01 , Study no: 1

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata tridentata	13	10	1.60	1.30
B	Chrysothamnus nauseosus consimilis	2	2	.38	.38
B	Chrysothamnus nauseosus hololeucus	4	2	.30	.30
B	Chrysothamnus viscidiflorus stenophyllus	0	3	-	.53
B	Gutierrezia sarothrae	10	6	.06	-
Total for Browse		29	23	2.34	2.51

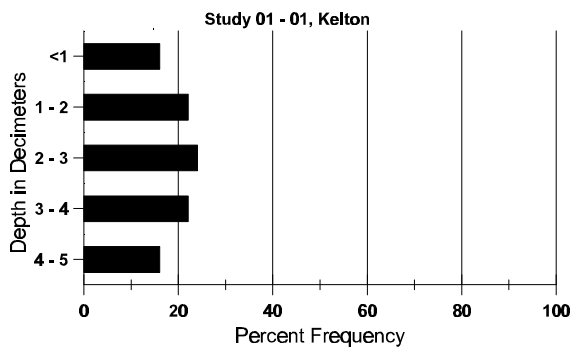
BASIC COVER --
Herd unit 01 , Study no: 1

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	388	386	2.00	23.00	39.01	62.26
Rock	111	30	1.25	.75	2.93	.52
Pavement	182	114	.25	1.25	2.15	1.33
Litter	400	381	80.75	54.25	69.33	49.56
Cryptogams	78	35	8.25	0	1.11	1.08
Bare Ground	155	157	7.50	20.75	4.40	7.05

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 01, Kelton

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
19.7	61.2 (18.3)	8.2	43.6	34.4	28.0	1.6	15.5	700.8	.61

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 1

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Deer	-	2	52	4 (10)
Cattle	4	2	70	6 (14)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 1

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (in)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia tridentata tridentata																		
S	84	3	2	-	-	-	-	-	-	-	4	1	-	-	166			5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	2	6	2	-	-	-	-	-	-	10	-	-	-	333			10
	90	2	-	-	-	-	-	-	-	-	1	1	-	-	66			2
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340			17
	01	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
M	84	1	15	31	-	-	-	-	-	-	46	-	1	-	1566	27	34	47
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	10	8	1
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	21	25	11
	01	4	1	-	-	-	-	-	-	-	5	-	-	-	100	26	40	5
D	84	-	7	12	-	-	-	1	-	-	6	-	12	2	666			20
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		36%			58%			19%			-95%							
'90		00%			00%			00%			+76%							
'96		00%			00%			00%			-61%							
'01		09%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2565	Dec:	26%			
												'90	132		25%			
												'96	560		0%			
												'01	220		27%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (in) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Atriplex confertifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	34	46	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>Chrysothamnus nauseosus consimilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	16	16	11
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	29	41	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
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%			-27%							
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	220		0%			
												'01	160		63%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (in) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus nauseosus hololeucus																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	1	-	-	-	-	-	-	-	1	-	-	-	33	22	26	1
	'96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	20	30	6
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	33	58	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	-	-	-	-	-	-	-	-	-	-	-	-	-	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%			+73%							
'96		00%			00%			00%			-67%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	33		0%			
												'96	120		0%			
												'01	40		50%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (in) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																	
Y	84	3	-	-	-	-	-	-	-	-	2	1	-	-	100		3
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	12 20	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	21 38	0	
	01	4	-	-	-	-	-	-	-	-	2	2	-	-	80	9 25	4
D	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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		00%			00%			00%									
'90		00%			00%			00%									
'96		00%			00%			00%									
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	199	Dec:	33%			
											'90	0		0%			
											'96	0		0%			
											'01	80		0%			
<i>Grayia spinosa</i>																	
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66	33 48	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	25 50	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%									
'90		00%			00%			00%									
'96		00%			00%			00%									
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	66	Dec:	-			
											'90	0		-			
											'96	0		-			
											'01	0		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (in) 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	14	-	-	1	-	-	-	-	-	-	-	-	300			15	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	7	-	-	-	-	-	-	-	-	-	-	-	140			7	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	9	-	-	-	-	-	-	-	-	-	-	-	180	11	16	9	
	01	2	-	-	-	-	-	-	-	-	-	-	-	40	6	9	2	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	6	-	-	-	-	-	-	-	-	-	-	5	120			6	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	300			15	
% 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%			63%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	320		0%			
												'01	160		75%			
Leptodactylon pungens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	7	16	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	9	18	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 (in) 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	6	6	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 1-2-01

Study site name: Rosette.

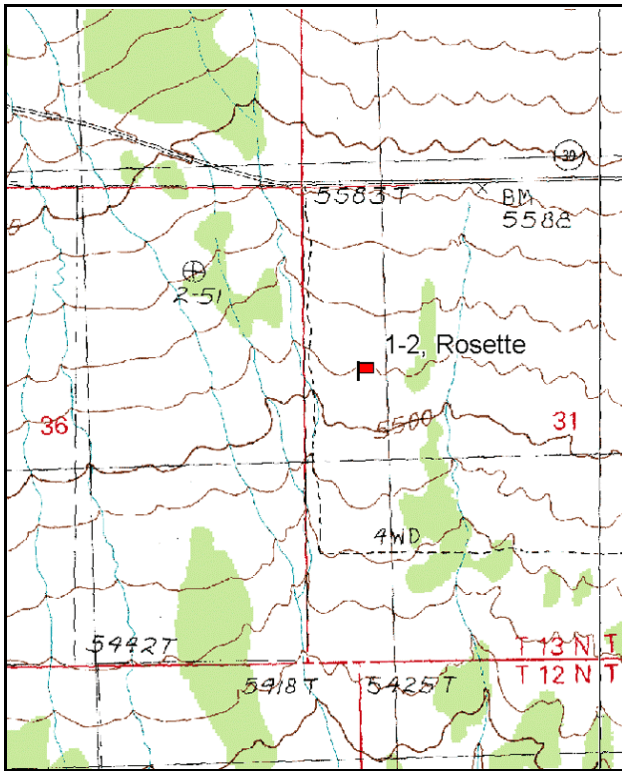
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 0 degrees magnetic.

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

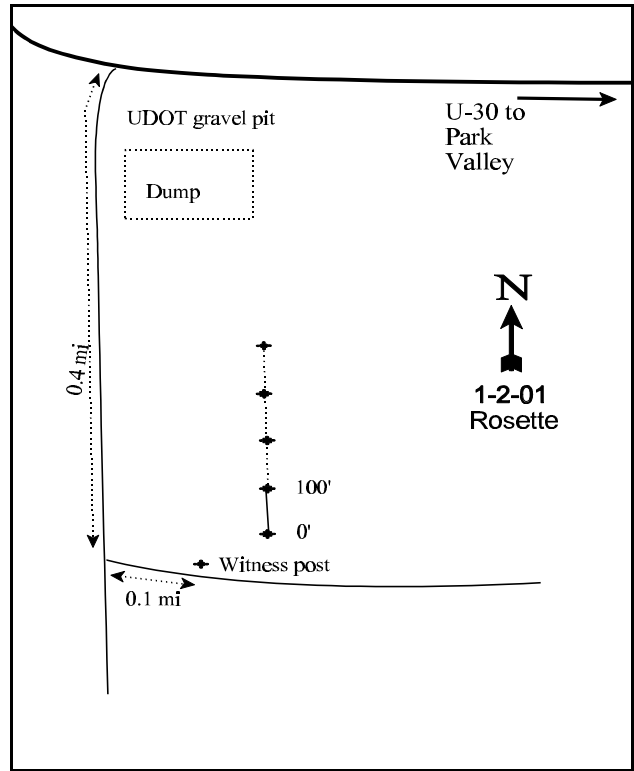
LOCATION DESCRIPTION

From Rosette, Utah and mile marker 51, proceed northeast on U-30 approximately 1.3 miles and turn right. Proceed through the Utah Department of Transportation gravel dump and find a dirt road on the west side of gravel pile area. Proceed south on this road for 0.4 miles (passing a left fork) to a left fork. Turn left (i.e., east) and proceed 0.1 miles to a witness post on the left side of the road and stop. From the witness post take a bearing of 9 degrees magnetic and walk 22 paces to the 0-foot stake of the frequency baseline. The 0-foot stake is wired with a red browse tag, number 7906.



Map Name: Rosette

Township 13N, Range 13W, Section 31



Diagrammatic Sketch

UTM 4631263 N, 301911E

DISCUSSION

Trend Study No. 1-2

The Rosette trend study is located approximately two miles east-southeast of Rosette on critical deer winter range. This area is a Wyoming big sagebrush type which also contains some scattered Utah juniper and a few pockets of black sagebrush. Judging from browse utilization and pellet group frequency, deer use through the years has ranged from moderate to heavy. Cattle also graze the area and were present at the time the study was initially established. A pellet group transect read on the site in 2001 estimated 26 deer days use/acre (65 days use/ha). This area is within the Hirschi allotment which is assigned for 25 cattle with a season of use from October 16 through December 31. Elevation is 5,480 feet on gently sloping to almost level terrain with a southerly exposure.

Soil texture is a clay loam with a neutral soil reaction (7.3 pH). The amount of phosphorus in the soil (7.2 ppm) could be a limiting factor because it has been shown that amounts below 10 ppm can limit plant growth and/or development. The soils have been alluvially deposited. There is minimal rockiness and the soil is moderately deep with an average effective rooting depth estimated at just over 15 inches. The ratio of protective ground cover from vegetation and litter compared to percent bare ground is relatively poor, yet erosion does not appear to be significant at this time because of nearly level terrain. However, the erosion condition classification was determined to be moderate in 2001.

The key browse species is Wyoming big sagebrush. Density estimates have varied since 1984, however the methods were slightly modified by increasing the sample size by more than three times in 1992. In terms of forage production, Wyoming sagebrush accounts for respectively 57% and 71% of the browse cover in 1996 and 2001. The sagebrush type in the 1970 Range Inventory was determined to have an air dry estimated production of 2,010 pounds to the acre. Utilization was determined to be heavy in 1984 with 52% of the population displaying heavy use. By 1990, only 11% of the sagebrush was classified as heavily hedged. Use was mostly light in 1996 and 2001. Percent decadency rose in 1990 to 77% with poor vigor expressed on 48% of those shrubs. By 1996, percent decadency declined to 29%. Currently, only 18% were classified as decadent. The bulk of plants exhibiting poor vigor were classified as decadent. Dead plants were first inventoried during the 1996 reading. The average number of dead sagebrush in 1996 and 2001 is 1,650 plants/acre. This would equate to about one dead plant to every three live plants. Poor vigor and the high number of dead plants is likely the result of intraspecific competition combined with drought, not a result of heavy use. Age class analysis from 1996 data suggested an expanding population due to a large number of seedlings and young. However in 2001, the proportion of seedlings and young within the population have been greatly reduced. Even with a slight decrease in the population in 2001, there are more than enough replacements (young age class) to make up for the slight decrease in overall numbers.

Other shrubs found on the site which produce additional forage consist of small numbers of black sagebrush and rubber rabbitbrush. Narrowleaf low rabbitbrush, a low growing increaser, has a current ('01) density of 3,160 plants/acre and has an age class structure of a stable to slightly decreasing population. Monitoring of this species abundance will be an important trend parameter in the future.

Herbaceous plants are considerably more diverse and important as forage than at the Kelton site (#1-1). Although percent cover and total herbaceous density are much lower here, cheatgrass is not nearly as abundant. Currently ('01), it only accounts for 28% of the grass cover. Perennial grasses are much more abundant on this site than at Kelton. Common species include: thickspike wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. Forbs are diverse yet produce only a little over 2% total cover. Common perennial forb species include hooker balsamroot, hoods phlox, and cryptantha.

1984 APPARENT TREND ASSESSMENT

Vegetative trend appears stable, however, the heavy forage utilization could produce changes in shrub composition and density. Herbaceous conditions are only fair, but are not noticeably declining. Soil trend appears stable to slightly down. Signs of soil movement are apparent, but the nearly level terrain prevents rapid soil loss.

1990 TREND ASSESSMENT

Trend for soil is stable. Bare ground cover values increased slightly from 42% to 50%, but basal vegetative cover nearly doubled. Trend for browse is down. Wyoming big sagebrush on this site had an estimated 25% canopy cover in 1990. However, it has declined since the last reading from 6,332 plants/acre in 1984 down to 3,799 plants per acre in 1990. Percent decadency has also increased from 23% to 77%. Very few seedlings and no young sagebrush were found on site in 1990. Recent utilization of the sagebrush has been light to moderate. In contrast, the narrowleaf low rabbitbrush has increased its density by 17%. Trend for the herbaceous understory is slightly up. Sandberg bluegrass and squirreltail have increased in nested frequency and quadrat frequency values since 1984. Sum of nested frequency of perennial forbs has also increased slightly

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - up slightly (4)

1996 TREND ASSESSMENT

The soil trend is still improving due to an increase in litter cover and a significant decline in bare ground (50% to 22%). This combined with the level terrain limit erosion. Trend for the key browse species, Wyoming big sagebrush, has also improved since 1990. Density has increased from 3,799 to 6,160 plants/acre, percent decadence has declined from 77% to 29%, and vigor is good on all but 31% of the decadent shrubs. Age class composition indicates an expanding population with 2,620 seedlings/acre and 3,040 young plants/acre estimated. Cover was estimated at 14% and a further increase in sagebrush cover and density will negatively effect understory plants. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses declined slightly, while the sum of nested frequency of forbs increased slightly. Sum of nested frequency of thickspike wheatgrass and bottlebrush squirreltail increased significantly.

TREND ASSESSMENT

soil - up (5)

browse - up (5)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

The soil trend is considered stable at this time. Percent litter cover and bare ground are similar with little change. The ratio of protective ground cover to bare soil has remained almost the same since 1996. This combined with the level terrain limit erosion even though the erosion condition was classified as moderate. Trend for the key browse species, Wyoming big sagebrush, has remained fairly stable with only a slight decrease in density. There are more than enough young plants to maintain the current population. Percent decadence has declined from 77% in 1990 to 29% in 1996 and 18% in 2001. Vigor is good on all but about 40% of the decadent shrubs. Age class analysis indicates a slightly expanding population with the number of

young plants outnumbering the estimated number of dead plants within the population. Cover for Wyoming sagebrush has increased from an estimated 14% to 18% in 2001. A further increase in sagebrush cover could negatively affect the herbaceous understory. Trend for the herbaceous understory appears stable. Sum of nested frequency for perennial grasses is stable, while sum of nested frequency for perennial forbs slightly declined. However, the perennial forbs make up less than 2% cover or less than 15% of the total herbaceous cover.

TREND ASSESSMENT

soil - stable, but only fair condition (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , 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 smithii	73	51	67	83	31	23	24	30	.57	1.12
G	Agropyron spicatum	a-	a1	b14	a-	-	1	6	-	.05	-
G	Bromus tectorum (a)	-	-	b259	a227	-	-	84	77	3.20	3.66
G	Oryzopsis hymenoides	1	2	-	1	1	2	-	1	-	.00
G	Poa secunda	180	231	189	212	70	83	71	78	5.15	7.40
G	Sitanion hystrix	a21	b74	b70	a29	10	35	30	15	.61	.68
G	Vulpia octoflora (a)	-	-	3	-	-	-	1	-	.00	-
Total for Annual Grasses		0	0	262	227	0	0	85	77	3.21	3.66
Total for Perennial Grasses		275	359	340	325	112	144	131	124	6.38	9.22
Total for Grasses		275	359	602	552	112	144	216	201	9.59	12.88
F	Agoseris glauca	-	-	3	-	-	-	2	-	.01	-
F	Allium acuminatum	b23	a-	a-	b9	9	-	-	7	-	.04
F	Antennaria rosea	-	-	3	7	-	-	1	4	.03	.07
F	Arabis spp.	-	-	6	3	-	-	3	1	.01	.03
F	Astragalus beckwithii	-	-	2	-	-	-	1	-	.00	-
F	Astragalus spp.	-	-	3	-	-	-	1	-	.00	-
F	Astragalus utahensis	-	2	6	7	-	1	4	4	.07	.04
F	Balsamorhiza hookeri	-	-	2	-	-	-	2	-	.18	-
F	Calochortus nuttallii	-	3	-	-	-	1	-	-	-	-
F	Chaenactis douglasii	a10	a4	b32	a5	4	2	11	3	.08	.01
F	Cryptantha spp.	a-	a5	b44	a-	-	4	18	-	.19	-
F	Cymopterus longipes	b53	ab55	a23	ab28	24	25	13	15	.06	.22
F	Delphinium nuttallianum	b17	a-	a-	a-	9	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	a3	b41	-	-	1	25	.00	.15
F	Eriogonum caespitosum	a2	b16	a3	a-	1	9	1	-	.00	-

Type	Species	Nestled Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Eriogonum cernuum (a)	-	-	_b 21	_a 6	-	-	8	2	.06	.03
F	Erigeron pumilus	-	-	-	1	-	-	-	1	-	.00
F	Gilia spp. (a)	-	-	13	5	-	-	6	2	.05	.01
F	Lappula occidentalis (a)	-	-	17	11	-	-	8	6	.09	.03
F	Lepidium perfoliatum	-	-	4	-	-	-	2	-	.03	-
F	Machaeranthera spp	-	-	4	-	-	-	3	-	.07	-
F	Navarretia intertexta (a)	-	-	4	-	-	-	2	-	.01	-
F	Pedicularis centranthera	-	-	-	7	-	-	-	3	-	.33
F	Penstemon spp.	-	1	-	-	-	1	-	-	-	-
F	Phlox hoodii	_a 27	_b 51	_{ab} 36	_a 30	12	24	17	15	.77	.97
F	Phlox longifolia	_{ab} 48	_b 66	_{ab} 57	_a 33	22	32	26	14	.18	.09
F	Polygonum douglasii (a)	-	-	4	-	-	-	2	-	.01	-
F	Ranunculus testiculatus (a)	-	-	_a 9	_b 69	-	-	3	27	.01	.23
F	Sisymbrium altissimum (a)	-	-	3	-	-	-	1	-	.03	-
F	Streptanthus cordatus	8	4	-	-	3	1	-	-	-	-
F	Zigadenus paniculatus	-	-	-	2	-	-	-	2	-	.01
Total for Annual Forbs		0	0	74	132	0	0	31	62	0.28	0.45
Total for Perennial Forbs		188	207	228	132	84	100	105	69	1.72	1.84
Total for Forbs		188	207	302	264	84	100	136	131	2.00	2.30

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

BROWSE TRENDS --
Herd unit 01 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	90	88	14.07	18.53
B	Chrysothamnus nauseosus consimilis	2	1	-	-
B	Chrysothamnus viscidiflorus stenophyllus	81	64	5.62	3.02
B	Juniperus osteosperma	8	7	2.50	1.51
B	Leptodactylon pungens	31	32	2.04	2.83
B	Opuntia spp.	8	3	.21	.06
Total for Browse		220	195	24.47	25.96

CANOPY COVER --
Herd unit 01 , Study no: 2

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	4	7	55	56	3.9	7.8

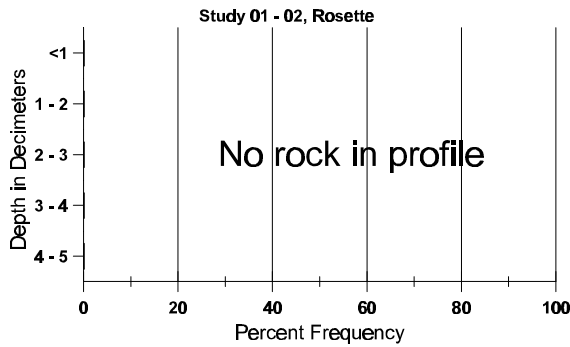
BASIC COVER --
Herd unit 01 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	349	342	4.25	8.25	35.01	42.59
Rock	161	53	0	.50	1.20	.37
Pavement	277	215	9.25	4.00	4.63	3.88
Litter	391	364	37.25	26.25	39.15	38.11
Cryptogams	155	80	7.25	11.50	4.57	2.85
Bare Ground	269	273	42.00	49.50	22.06	28.75

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 02, Rosette

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.3	63.8 (13.6)	7.3	46.6	25.4	28.0	1.5	7.2	236.8	.72

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 2

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	19	6	122	N/A
Deer	21	11	339	26 (65)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 2

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches)		Total				
		1	2	3	4		Ht. Cr.	Ht. Cr.					
Artemisia nova													
M	'84	-	1	-	-	-	-	-	1	66	10	10	1
	'90	-	-	-	-	-	-	-	0	0	-	-	0
	'96	-	-	-	-	-	-	-	0	0	-	-	0
	'01	-	-	-	-	-	-	-	0	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%		00%							
'01		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)						'84	66	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>Artemisia tridentata wyomingensis</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	131	-	-	-	-	-	-	-	-	131	-	-	-	2620		131	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	2	1	6	-	-	-	-	-	-	7	-	2	-	600		9	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	151	-	-	1	-	-	-	-	-	152	-	-	-	3040		152	
	01	59	-	-	1	-	-	1	-	-	61	-	-	-	1220		61	
M	84	5	26	33	-	-	-	-	-	-	60	-	4	-	4266	19 20	64	
	90	11	1	1	-	-	-	-	-	-	13	-	-	-	866	27 28	13	
	96	35	29	-	2	-	-	-	-	-	66	-	-	-	1320	25 37	66	
	01	157	-	-	3	-	-	-	-	-	160	-	-	-	3200	22 27	160	
D	84	-	12	10	-	-	-	-	-	-	8	-	10	4	1466		22	
	90	32	7	5	-	-	-	-	-	-	23	5	12	4	2933		44	
	96	52	38	-	-	-	-	-	-	-	62	-	-	28	1800		90	
	01	45	3	-	-	-	-	-	-	-	29	-	-	19	960		48	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1780		89	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1520		76	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		41%			52%			21%			-40%							
'90		14%			11%			28%			+38%							
'96		22%			00%			09%			-13%							
'01		01%			00%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	6332	Dec:	23%			
												'90	3799		77%			
												'96	6160		29%			
												'01	5380		18%			
<i>Atriplex canescens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13 11	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				
Chrysothamnus nauseosus consimilis																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	17	19	2
	'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		00%			00%			00%										
'96		00%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	40		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 stenophyllus																	
S	84	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6
	90	2	2	-	3	-	-	-	-	-	7	-	-	-	466		7
	96	80	-	-	3	-	-	-	-	-	83	-	-	-	1660		83
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
Y	84	5	3	-	-	-	-	-	-	-	7	-	1	-	533		8
	90	18	1	-	-	-	-	-	-	-	17	1	1	-	1266		19
	96	59	-	-	-	-	-	-	-	-	59	-	-	-	1180		59
	01	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18
M	84	11	21	1	-	-	-	-	-	-	31	-	2	-	2200	7 13	33
	90	15	2	4	1	-	-	-	-	-	20	2	-	-	1466	9 8	22
	96	192	2	-	30	-	-	6	-	-	230	-	-	-	4600	11 18	230
	01	88	-	-	11	-	-	-	-	-	99	-	-	-	1980	10 14	99
D	84	-	10	1	-	-	-	-	-	-	6	-	5	-	733		11
	90	9	2	7	4	-	-	-	-	-	18	-	2	2	1466		22
	96	1	5	-	-	-	-	-	-	-	5	-	-	1	120		6
	01	36	-	-	5	-	-	-	-	-	40	-	-	1	820		41
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	540		27
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		65%			04%			15%			+17%						
'90		08%			17%			08%			+29%						
'96		02%			00%			.33%			-46%						
'01		00%			00%			.63%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	3466	Dec:	21%		
												'90	4198		35%		
												'96	5900		2%		
												'01	3160		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			
Juniperus osteosperma																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	-	5
	01	2	-	-	-	-	-	-	2	-	4	-	-	-	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%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-			
											'90	0		-			
											'96	160		-			
											'01	140		-			

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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	2	-	-	-	-	-	5	-	-	-	333		5	
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
	01	9	-	-	3	-	-	-	-	-	12	-	-	-	240		12	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66	5	5	1
	96	96	-	-	16	-	-	-	-	-	112	-	-	-	2240	12	15	112
	01	95	-	-	19	-	-	-	-	-	114	-	-	-	2280	7	8	114
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	4	-	-	3	-	-	-	-	-	6	-	-	1	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%			+82%							
'96		00%			00%			.79%			+ 5%							
'01		00%			00%			.75%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	465		14%			
												'96	2520		1%			
												'01	2660		5%			

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	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	4	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	10	1
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	4	12	6
	01	5	-	-	2	-	-	-	-	-	7	-	-	-	140	-	-	7
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	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%			+ 0%							
'90		00%			00%			00%			+59%							
'96		00%			00%			00%			-13%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	66		0%			
												'96	160		13%			
												'01	140		0%			
Pinus edulis																		
S	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%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			

Trend Study 1-3-01

Study site name: Rosebud Hills.

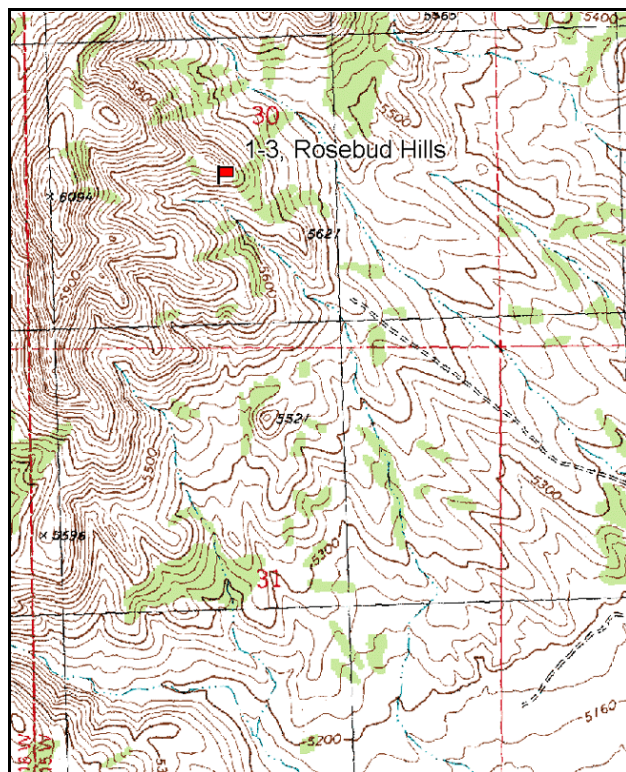
Vegetation type: Black Sagebrush.

Compass bearing: frequency baseline 341 degrees magnetic.

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

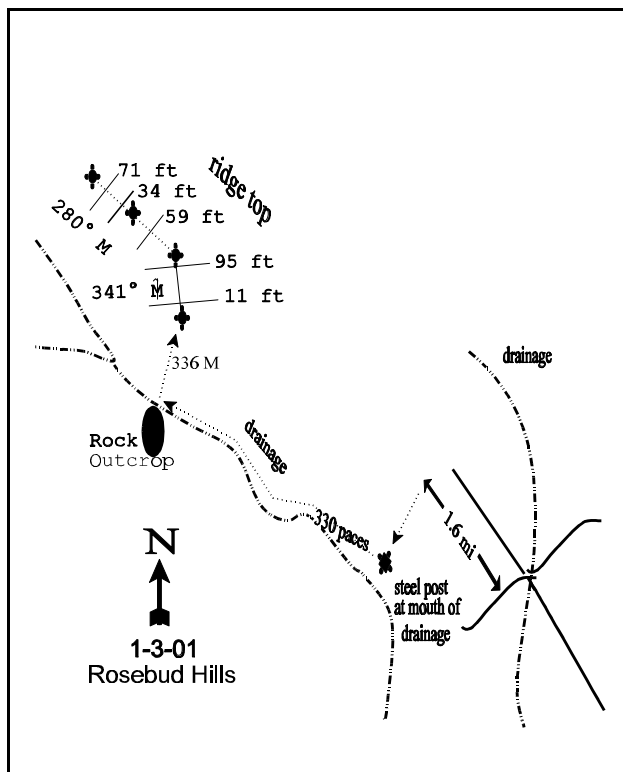
LOCATION DESCRIPTION

Traveling towards Rosette (north) on U-30, proceed 0.1 miles past mile marker 34 and turn left (west). Proceed through a gate and travel 1.2 miles to a fork. Turn left and proceed 0.3 miles southwest to another fork. Turn right and proceed 1.6 miles to end of the road, crossing a wash and following the ridgetop. From the end of the road walk to the mouth of the drainage to the left. Start up the drainage and find a green steel stake near the opening of the drainage. Beginning at the stake, proceed approximately 330 paces up the drainage bottom and note a large rock outcrop on the left. If the drainage has divided, you have gone too far. From the outcrop, take a bearing of 336 degrees magnetic and proceed 75 yards up the slope to the 0-foot stake of the baseline. The 0-foot stake is marked with browse tag number 7907. The baseline runs south to north at 341 degrees magnetic. Lines 2 and 3 change directions and run 280 degrees magnetic. Lines 2 and 3 change directions and run 280 degrees magnetic.



Map Name: Warm Springs Hill

Township 11N, Range 15W, Section 30



Diagrammatic Sketch

UTM 4613482 N, 282590 E

DISCUSSION

Trend Study No. 1-3

The Rosebud Hills study is located on the east side of the Rosebud Hills. In the past it was thought to be a major concentration area for wintering deer. Evidence for this conclusion was furnished by the presence of 12 winter-killed carcasses located within a 200 yard radius of the study site during the 1984 readings. Pellet groups were abundant, but appear to be quickly dispersed by overland water flow. A pellet group transect read on site in 2001 estimated only 12 deer days use/acre (30 days use/ha) and 1 elk day use/acre (3 days use/ha). This area is typical foothill terrain, occupied primarily by black sagebrush with scattered pockets of Utah juniper on the ridges and canyon bottoms. Vegetative production for this vegetative type (black sagebrush-grass) was inventoried and determined in 1970 to have an air dry weight of 1,194 pounds per acre. The study site has a moderately steep (40%) south slope and an elevation of 5,720 feet.

Soils on the study site, including most of the surrounding area, are extremely rocky. It is a sandy clay-loam with a slightly alkaline pH (7.8). Site potential could be affected by the low amounts of phosphorus in the soil (5.4 ppm) where values less than 10 ppm can affect plant growth and development. Average rooting depth was estimated at almost 17 inches during the 1996 reading. The underlying rock appears to be fractured in some areas as some deeper measurements were encountered (over 20 inches). Weathered-in-place, soil is derived from parent material composed primarily of metamorphic rock, probably quartzite, with lesser amounts of a sedimentary shale-like rock. Ground cover from vegetation or litter is poor and erosion is occurring. Signs of erosion include the amount of exposed rock, erosion pavement, and pedestalling of perennial plants. The soil surface has an almost "armored" appearance with rock and pavement covering more than half of the ground surface (65% in 2001).

Browse composition is dominated by an evenly spaced, but low-growing stand of black sagebrush numbering approximately 7,320 plants/acre in 1996. Currently ('01), the density is estimated at 7,600 plants/acre. Of these, 6% are young, 71% are mature, and 23% are decadent. Individual shrubs are regularly spaced and separated by interspaces largely devoid of vegetation. Use was very heavy in 1984, when 91% of the sagebrush was classified as heavily hedged (>60% of twigs browsed). Percent decadence was also high then at 47%. Conditions were similar in 1990, except use was mostly light. Use was moderate in 1996 and light in 2001.

Other shrubs occurring on the study area include: shadscale saltbush, narrowleaf low rabbitbrush, Nevada ephedra, spiny horsebrush, grey horsebrush, spiny hopsage, Utah juniper, a few antelope bitterbrush, and big sagebrush that are intermediate in appearance between basin and Wyoming big sage. The latter two species, however, are very heavily utilized because they are preferred and in such low numbers. They could disappear from the site over time. Shadscale is still the second most productive shrub on the site, providing 12% of the shrub cover in 2001. Utilization was moderate to heavy in 1996, but light in 2001.

Herbaceous composition is depleted and is of little value either for forage or soil protection. Grasses combined to produce only 1.5% cover in 1996, and 5% cover in 2001. Forbs continue to combine for less than 1% cover. Perennial or biennial plants are scarce and are limited to a few low-growing milkvetches, cryptantha, longleaf phlox, and grasses such as Bottlebrush squirreltail, Indian ricegrass, Sandberg bluegrass, and sparse clumps of bearded bluebunch wheatgrass in the canyon bottom.

1984 APPARENT TREND ASSESSMENT

Soil is very shallow and rocky. A long history of erosion has removed much of the surface soil leaving an almost "armored" soil surface composed of small to medium sized rocks and erosion pavement. Trend appears to be in a state of decline but most of the damage has already occurred. Vegetative condition is poor but essentially stable. The herbaceous component is depleted and unlikely to improve or deteriorate further.

The black sagebrush population is maintaining itself through reproduction. Seedlings become established in shelter provided either by larger rocks or directly underneath shrub crowns.

1990 TREND ASSESSMENT

The lightly utilized south-facing slope is dominated by black sagebrush and shadscale. Both populations appear relatively stable. There is almost a 15% canopy cover from the low-growing sagebrush. The site supports very low diversity and production for perennial herbaceous plants. Perennial grass sum of nested frequency and quadrat frequency indicates a slight overall decline. Forbs are already at very low frequencies (almost non-existent) with not much change. The high percentage of erosion pavement and active sheet erosion is normal for this type of site.

TREND ASSESSMENT

soil - stable, but poor condition (3)

browse - stable (3)

herbaceous understory - down slightly and poor condition (2)

1996 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1990. Soil conditions are poor with little bare soil being exposed. Soil depth estimates made in 1996 report effective rooting depth to be almost 17 inches with occasional measurements over 20 inches. Soil temperature at an average depth of 15 inches is moderately high at 64°F, making this slope a harsh site for seedling establishment with more than 60% rock cover and moderately high soil surface temperatures during the summer months. This helps explain why this area is dominated by black sagebrush instead of mountain big sagebrush. The browse trend is slightly up with increased densities of black sagebrush and shadscale. Current utilization is heavier on these shrubs than in 1990, but not as heavy as 1984. Percent decadence is lower and vigor is good. The herbaceous understory is still deficient. Trend is slightly up, due to an increase in the sum of nested frequency of grasses and forbs.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - slightly up (4)

herbaceous understory - slightly up but poor (4)

2001 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1996. Soil conditions continue to be poor but little bare soil is exposed due to the extremely high rock and pavement cover. The browse trend is fairly stable for black sagebrush and shadscale. Current utilization is mostly light. Percent decadence is slightly higher yet the population still shows good vigor. The herbaceous understory continues to be deficient but now approaches 6% cover. Trend is stable for perennial species. Sum of nested frequency of perennial grasses declined slightly but neither Indian ricegrass or bottlebrush squirreltail declined significantly. These two species account for 37% of the total herbaceous cover. Nested frequency of annual cheatgrass did increase significantly. Sum of nested frequency of perennial forbs also declined slightly but they provide only 2% of the herbaceous cover. Annual forbs increased in frequency.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - stable (3)

herbaceous understory - stable but in poor condition (3)

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 3

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	<i>Bromus tectorum</i> (a)	-	-	_a 119	_b 192	-	-	48	75	.61	3.06
G	<i>Oryzopsis hymenoides</i>	23	31	30	24	14	16	17	11	.42	1.20
G	<i>Sitanion hystrix</i>	_b 68	_a 17	_a 40	_a 36	33	7	22	21	.42	.87
Total for Annual Grasses		0	0	119	192	0	0	48	75	0.61	3.06
Total for Perennial Grasses		91	48	70	60	47	23	39	32	0.85	2.07
Total for Grasses		91	48	189	252	47	23	87	107	1.47	5.13
F	<i>Arabis</i> spp.	-	-	-	1	-	-	-	1	-	.00
F	<i>Astragalus beckwithii</i>	2	-	-	-	1	-	-	-	-	-
F	<i>Astragalus newberryi</i>	1	1	5	-	1	1	2	-	.01	-
F	<i>Castilleja linariaefolia</i>	-	-	7	-	-	-	3	-	.18	-
F	<i>Cryptantha</i> spp.	_A -	_a 1	_b 20	_a -	-	1	9	-	.10	-
F	<i>Eriogonum cernuum</i> (a)	-	-	50	-	-	-	22	-	.38	-
F	<i>Gilia</i> spp. (a)	-	-	_a 8	_b 83	-	-	3	37	.01	.27
F	<i>Lappula occidentalis</i> (a)	-	-	_a 4	_b 37	-	-	2	18	.01	.11
F	<i>Oenothera caespitosa</i>	_a -	_a -	_b 12	_b 9	-	-	6	6	.22	.10
F	<i>Phlox longifolia</i>	-	-	6	1	-	-	2	1	.03	.00
F	<i>Sphaeralcea coccinea</i>	-	-	1	-	-	-	1	-	.00	-
F	Unknown forb-perennial	-	-	4	-	-	-	2	-	.01	-
Total for Annual Forbs		0	0	62	120	0	0	27	55	0.40	0.38
Total for Perennial Forbs		3	2	55	11	2	2	25	8	0.57	0.11
Total for Forbs		3	2	117	131	2	2	52	63	0.98	0.50

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

BROWSE TRENDS --
Herd unit 01 , Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	98	93	14.77	13.89
B	Artemisia spinescens	1	2	-	-
B	Atriplex confertifolia	64	60	2.24	1.70
B	Chrysothamnus viscidiflorus stenophyllus	33	47	.86	2.36
B	Ephedra nevadensis	6	5	.06	.53
B	Juniperus osteosperma	3	4	.44	1.37
B	Kochia americana	3	5	-	.03
B	Tetradymia nuttallii	4	9	.03	.33
Total for Browse		212	225	18.40	20.24

BASIC COVER --
Herd unit 01 , Study no: 3

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	256	263	1.25	4.50	20.42	27.07
Rock	370	343	43.00	54.75	45.49	39.50
Pavement	349	362	14.00	19.25	15.93	25.78
Litter	361	250	19.25	13.75	15.79	8.97
Cryptogams	81	11	.50	0	.43	.10
Bare Ground	205	196	22.00	7.75	3.59	6.07

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 03, Rosebud Hills

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.7	64.0 (14.9)	7.8	50.6	26.1	23.4	.81	5.4	208.0	.64

PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 3

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	13	4	278	N/A
Elk	-	-	17	1 (3)
Deer	30	6	157	12 (30)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 3

AGE	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia nova																		
S	84	47	2	-	-	-	-	-	-	-	49	-	-	-	1633			49
	90	30	-	-	-	-	-	-	-	-	30	-	-	-	1000			30
	96	24	-	-	2	-	-	-	-	-	26	-	-	-	520			26
	01	8	-	-	-	-	-	1	-	-	9	-	-	-	180			9
Y	84	5	2	-	-	-	-	-	-	-	7	-	-	-	233			7
	90	49	2	-	-	-	-	-	-	-	49	1	1	-	1700			51
	96	24	15	2	1	1	-	-	-	-	43	-	-	-	860			43
	01	19	-	-	-	-	-	2	-	-	21	-	-	-	420			21
M	84	-	3	85	-	-	-	-	-	-	69	-	19	-	2933	14	23	88
	90	62	-	-	-	-	-	-	-	-	62	-	-	-	2066	9	18	62
	96	8	99	40	-	107	3	-	-	-	252	-	5	-	5140	10	24	257
	01	271	-	-	-	-	-	-	-	-	271	-	-	-	5420	8	21	271
D	84	-	6	79	-	-	-	-	-	-	58	-	27	-	2833			85
	90	75	2	1	1	-	-	-	-	-	65	2	7	5	2633			79
	96	2	42	6	-	14	2	-	-	-	55	-	-	11	1320			66
	01	78	3	-	7	-	-	-	-	-	61	-	2	25	1760			88
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	740			37
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	840			42
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		06%			91%			26%			+ 6%							
'90		02%			.52%			07%			+13%							
'96		76%			14%			04%			+ 4%							
'01		.78%			00%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	5999	Dec:	47%			
												'90	6399		41%			
												'96	7320		18%			
												'01	7600		23%			

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 spinescens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	3	-	-	-	-	-	-	-	-	-	-	60	3	4	3	
	01	-	-	-	-	-	-	2	-	-	-	-	-	40	13	13	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	100%			00%			00%			-33%							
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
												'01	40		-			
Atriplex confertifolia																		
S	84	1	-	-	-	-	-	-	-	-	-	-	-	33			1	
	90	2	-	-	1	-	-	-	-	-	-	-	-	100			3	
	96	17	-	-	-	-	-	-	-	-	-	-	-	340			17	
	01	-	-	-	1	-	-	-	-	-	-	-	-	20			1	
Y	84	4	-	-	-	-	-	-	-	-	-	-	-	133			4	
	90	3	-	-	-	-	-	-	-	-	-	-	-	100			3	
	96	35	26	4	4	17	1	-	-	-	-	-	-	1740			87	
	01	5	-	-	11	-	-	1	-	-	-	-	-	340			17	
M	84	21	2	1	-	-	-	-	-	-	-	-	-	800	8	13	24	
	90	13	-	-	-	-	-	-	-	-	-	-	-	433	8	9	13	
	96	14	21	9	26	76	28	-	-	6	-	-	-	3600	6	12	180	
	01	15	3	2	107	-	-	10	-	-	-	-	-	2740	4	8	137	
D	84	10	2	1	-	-	-	-	-	-	-	-	-	433			13	
	90	16	-	-	-	-	-	-	-	-	-	-	-	533			16	
	96	1	-	-	1	8	1	-	-	-	-	-	-	220			11	
	01	4	-	1	37	-	-	2	-	-	-	-	-	880			44	
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	10%			05%			02%			-22%							
	'90	00%			00%			19%			+81%							
	'96	53%			18%			01%			-29%							
	'01	02%			02%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1366	Dec:	32%			
												'90	1066		50%			
												'96	5560		4%			
												'01	3960		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				
Chrysothamnus viscidiflorus stenophyllus																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	7	-	-	1	-	-	-	-	-	8	-	-	-	266		8	
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100		5	
	01	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	84	8	2	2	-	-	-	-	-	-	12	-	-	-	400	6	8	12
	90	10	-	-	-	-	-	-	-	-	10	-	-	-	333	8	11	10
	96	36	-	-	3	3	-	-	-	-	42	-	-	-	840	8	15	42
	01	51	-	-	-	-	-	-	-	-	51	-	-	-	1020	8	16	51
D	84	1	1	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	4	-	-	-	-	-	2	-	-	5	-	-	1	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		16%			11%			00%			- 5%							
'90		00%			00%			00%			+36%							
'96		06%			00%			00%			+29%							
'01		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	632	Dec:	10%			
												'90	599		0%			
												'96	940		0%			
												'01	1320		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				
Ephedra nevadensis												
Y	84	-	-	-	-	-	-	-	0		0	
	90	-	1	-	-	-	-	-	33		1	
	96	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	20		1	
M	84	-	-	2	-	1	-	-	100	10	13	3
	90	-	-	1	1	-	-	-	66	11	14	2
	96	-	-	3	-	1	3	-	140	11	16	7
	01	2	-	1	-	-	-	-	60	11	23	3
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		33%		67%		33%		- 1%				
'90		33%		33%		00%		+29%				
'96		14%		86%		00%		-29%				
'01		00%		40%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	100	Dec:	0%
									'90	99		0%
									'96	140		0%
									'01	100		20%
Juniperus osteosperma												
S	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	33		1	
	96	-	-	-	-	-	-	-	0		0	
	01	3	-	-	-	-	-	-	60		3	
M	84	-	1	-	-	-	1	-	66	60	66	2
	90	1	-	-	-	-	-	-	33	67	87	1
	96	3	-	-	-	-	-	-	60	-	-	3
	01	1	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		50%		00%		00%		+ 0%				
'90		00%		00%		00%		- 9%				
'96		00%		00%		00%		+25%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	66	Dec:	-
									'90	66		-
									'96	60		-
									'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				
Kochia americana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100	6	5	
	01	1	-	-	-	-	-	1	-	-	2	-	-	-	40	5	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%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	120		-			
												'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				
Tetradymia nuttallii												
S	84	1	-	-	-	-	-	-	1	1		
	90	6	-	-	-	-	-	-	6	-	-	6
	96	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	0	-	-	0
Y	84	10	-	-	-	-	-	-	10	-	-	10
	90	3	-	-	-	-	-	-	3	-	-	3
	96	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	1	-	-	1
M	84	2	-	-	-	-	-	-	2	-	-	2
	90	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	2	1	-	-	3	-	-	3
	01	-	-	-	-	-	2	-	2	-	-	2
D	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	1	-	-	1
	01	4	-	-	2	-	4	-	4	-	1	10
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%		-75%				
'90		00%		00%		00%		-20%				
'96		25%		00%		25%		+69%				
'01		00%		00%		46%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	399	Dec:	0%
									'90	100		0%
									'96	80		25%
									'01	260		77%
Tetradymia spinosa												
M	84	1	-	-	-	-	-	-	1	-	-	1
	90	1	-	-	-	-	-	-	1	-	-	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		00%		00%		100%						
'96		00%		00%		00%						
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	33	Dec:	-
									'90	33		-
									'96	0		-
									'01	0		-

Trend Study 1-4-01

Study site name: Chokecherry Springs.

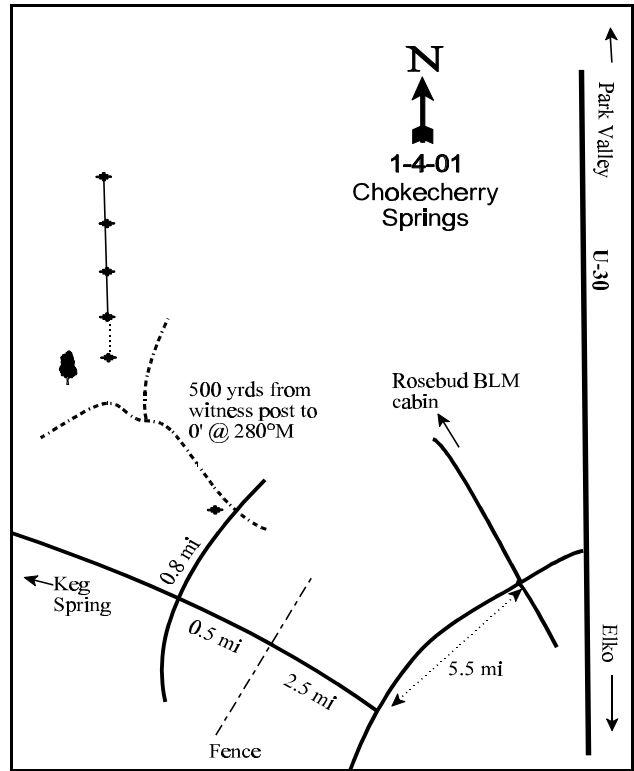
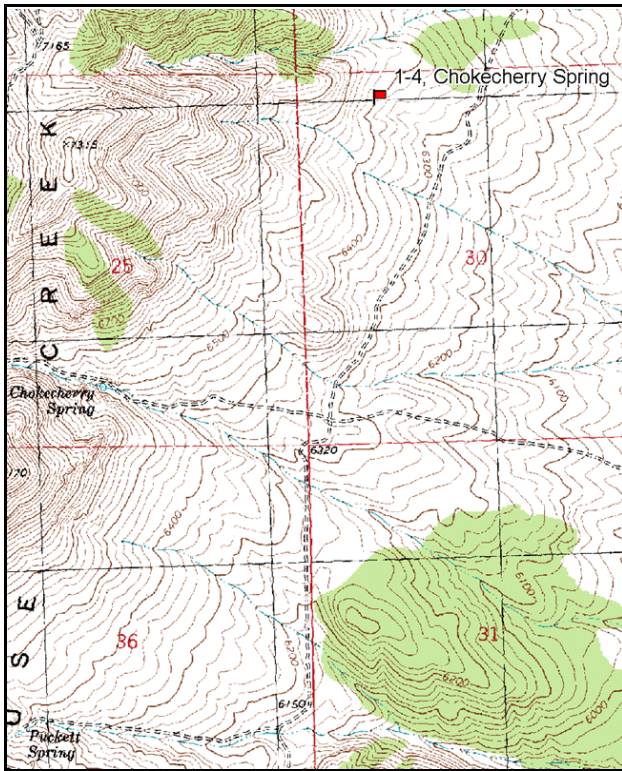
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 345 degrees magnetic.

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

LOCATION DESCRIPTION

Proceed from U-30 towards the Rosebud BLM field station. Bear left at the fork to the BLM station. Travel 2.1 miles to canal and intersection with a sign designating Emigrant Pass Road. Proceed southwest on Emigrant Pass Road 5.5 miles to a fork. Turn right and travel 2.5 miles to a gate. Pass through the gate and proceed 0.5 miles and turn right at a four-way junction. Travel 0.8 miles to a witness post on left side of road and stop. From the witness post, take a bearing of 276 degrees magnetic to a large juniper, just off the left side of the drainage with several young around it. This juniper is located on the slope above the split in the drainage. Walk about 500 yards from the witness post to the large juniper. From this tree, take a bearing of 9 degrees magnetic and walk 9 paces to the 0-foot stake of the baseline, which is marked with browse tag #7910. The baseline runs at 345 degrees magnetic.



Map Name: Emigrant Pass

Diagrammatic Sketch

Township 10N, Range 16W, Section 30

UTM 4604973 N, 272512 E

DISCUSSION

Trend Study No. 1-4

The Chokecherry Springs study is located approximately one mile northeast of Chokecherry Spring on a moderately gentle (15%) east-southeast facing slope. This area is a mountain big sagebrush-grass type which contains a scattered population of antelope bitterbrush. Elevation (6,400 feet) and exposure both suggest that the area is not "critical" deer winter range. The local conservation officer considers the area "preferred winter range." A pellet group transect read in conjunction with the vegetation transect estimates 36 deer days use/acre (88 deer days use/ha) and 3 cow days use/acre (7 cow days use/ha). Vegetationally and topographically, this site is intermediate between the mountain brush type on steeper, higher slopes and the more gentle alluvial slopes to the east. Immediately below and east of the study area, there are broad ridges occupied by black sagebrush with intervening swales containing mostly basin big sagebrush.

Soil is moderately deep clay loam, but quite rocky, and slightly alkaline (7.7 pH). Effective rooting depth (see methods) is not an apparent problem. Average effective rooting depth was estimated at nearly 16 inches with several measurements over 20". Like the site at Rosebud Hills (#1-3), soil temperature is moderately high, with an average of 60° F at a depth of nearly 17 inches. Surface rock cover is much lower however than site #1-3, with rock and pavement combining to produce almost 10% cover in 2001. The area appears fertile and generally has a good litter cover and organic content. However, phosphorus could be a limiting factor at only 5.9 ppm where values less than 10 ppm can adversely affect some plants development and growth. Vegetative cover from shrubs, to a lesser extent herbaceous plants, are adequate to prevent accelerated erosion. Low to moderate soil movement is occurring by trailing livestock and wildlife. The erosion condition class was determined to be only slight in 2001.

By virtue of its abundance and palatability, mountain big sagebrush is the key browse species, accounting for 51% of estimated browse cover in 2001. The population has been steadily decreasing in density since 1984, by about 15% each time it was sampled. Utilization is mostly light to moderate. Dead plants are fairly numerous at 840 plants/acre in 2001, a dead to live ratio of 1:3. This ratio has been fairly consistent since 1996. A serious threat to big sagebrush as well as most other browse species, is the winter feeding activities of Voles (Microtus spp.). A large number of shrubs in the immediate area showed evidence of complete or near complete girdling damage during the 1984 reading. This appears to have commonly occurred during the severe winters of 1982-84 in many areas. Such damage is especially evident in swales, however, it has also occurred within the study area. Some winter injury was noted on some of the sagebrush in 1996, perhaps caused by the deep snows during the 1992-93 winter. Currently ('01) there are an estimated 540 decadent plants/acre, 19% of which were classified as dying.

Among other shrub species, the most important is a semi-erect layering ecotype of antelope bitterbrush. It made up 20% of the browse cover in 2001. This species showed evidence of relatively intense deer use as well as rodent damage in 1984 and 1990. Current ('01) use is light to moderate. The site could support more bitterbrush than currently occurs. Narrowleaf low rabbitbrush, a known increaser, occurs in moderately high numbers and displays a stable trend.

Perennial grasses occur in rather low numbers with 7 species combining to produce only about 9% cover in 1996 and 2001. Most important is bluebunch wheatgrass followed by subalpine needlegrass, bottlebrush squirrel tail, and Sandberg bluegrass. Almost all of these showed evidence of use by cattle in 1984. Annual cheatgrass is the most abundant grass which accounted for 42% of the grass cover in 1996 and 73% in 2001.

Forb composition is moderately diverse but not highly productive. The most productive forbs on the site include: arrowleaf balsamroot, stoneseed, silvery lupine, tapertip hawksbeard, and longleaf phlox.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable even though limited erosion is occurring. Animal use is the chief disturbance and most erosion is associated with trampling and effects of trailing. Soil trend could easily decline if intensity of use were to greatly increase. Vegetative trend appears stable to slightly down. The principal factors are a large and vigorous population of narrowleaf low rabbitbrush, serious rodent damage on all species of shrubs and an apparent slow but steady decline in antelope bitterbrush. The latter species maintains itself primarily through vegetative means.

1990 TREND ASSESSMENT

This relatively higher elevation winter range shows the potential for excellent mountain big sagebrush and bitterbrush production. The trend values for these key browse species are down slightly. Both populations have declined in density and show lower numbers of seedlings and young. Utilization of sagebrush is mostly light this year and percent decadence is stable. However, 45% of the decadent plants sampled were classified as dying. Bitterbrush has declined 60% in density and half of the plants sampled in 1990 are decadent. The herbaceous understory is diverse and fairly productive. Five out of the six grasses and twelve out of twenty-one forbs have increased nested and quadrat frequency values.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - slightly up (4)

1996 TREND ASSESSMENT

Ground cover characteristics have improved since 1990. Percent bare ground has declined from 17% to 7% and litter cover has increased from 45% to 55%. Trend for the key browse species, mountain big sagebrush, appears to be stable to slightly down. The population has declined slightly, percent decadence has increased from 21% to 26%, and the proportion of shrubs displaying poor vigor increased slightly (14% to 16%). Trend for antelope bitterbrush is up. However, bitterbrush accounts for only 14% of the shrub cover with an estimated density of 740 plants/acre. The increase in density since 1990 (132 to 740 plants/acre) is likely due to the larger, more representative sample used in 1996. Percent decadency declined from 50% to 0%, with heavy use decreasing from 50% to 3%. Overall, trend for browse is stable. The herbaceous understory displays a slightly upward trend. Sum of nested frequency increased slightly for perennial grasses while nested frequency of forbs remained similar.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - up slightly (4)

2001 TREND ASSESSMENT

Ground cover characteristics have remained similar to 1996. There has been little change in percent bare soil but a slight decrease in litter cover. Trend for soil is stable. Trend for the key browse species, mountain big sagebrush, appears to be slightly down. The population has declined slightly, percent decadence is still fairly high, and young recruitment is poor. There has been a decrease in the sagebrush population of about 15% during each sampling date since 1984. Trend for antelope bitterbrush is slightly up, but it accounts for only about 20% of the shrub cover with an estimated density of 800 plants/acre. Percent decadency of bitterbrush remains low at 5%. Overall, trend for browse is slightly down. The herbaceous understory displays a slightly upward trend. Sum of nested frequency increased slightly for perennial grasses, while frequency for perennial

forbs remained similar. One negative factor is the significant increase in annual cheatgrass. Cover of cheatgrass has increased nearly 4 fold since 1996. It currently accounts for 73% of the grass cover with a cover value of 23%.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

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

HERBACEOUS TRENDS --

Herd unit 01 , 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 dasystachyum	a-	a-	ab12	b17	-	-	4	5	.59	.51
G	Agropyron spicatum	ab58	c72	ab50	b52	28	31	24	22	2.91	2.30
G	Bromus tectorum (a)	-	-	a318	b360	-	-	90	98	6.21	23.46
G	Festuca ovina	-	1	5	-	-	1	3	-	.19	-
G	Oryzopsis hymenoides	4	14	11	10	2	7	5	4	.37	.07
G	Poa secunda	a22	ab35	b58	c140	12	18	26	52	.99	3.95
G	Sitanion hystrix	a17	a10	ab30	b41	8	6	14	20	1.18	.81
G	Stipa thurberiana	a-	ab6	c26	bc15	-	4	13	7	2.45	.84
Total for Annual Grasses		0	0	318	360	0	0	90	98	6.21	23.46
Total for Perennial Grasses		101	138	192	275	50	67	89	110	8.69	8.51
Total for Grasses		101	138	510	635	50	67	179	208	14.90	31.97
F	Agoseris glauca	b28	b32	a5	a2	13	12	3	2	.01	.01
F	Allium spp.	b40	a4	ab14	c92	19	3	8	45	.04	.67
F	Astragalus beckwithii	a4	ab15	c37	bc28	3	8	19	16	.53	.80
F	Astragalus spp.	b34	b24	a-	a-	18	13	-	-	-	-
F	Balsamorhiza sagittata	4	6	11	6	3	4	6	4	1.29	.68
F	Camelina microcarpa (a)	-	-	76	74	-	-	29	31	.19	.81
F	Calochortus nuttallii	-	2	-	5	-	1	-	2	-	.01
F	Chaenactis douglasii	4	2	7	-	2	1	3	-	.01	-
F	Cirsium arvense	5	4	4	-	3	2	2	-	.01	-
F	Collomia linearis (a)	-	-	b46	a8	-	-	25	3	.15	.01
F	Comandra pallida	a7	a6	b29	b36	2	2	11	18	.55	.50
F	Collinsia parviflora (a)	-	-	179	156	-	-	67	56	.93	1.30
F	Crepis acuminata	a2	b33	b17	ab11	2	14	11	6	.35	.31
F	Cryptantha spp.	-	-	13	-	-	-	8	-	.04	-
F	Draba spp. (a)	-	-	-	2	-	-	-	1	-	.00
F	Galium aparine (a)	-	-	8	-	-	-	4	-	.04	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Gayophytum ramosissimum (a)	-	-	_a 1	_b 51	-	-	1	19	.03	.67
F	Gilia spp. (a)	-	-	-	11	-	-	-	3	-	.01
F	Hackelia patens	_{ab} 19	_b 27	_a 8	_a 1	9	15	4	1	.04	.00
F	Lappula occidentalis (a)	-	-	-	2	-	-	-	2	-	.01
F	Lactuca serriola	2	-	-	-	1	-	-	-	-	-
F	Lithospermum ruderales	_a 1	_b 15	_b 15	_{ab} 7	1	8	8	5	1.20	.29
F	Lomatium triternatum	9	13	8	4	5	6	4	3	.04	.01
F	Lupinus argenteus	_{ab} 13	_a 3	_b 23	_{ab} 17	6	2	11	8	1.33	1.46
F	Lygodesmia spinosa	_a 29	_b 47	_{ab} 37	_a 19	17	26	18	10	.66	.55
F	Machaeranthera spp	_a -	_a -	_b 13	_a -	-	-	5	-	.02	-
F	Microsteris gracilis (a)	-	-	_a -	_b 32	-	-	-	17	-	.47
F	Oenothera caespitosa	2	2	2	-	1	2	1	-	.03	-
F	Penstemon speciosus	-	1	-	-	-	1	-	-	-	-
F	Phlox longifolia	_a 60	_{ab} 89	_b 100	_b 103	28	42	48	47	.51	.80
F	Ranunculus testiculatus (a)	-	-	7	13	-	-	3	4	.01	.02
F	Tragopogon dubius	1	5	5	2	1	3	3	2	.04	.01
F	Veronica biloba (a)	-	-	21	20	-	-	8	6	.06	.05
Total for Annual Forbs		0	0	338	369	0	0	137	142	1.43	3.39
Total for Perennial Forbs		264	330	348	333	134	165	173	169	6.75	6.12
Total for Forbs		264	330	686	702	134	165	310	311	8.19	9.51

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

BROWSE TRENDS --
Herd unit 01 , Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	70	65	13.18	16.61
B	Chrysothamnus nauseosus consimilis	7	7	.79	.96
B	Chrysothamnus viscidiflorus viscidiflorus	77	72	10.39	5.98
B	Juniperus osteosperma	3	6	.01	.33
B	Opuntia spp.	12	8	.03	.56
B	Purshia tridentata	28	25	3.91	6.42
B	Symphoricarpos oreophilus	5	10	.07	1.43
Total for Browse		202	193	28.41	32.32

CANOPY COVER --
Herd unit 01 , Study no: 4

Point-Quarter Tree Data

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	-	1	28	76	3.9	2.6

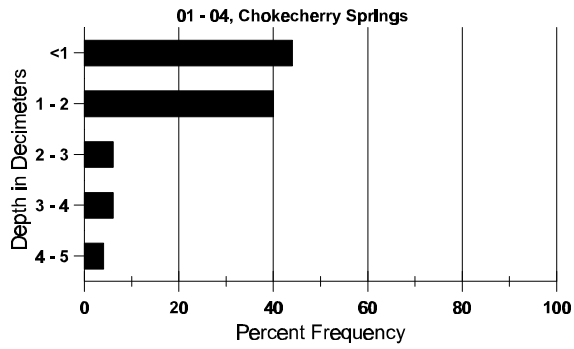
BASIC COVER --
Herd unit 01 , Study no: 4

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	366	386	1.75	11.50	46.40	62.06
Rock	216	115	8.25	9.75	6.39	4.69
Pavement	242	190	14.75	16.50	6.14	4.69
Litter	397	359	58.50	45.25	55.46	44.56
Cryptogams	11	4	0	0	.05	.06
Bare Ground	187	152	16.75	17.00	7.03	7.97

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 04, Chochecherry Springs

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	60.6 (16.9)	7.7	41.7	29.0	29.3	2.5	5.9	201.6	.5

Stoniness Index



PELLET GROUP FREQUENCY -- Herd unit 01 , Study no: 4

Type	Quadrat Frequency	
	'96	'01
Rabbit	5	1
Deer	11	14
Cattle	3	1

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
17	N/A
461	35 (88)
35	3 (7)

BROWSE CHARACTERISTICS --

Herd unit 01 , 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 tridentata vaseyana																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	9	-	-	-	-	-	-	-	-	9	-	-	180		9		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	84	24	3	-	-	-	-	-	-	-	27	-	-	1800		27		
	90	4	-	-	-	-	-	-	-	-	4	-	-	266		4		
	96	16	1	-	-	-	-	-	-	-	17	-	-	340		17		
	01	5	-	-	-	-	-	-	-	-	5	-	-	100		5		
M	84	7	10	3	-	-	-	-	-	-	20	-	-	1333	34 36	20		
	90	32	4	-	-	-	-	-	-	-	36	-	-	2400	19 25	36		
	96	84	7	-	1	-	-	-	-	-	88	2	2	1840	20 32	92		
	01	91	2	-	1	-	-	-	-	-	94	-	-	1880	22 33	94		
D	84	-	5	8	-	-	-	-	-	-	10	-	3	866		13		
	90	10	-	1	-	-	-	-	-	-	4	-	2	733		11		
	96	28	6	2	3	-	-	-	-	-	18	-	-	780		39		
	01	26	-	-	1	-	-	-	-	-	22	-	-	540		27		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	980		49		
	01	-	-	-	-	-	-	-	-	-	-	-	-	840		42		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		30%			18%			05%			-15%							
'90		08%			02%			14%			-13%							
'96		09%			01%			16%			-15%							
'01		02%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3999	Dec:	22%			
												'90	3399		22%			
												'96	2960		26%			
												'01	2520		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 consimilis																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	26	36	3
	01	2	2	-	1	-	-	-	-	-	5	-	-	-	100	26	26	5
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%										
'90		00%			00%			00%										
'96		00%			00%			00%			-20%							
'01		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	200		20%			
												'01	160		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																		
Y	84	9	1	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	96	6	2	-	2	-	-	-	-	-	9	-	1	-	200		10	
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	26	11	-	-	-	-	-	-	-	37	-	-	-	2466	28 32	37	
	90	21	2	-	1	-	-	-	-	-	22	1	-	1	1600	15 16	24	
	96	145	10	-	12	-	-	-	-	-	167	-	-	-	3340	14 24	167	
	01	109	3	-	14	-	-	-	-	-	126	-	-	-	2520	11 18	126	
D	84	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12	
	90	16	1	-	1	-	-	-	-	-	16	-	-	2	1200		18	
	96	3	1	1	1	-	-	-	-	-	4	-	-	2	120		6	
	01	17	1	-	1	-	-	-	-	-	14	-	-	5	380		19	
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	20%			00%			00%			-15%							
	'90	06%			00%			06%			+ 9%							
	'96	07%			.54%			02%			-18%							
	'01	03%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3932	Dec:	20%			
												'90	3333		36%			
												'96	3660		3%			
												'01	3000		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								
Juniperus osteosperma																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	1	-	-	-	-	1	-	-	-	66		1
	96	-	-	-	2	-	-	-	-	2	-	-	-	40		2
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	84	1	-	-	-	-	-	-	-	1	-	-	-	66		1
	90	1	-	-	-	-	-	-	-	1	-	-	-	66		1
	96	2	-	-	-	-	-	-	-	2	-	-	-	40		2
	01	4	-	-	1	-	-	1	-	6	-	-	-	120		6
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-
	01	-	-	-	-	-	-	-	-	-	-	-	-	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%		+50%								
'01		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'84	66	Dec:	-			
										'90	66		-			
										'96	60		-			
										'01	120		-			
Opuntia spp.																
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	3	-	-	-	-	-	-	-	3	-	-	-	200	6	5
	90	3	-	-	-	-	-	-	-	3	-	-	-	200	8	17
	96	13	-	-	-	-	-	-	-	13	-	-	-	260	5	15
	01	9	-	-	-	-	-	-	-	9	-	-	-	180	5	10
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%		+ 0%								
'90		00%		00%		00%		+33%								
'96		00%		00%		00%		-40%								
'01		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'84	200	Dec:	0%			
										'90	200		0%			
										'96	300		7%			
										'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	2	1	2	-	-	-	-	-	-	4	-	1	-	333		5	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	2	1	-	1	-	-	-	-	-	4	-	-	-	80		4	
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'90	-	-	1	-	-	-	-	-	-	1	-	-	-	66	15	35	
	'96	18	11	1	2	1	-	-	-	-	33	-	-	-	660	27	54	
	'01	17	15	2	1	2	-	-	-	-	37	-	-	-	740	33	57	
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	-	1	-	-	-	1	-	-	-	2	-	-	-	40		2	
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%			40%			20%			-60%							
'90		50%			50%			00%			+82%							
'96		35%			03%			00%			+ 8%							
'01		45%			08%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	132		50%			
												'96	740		0%			
												'01	800		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				
Symphoricarpos oreophilus																		
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	1	1	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	1	-	-	-	-	-	-	-	2	-	-	-	133	26	65	2
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200	17	52	3
	96	2	1	-	1	-	-	-	-	-	4	-	-	-	80	21	47	4
	01	12	-	-	1	-	-	-	-	-	13	-	-	-	260	21	49	13
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		25%			00%			00%			+20%							
'90		00%			00%			20%			-64%							
'96		33%			17%			00%			+54%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	332		20%			
												'96	120		0%			
												'01	260		0%			

Trend Study 1-5-01

Study site name: Devil's Playground.

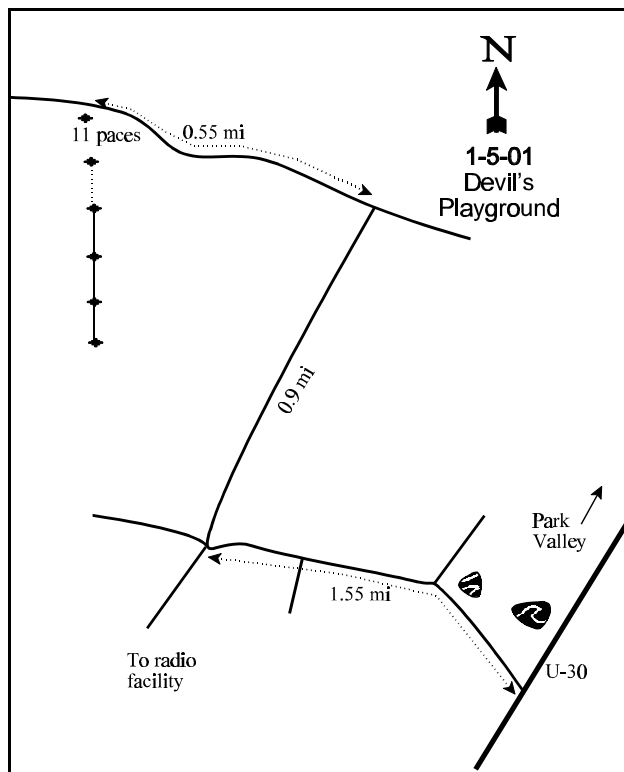
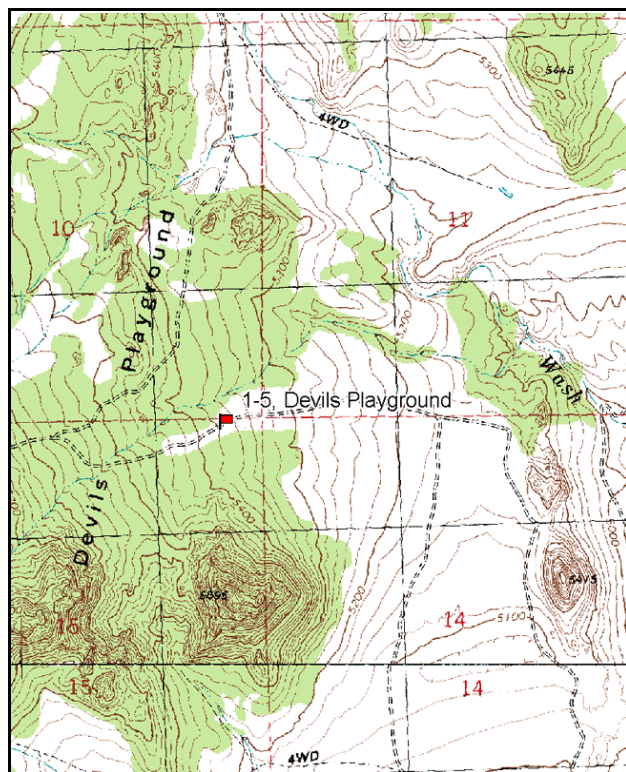
Vegetation type: Black Sagebrush.

Compass bearing: frequency baseline 173 degrees magnetic.

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

LOCATION DESCRIPTION

Proceed toward Elko, Nevada on U-30 to mile marker 24 and turn right (west). Travel 1.55 miles to a fork and bear right. Bear right and travel 0.9 miles. Turn left (west) and travel 0.55 miles to rock pile on left side of road. Walk 11 paces southwest from the rock pile to the 0-foot stake of the frequency baseline. The baseline is marked by a red browse tag #708. The azimuth of the baseline is 173 degrees magnetic.



Map Name: Emigrant Pass

Diagrammatic Sketch

Township 9N, Range 16W, Section 15

UTM 4598420 N, 278270 E

DISCUSSION

Trend Study No. 1-5

The Devil's Playground study samples what is considered critical deer winter range. This area is on gentle (5% to 10%) east facing slopes interrupted by large granite outcrops. The vegetation is dominated by juniper-pinyon woodland with numerous and various sized openings occupied by black sagebrush and Wyoming sagebrush. The study area is a mixture of sagebrush and pinyon-juniper woodland at about 5,390 feet elevation. Further to the east, vegetation becomes increasingly dominated by black sagebrush in the more shallow soils. To the west and at a higher elevation, juniper-pinyon woodland is associated with significant amounts of sagebrush and bitterbrush. Deer and sheep are the primary forage users. A pellet-group transect read in conjunction with the vegetation transect in 2001 estimated 15 deer days use/acre (36 days use/ha). This area is within the White Lakes allotment which allows 1,500 sheep to use the area from December 1st through March 31st.

Soil on the site is derived from granite parent material. It is a coarse textured sandy loam which is light colored on the surface, but much darker below. The soil is moderately alkaline (8 pH) with levels of phosphorus at only 3.5 ppm. Values less than 10 ppm may limit normal plant growth and development. Ground cover from vegetation or litter is moderately poor and there are extensive areas of erosion pavement and bare ground between shrubs and trees. The soil appears highly erodible and erosion would increase if the terrain was steeper. The erosion condition class was determined to only be slight in 2001. The soil is moderately deep and well drained. Average effective rooting depth was estimated at 27 inches. Soil temperature is relatively high averaging 60° F at an average depth of 20 inches. Soil temperatures at other sites in the area are also relatively high. The sandy texture and the excessive drained nature of the soil are the main reasons this area is dominated by black sagebrush instead of Wyoming sagebrush.

Browse composition consists chiefly of black sagebrush, interspersed by smaller amounts of narrowleaf low rabbitbrush, prickly phlox, and Wyoming sagebrush. Also present are scattered individuals of Nevada ephedra and spiny hopsage. The black sagebrush population has slowly increased since 1984, from 4,266 plants/acre to 6,380 plants/acre in 2001. The population has good vigor except for some of the decadent individuals. Utilization was noted as heavy in 1984 when 80% of the population displayed heavy use. This is probably one of the factors responsible for partial crown death observed in many of the sagebrush, along with winter injury which occurred to most populations of sagebrush during the bad winters of the early to mid 1980's. Use has been mostly light to moderate since the initial readings. Percent decadence has moderated somewhat since the initial highs in 1984 and 1990 (56% and 82% respectively) to 28% in 2001. The percentage of the decadent plants classified as dying has stayed relatively stable around 25%. Drought combined with the moderately high density of black sagebrush and excessively drained (xeric) characteristics of the soil are likely responsible for this decadence. There are still approximately 510 decadent plants/acre classified as dying. Seedlings and young plants are fairly numerous and in sufficient numbers to maintain the population.

Narrowleaf low rabbitbrush, showed moderate to heavy use in 1984. All other readings show only light use of this less preferred shrub. A few spiny hopsage occur on the site, but none were sampled within the shrub density strips. These shrubs were heavily hedged and appeared to be dying.

The herbaceous understory is fairly diverse but not abundant. Five species of perennial grasses combined to produce about 5% cover in 1996 and 8% cover in 2001. Dominant species include: bluebunch wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. Annual grasses and forbs are numerous, but not dense enough to constitute a fire hazard. Perennial forbs are diverse yet only produce about 1% to 2% total cover. Most of these are low growing and of little forage value.

1984 APPARENT TREND ASSESSMENT

Trend assessment on this site is influenced greatly by animal use associated with excessively harsh winters of 1983-85, soil characteristics, and plant composition. The first factor, animal use, has no doubt had a substantial effect on almost all trend parameters. Use is very heavy and has possibly influenced an unsatisfactory age structure in the key browse species as well as a general depletion of the herbaceous understory. In turn, ground cover and soil organic content have been reduced, which has led to a significant but not extreme rate of soil erosion. One other factor should be considered. The study is within an area where expansion and gradual thickening of the juniper-pinyon type is very likely to occur. Current conditions are such that this process is likely to be enhanced. Both soil and vegetative trends appear to be declining.

1990 TREND ASSESSMENT

Black sagebrush has increased slightly in density. Recent use was judged to be light, compared to heavy use by sheep and deer in previous years. This sagebrush population contains a very high number of decadent plants (82%). It still provides most of the cover on the study site, where there is a relatively low density of pinyon and juniper. Surrounding areas support a much higher density of trees, but not usually a closed canopy. There is a vigorous stand of native grasses for a black sagebrush range type. Three out of five perennial grasses increased significantly in nested frequency. Percent bare ground has decreased slightly (36% to 32%) but litter cover decreased substantially (40% to 33%). Soil erosion is still active but is not serious.

TREND ASSESSMENT

soil - stable but poor condition (3)

browse - slightly down (2)

herbaceous understory - slightly improving but depleted (4)

1996 TREND ASSESSMENT

Protective ground cover characteristics have changed somewhat since 1990. Percent bare ground has declined from 32% to 20%, but some of the increase is due to an increase in pavement cover. Pavement and rock cover have increased since 1984 and currently cover nearly 30% of the ground surface. Litter cover has also declined steadily since 1984 (40% to 27%). The soil is very porous due to the sandy texture, however there are some signs of soil pedestalling and an active gully between lines 2 and 3. Trend for soil is considered stable but in poor condition. The browse trend for the key species, black sagebrush is slightly up. Percent decadence has declined from an extremely high 82% in 1990 to 26%. Utilization is moderate with heavy use reported on only 14% of the population. Vigor is good on all but 22% of the decadent sagebrush. The increaser, narrowleaf low rabbitbrush appears to have a stable trend. Spiny hopsage, likely the most preferred browse on the site, occurs in small numbers and appears to be dying out due to heavy use and lack of reproduction. Trend for the herbaceous understory is mixed. Trend for grasses is down slightly due to decline in the sum of nested frequency of perennial species. However, only 2 species declined significantly, bottlebrush squirreltail and Thurber needlegrass. The most abundant perennial species, Sandberg bluegrass, declined slightly in nested frequency but the change was not significant. Trend for forbs is up with an increase in diversity and sum of nested frequency of perennial species. Since forbs contribute little to the total herbaceous cover on the site, the overall herbaceous trend is considered stable.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - up slightly (4)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Protective ground cover characteristics have remained almost unchanged since 1996. Percent bare ground has declined slightly, but some of the change is due to an increase in pavement cover. Pavement and rock cover have continually increased since 1984 and currently cover nearly 33% of the ground surface. Litter cover has declined steadily since 1984 except for a slight increase in 2001. The soil is very porous due to the sandy texture, however there are some signs of soil pedestalling and an active gully between lines 2 and 3. Trend for soil is considered stable but in poor condition. The browse trend for the key species, black sagebrush, is slightly up. Percent decadence has remained relatively low since 1996. Utilization is light to moderate with heavy use reported on only 17% of the population. Vigor is good on all but 10% of the decadent sagebrush. The increaser, narrowleaf low rabbitbrush, appears to have a stable trend. Spiny hopsage, likely the most preferred browse on the site, occurs in very small numbers and appears to continue slowly dying out due to excessive use, drought, and lack of reproduction. Trend for the herbaceous understory is mixed. Trend for perennial grasses is fairly stable while trend for perennial forbs is down. However forbs make up only 7% of the herbaceous cover. Since forbs contribute little to the total herbaceous cover on the site, trend is still considered stable.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - slightly up (4)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , 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	a28	b56	ab46	ab35	14	22	20	13	1.00	2.26
G	Bromus tectorum (a)	-	-	a97	b284	-	-	45	91	.37	5.21
G	Oryzopsis hymenoides	a4	b17	ab18	ab5	2	10	9	3	.66	.09
G	Poa secunda	a53	b162	b148	b142	26	66	60	54	2.90	3.42
G	Sitanion hystrix	b114	b100	a56	a43	50	49	30	19	.66	.40
G	Stipa thurberiana	b11	bc22	a-	c34	5	11	-	16	-	1.71
G	Vulpia octoflora (a)	-	-	a78	b145	-	-	32	60	.16	.52
Total for Annual Grasses		0	0	175	429	0	0	77	151	0.53	5.74
Total for Perennial Grasses		210	357	268	259	97	158	119	105	5.23	7.89
Total for Grasses		210	357	443	688	97	158	196	256	5.76	13.63

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Agoseris glauca</i>	a ⁻	a ⁻	b ¹⁷	a ⁻	-	-	7	-	.03	-
F	<i>Astragalus beckwithii</i>	2	7	3	4	1	2	3	1	.04	.15
F	<i>Aster</i> spp.	a ⁻	a ⁻	b ⁷⁶	a ⁻	-	-	33	-	.16	-
F	<i>Astragalus utahensis</i>	10	14	11	2	5	7	6	1	.08	.06
F	<i>Castilleja chromosa</i>	b ¹¹	ab ¹	ab ⁷	a ⁻	6	1	3	-	.06	-
F	<i>Chaenactis douglasii</i>	b ²²	ab ⁴	b ²⁸	a ³	11	4	12	1	.08	.00
F	<i>Collinsia parviflora</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Crepis acuminata</i>	-	-	3	-	-	-	1	-	.03	-
F	Cruciferae (a)	-	-	b ³¹	a ⁻	-	-	14	-	.07	-
F	<i>Cryptantha</i> spp.	a ⁻	a ⁴	b ⁹³	a ⁻	-	2	37	-	.36	-
F	<i>Delphinium nuttallianum</i>	-	-	3	2	-	-	1	1	.00	.03
F	<i>Descurainia pinnata</i> (a)	-	-	4	11	-	-	2	6	.01	.03
F	<i>Eriogonum cernuum</i> (a)	a ¹	ab ⁶	b ¹⁰	a ⁻	1	3	5	-	.02	-
F	<i>Eriogonum ovalifolium</i>	-	-	13	-	-	-	5	-	.05	-
F	<i>Galium aparine</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Gayophytum ramosissimum</i> (a)	-	-	35	18	-	-	14	9	.09	.04
F	<i>Gilia</i> spp. (a)	-	-	21	30	-	-	8	16	.04	.08
F	<i>Lappula occidentalis</i> (a)	-	-	-	8	-	-	-	5	-	.02
F	<i>Lomatium</i> spp.	-	-	4	4	-	-	1	3	.00	.16
F	<i>Lygodesmia spinosa</i>	-	-	-	-	-	-	-	-	.00	-
F	<i>Navarretia intertexta</i> (a)	-	-	b ⁷⁸	a ⁻	-	-	34	-	.17	-
F	<i>Phlox hoodii</i>	-	8	4	1	-	4	2	1	.03	.03
F	<i>Phlox longifolia</i>	ab ³⁵	a ²³	ab ³⁵	b ⁴⁹	17	12	16	29	.10	.40
F	<i>Phlox</i> spp.	a ⁻	a ⁻	c ¹⁰²	b ³¹	-	-	37	16	.43	.08
F	<i>Townsendia</i> spp.	-	2	-	-	-	1	-	-	-	-
F	<i>Tragopogon dubius</i>	b ¹³	a ⁻	a ²	a ⁻	6	-	1	-	.03	-
Total for Annual Forbs		1	6	148	73	1	3	63	38	0.34	0.18
Total for Perennial Forbs		93	63	432	96	46	33	179	53	1.60	0.91
Total for Forbs		94	69	580	169	47	36	242	91	1.94	1.10

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

BROWSE TRENDS --
Herd unit 01 , Study no: 5

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	86	84	11.55	13.55
B	Artemisia tridentata wyomingensis	7	5	.60	.15
B	Chrysothamnus viscidiflorus stenophyllus	50	45	1.50	2.54
B	Juniperus osteosperma	3	7	4.88	3.77
B	Leptodactylon pungens	10	12	.16	.03
B	Opuntia polyacantha	1	3	-	.01
B	Pinus monophylla	2	1	.00	.38
B	Symphoricarpos oreophilus	1	1	-	-
Total for Browse		160	158	18.70	20.45

CANOPY COVER --
Herd unit 01 , Study no: 5

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	11	13	39	76	13.2	7.0
Pinus monophylla	-	-	9	49	4.6	2.1

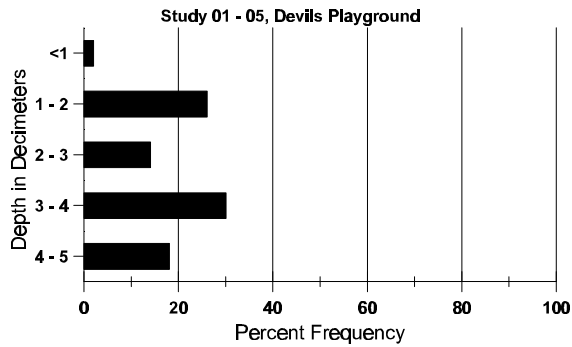
BASIC COVER --
Herd unit 01 , Study no: 5

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	310	327	2.50	8.25	25.64	38.59
Rock	121	19	.25	.50	1.48	.38
Pavement	341	317	20.75	25.00	27.95	32.52
Litter	371	326	39.75	33.00	27.04	29.48
Cryptogams	45	59	1.25	1.50	.72	1.59
Bare Ground	275	226	35.50	31.75	19.56	16.53

SOIL ANALYSIS DATA --
 Herd Unit 01, Study no: 05, Devils Playground

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
26.2	59.6 (19.7)	8.0	65.7	17.0	17.3	.98	3.5	92.8	.5

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 01 , Study no: 5

Type	Quadrat Frequency	
	'96	'01
Sheep	-	1
Rabbit	32	7
Elk	2	-
Deer	44	24

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
104	N/A
-	-
191	15 (36)

BROWSE CHARACTERISTICS --

Herd unit 01 , 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			
Artemisia nova																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	84	1	4	2	-	-	-	-	-	-	7	-	-	-	466		7
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	8	14	-	-	-	-	-	-	-	22	-	-	-	440		22
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
M	84	-	3	18	-	-	-	-	-	-	20	-	1	-	1400	9 16	21
	90	13	-	-	1	-	-	-	-	-	14	-	-	-	933	10 15	14
	96	19	122	33	1	20	3	-	-	-	198	-	-	-	3960	9 23	198
	01	80	91	45	8	-	-	-	-	-	219	5	-	-	4480	10 21	224
D	84	-	4	31	1	-	-	-	-	-	24	-	12	-	2400		36
	90	64	1	-	-	-	-	-	-	-	48	-	-	17	4333		65
	96	11	56	6	3	2	-	-	-	-	61	-	-	17	1560		78
	01	47	23	10	9	-	-	-	-	-	58	-	5	26	1780		89
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	740		37
	01	3	-	-	-	-	-	-	-	-	-	-	-	3	640		32
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		17%			80%			20%			+19%						
'90		01%			00%			22%			+12%						
'96		72%			14%			06%			+ 7%						
'01		36%			17%			10%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	4266	Dec:	56%		
												'90	5266		82%		
												'96	5960		26%		
												'01	6380		28%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
Artemisia tridentata wyomingensis																	
S	84	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	1	-	-	-	-	-	-	1	-	-	-	66	20	25	1
	90	1	-	-	-	-	-	-	-	1	-	-	-	66	21	29	1
	96	5	6	-	-	-	-	-	-	11	-	-	-	220	21	39	11
	01	5	-	-	-	-	-	-	-	5	-	-	-	100	35	41	5
D	84	-	3	-	-	-	-	-	-	3	-	-	-	200		3	
	90	1	2	-	-	-	-	-	-	2	1	-	-	200		3	
	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		80%			20%			00%			+ 0%						
'90		40%			00%			00%			-22%						
'96		62%			00%			00%			-62%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	332	Dec:	60%				
										'90	332		60%				
										'96	260		15%				
										'01	100		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 viscidiflorus stenophyllus											
S	84	2	-	-	-	-	-	-	2	2	
	90	-	-	-	-	-	-	-	0	0	
	96	-	-	-	-	-	-	-	0	0	
	01	-	-	-	-	-	-	-	0	0	
Y	84	6	1	1	-	-	-	-	8	8	
	90	17	-	-	1	-	-	-	18	18	
	96	6	-	-	1	-	-	-	7	7	
	01	5	-	-	-	-	-	-	5	5	
M	84	3	5	8	-	-	-	-	16	10 11	16
	90	10	1	-	5	-	-	-	16	15 19	16
	96	61	5	-	10	-	-	1	77	9 13	77
	01	51	2	-	4	-	-	-	54	3 14	57
D	84	-	3	2	-	-	-	-	4	- 1	5
	90	1	-	-	-	-	-	-	1	- -	1
	96	-	-	-	-	-	-	-	-	- -	0
	01	15	1	-	-	-	-	-	13	- - 3	16
X	84	-	-	-	-	-	-	-	-	- -	0
	90	-	-	-	-	-	-	-	-	- -	0
	96	-	-	-	-	-	-	-	-	- -	0
	01	-	-	-	-	-	-	-	-	- -	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'84		31%		38%		03%		+17%			
'90		03%		00%		00%		-28%			
'96		06%		00%		00%		- 7%			
'01		04%		00%		04%					
Total Plants/Acre (excluding Dead & Seedlings)						'84	1932	Dec:	17%		
						'90	2332		3%		
						'96	1680		0%		
						'01	1560		21%		
Ephedra nevadensis											
M	84	-	-	-	-	-	-	-	0	- -	0
	90	-	-	-	-	-	-	-	0	- -	0
	96	-	-	-	-	-	-	-	0	16 17	0
	01	-	-	-	-	-	-	-	0	15 10	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				
Grayia spinosa																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	31	35	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		-			
Juniperus osteosperma																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120	-	-	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%			+63%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
												'01	160		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Leptodactylon pungens																		
Y	84	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	2	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	4	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	11	-	-	1	-	-	-	-	-	12	-	-	-	240	9	11	12
	01	15	-	-	6	-	-	-	-	-	21	-	-	-	420	9	12	21
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	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		00%			00%			00%			+31%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	532	Dec:	0%				
											'90	0		0%				
											'96	360		11%				
											'01	520		19%				
Opuntia polyacantha																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	7	1
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120	7	9	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%			-70%							
'96		00%			00%			00%			+83%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	66		-				
											'96	20		-				
											'01	120		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Pinus monophylla																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	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%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	40		-				
											'01	20		-				
Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	16	23	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	
% 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		100%			00%			00%			+50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	20		-				
											'01	40		-				

Trend Study 1-6-01

Study site name: Bovine Exclosure.

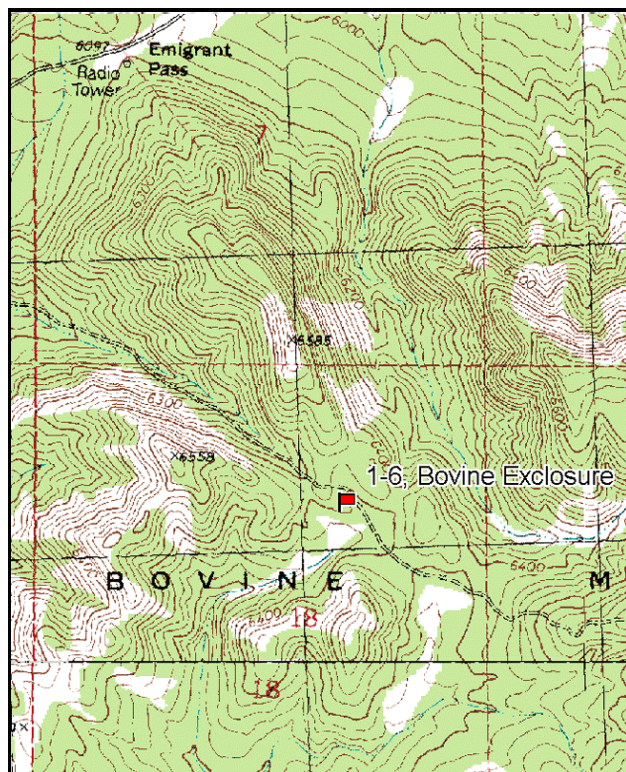
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft). Rebar: belt 4 on 13 ft.

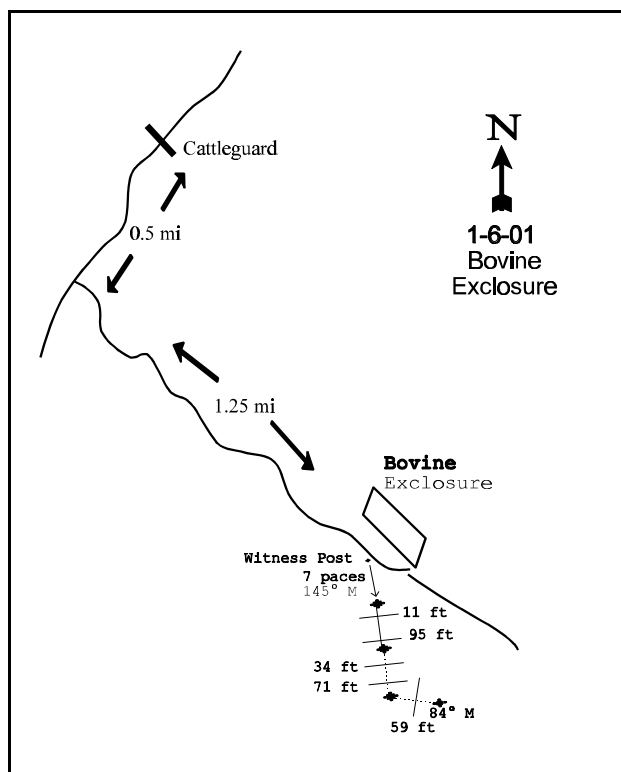
LOCATION DESCRIPTION

Proceed southwest to the summit of Emigrant Pass on Emigrant Pass Road. From the cattleguard at the summit, continue south 0.5 miles to a fork and turn left. Travel 1.25 miles on this road to the Bovine Exclosure where there is a witness post on the right side of the road. From the witness post, follow an azimuth of 145 degrees magnetic for 7 paces to the 0-foot stake of the baseline marked with browse tag #7909. The bearing of the baseline is 165 degrees magnetic. Line 3 changes direction to 59 degrees magnetic.



Map Name: Emigrant Pass

Township 9N, Range 16W, Section 18



Diagrammatic Sketch

UTM 4598188 N, 273130 E

DISCUSSION

Trend Study No. 1-6

The Bovine Exclosure trend study is located immediately adjacent (south) to the Bovine exclosure. Although at a relatively high elevation (6,400 ft.), the study site receives substantial deer use during all but the most severe winters. During the winter of 1983-84, two and a half to three feet of snow covered the area and deer were unable to use the area in midwinter. However, during most years, the area is available and is considered critical deer winter range. A pellet-group transect read on the site in 2001 estimated light use with 20 deer days use/acre (50 deer days use/ha). The site is located in a small "saddle" and thus has only a 5% to 10% percent east-southeast facing slope. Much of the surrounding area is steeper. The range type is sagebrush-grass with scattered or open juniper-pinyon woodland. Point-quarter data from 2001 estimated Utah juniper density at 87 trees/acre and single-leaf pinyon at 27 trees/acre. This area is in the White Lakes sheep allotment which is grazed by 1,5000 sheep from December 1 through March 31.

Soil is loose and coarse textured but apparently quite deep, especially on the more level areas. Soil texture is a loam to clay loam with a soil reaction that is slightly alkaline (7.8 pH). On steeper areas, erosion has resulted in more shallow soils with a lot of exposed rock. Effective rooting depth averages 22 to 24 inches along the original baseline. Two additional 100 foot baselines were added in 1996 to increase the sample size. These two baselines are on more shallow soils averaging only 12 to 13 inches in depth. Surface rock cover is also greater. The parent material appears to be granite, which must contain some subsurface fractures because there are some basin big sagebrush growing on these more shallow soils. Ground cover is fair for perennial grasses and litter. Erosion is not currently a problem with the erosion condition class rated as stable in 2001.

The key browse species, basin big sagebrush provides 39% of the total browse cover. The density has continually decreased since 1990 (3,199 plants/acre to 1,900 plants/acre) and 40% of the population is currently ('01) classified as dead. Forage production for this sagebrush type was estimated at 2,010 pounds per acre (air dry) with the 1970 range inventory. Extremely heavy vole damage during the 1983-84 winter, killed most of the big sagebrush and bitterbrush within the area. Other shrubs which include: black sagebrush, rubber rabbitbrush, stickyleaf low rabbitbrush, and Utah juniper experienced considerably less rodent damage. Under more normal circumstances, shrub density, especially that of the more preferred species would be higher. The surviving basin big sagebrush sampled in 1984 were generally in poor vigor with 63% of the population classified as decadent. Decadency was primarily from rodent damage at that time. Browsing by deer was moderate with 20% of the plants heavy utilized. Utilization has been mostly light to moderate since 1990, with percent decadency at much lower percentages. Vigor has been good on all but a few decadent plants. During the 1996 reading, dead plants were included in the shrub counts. The percentage of dead plants within the population has remained at about 40 to 45%. This data provides an idea as to the extent of the 1983-84 die-off. Many of the decadent and dying sagebrush encountered in 1996 and 2001 appeared to be a result of periods of drought since the late 1980's.

With the extended base line used in 1996, more black sagebrush and bitterbrush were picked up in the sample. Currently ('01) there are an estimated 1,220 black sagebrush plants/acre which are lightly hedged and in good vigor. Bitterbrush number about 220 plants/acre with 18% displaying heavy use. Percent decadency of these shrubs is now down to 9% and vigor is good.

It was feared that the widespread die off would provide an opportunity for less desirable shrubs such as broom snakeweed and narrowleaf low rabbitbrush to increase. Narrowleaf low rabbitbrush has remained fairly stable since 1984 and broom snakeweed, first sampled in 1996, numbered only 520 plants/acre in 2001. Observations from the nearby livestock exclosure also show a basin big sagebrush die-off. Both the total exclosure and the livestock exclosure show dead and dying plants. Use of the sagebrush in the livestock

exclosure was light to moderate while the bitterbrush had a clubbed growth form indicating heavy use.

The herbaceous understory was dominated by native grasses, primarily bluebunch wheatgrass and Sandberg bluegrass in 1996. Now that has changed to where perennial grasses only make up 56% of the grass cover where earlier it was at 83%. Annual cheatgrass is becoming more abundant. It has continually increased to where it now contributes 44% of the total grass cover. Forb composition features several large showy species and a variety of lower growing forms. Overall forb composition and density are above the average for most juniper-pinyon sites in this area. Important forbs include: arrowleaf balsamroot, tapertip hawksbeard, two large *Lomatium* species, and at least two kinds of milkvetch.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable even though there are numerous patches of bare ground and erosion pavement. The interspersed herbaceous cover and litter accumulations have acted to prevent serious erosion. The gentle slope is also a mitigating factor. Vegetative trend appears down primarily because of widespread rodent damage to the most important browse species. Whether there will be any recovery will become apparent within the next few years. However, herbaceous density appears to be high enough to offer some competition to developing shrub seedlings.

1990 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground increased slightly while litter cover declined. However, basal vegetative cover nearly doubled and erosion is not a problem on this site. Trend for browse is up. Density of big sagebrush increased since 1984 from 1,532 to 3,199. Percent decadency has declined from 63% in 1984, to 23% in 1990. Seedlings and young plants are abundant and the population appears to be increasing. Hedging is light on the available shrubs and sagebrush canopy cover averages 11%. The point-quarter data estimated 77 junipers per acre, 67% mature trees. The grass component, mainly bluebunch wheatgrass and Sandberg bluegrass, increased significantly in nested frequency, while thickspike wheatgrass decreased significantly during this same period.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - up (5)

1996 TREND ASSESSMENT

Trend for soil continues to be stable. Litter cover declined but percent bare ground also went down from 26% to 15%. Trend for browse is stable. Density estimates are similar for mature and decadent plants compared to 1990 data. The number of seedlings and young declined considerably but there are still enough to maintain the population. Use is currently light to moderate and percent decadency slightly higher at 27%. Trend for the herbaceous understory is slightly down. Sum of nested frequency of perennial grasses and forbs declined slightly since 1990. Sum of nested frequency for bluebunch wheatgrass declined significantly while frequency of Sandberg bluegrass remained the same. Three of the forb species encountered in 1990 declined significantly in nested frequency. Since 1984, forb sum of nested frequency has declined with every reading while grasses increased initially then declined slightly.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil continues to be stable. Litter cover increased slightly with percent bare ground decreasing to 12%. Trend for browse is slightly down. Density estimates for all three preferred browse species is slightly down. The number of seedlings and young declined considerably. Use is currently light to moderate with percent decadency slightly higher for both sagebrush species. Trend for the herbaceous understory is slightly down. Sum of nested frequency of perennial grasses and forbs continues to decline. Sum of nested frequency for bluebunch wheatgrass declined significantly since 1996, while frequency of Sandberg bluegrass remains stable. Sum of nested frequency of perennial forbs also declined and since 1984, sum of nested frequency for perennial forbs has declined with every reading.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 6

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	b ₃₅	a ₇	a ₁₀	a ₁₇	15	2	3	6	.21	.37
G	Agropyron spicatum	ab ₁₃₈	c ₂₀₇	b ₁₅₇	a ₁₁₉	57	85	66	48	7.69	6.48
G	Bromus tectorum (a)	-	-	a ₂₂₃	b ₂₈₈	-	-	70	90	2.32	9.53
G	Elymus cinereus	b ₁₂	a ₂	a ₄	a ₂	6	1	2	1	.15	.38
G	Oryzopsis hymenoides	a ₋	ab ₁	ab ₈	b ₁₀	-	1	4	5	.09	.12
G	Poa secunda	a ₅₄	b ₁₄₅	b ₁₄₅	b ₁₆₁	22	60	56	65	3.32	4.40
G	Sitanion hystrix	a ₋	a ₋	b ₁₆	ab ₅	-	-	5	2	.24	.41
Total for Annual Grasses		0	0	223	288	0	0	70	90	2.32	9.53
Total for Perennial Grasses		239	362	340	314	100	149	136	127	11.71	12.18
Total for Grasses		239	362	563	602	100	149	206	217	14.04	21.72
F	Agoseris glauca	a ₋	b ₁₇	a ₅	a ₋	-	12	3	-	.01	-
F	Allium spp.	3	-	-	-	1	-	-	-	-	-
F	Arabis spp.	a ₋	ab ₁₀	b ₂₄	a ₋	-	6	11	-	.08	.00
F	Astragalus beckwithii	ab ₁₆	b ₃₂	a ₇	a ₆	7	15	5	4	.05	.09
F	Astragalus cibarius	b ₂₄	a ₋	a ₂	b ₃₃	14	-	1	16	.00	.23
F	Balsamorhiza sagittata	11	5	8	3	7	3	4	2	.87	.72
F	Caulanthus crassicaulis	-	4	-	-	-	2	-	-	-	-
F	Calochortus nuttallii	-	3	-	-	-	2	-	-	-	-
F	Collomia linearis (a)	-	-	11	17	-	-	4	9	.02	.12
F	Comandra pallida	-	4	5	9	-	2	3	4	.04	.10
F	Collinsia parviflora (a)	-	-	26	25	-	-	12	13	.06	.11

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Cordylanthus ramosus</i> (a)	_b 29	_a -	_a -	_b 49	12	-	-	22	-	.23
F	<i>Crepis acuminata</i>	_c 97	_b 45	_a 9	_{ab} 21	46	24	4	12	.02	.56
F	<i>Cryptantha</i> spp.	_a -	_a -	_b 18	_a -	-	-	7	-	.06	-
F	<i>Delphinium nuttallianum</i>	_b 52	_a 2	_a 3	_a 1	26	1	2	1	.01	.00
F	<i>Descurainia pinnata</i> (a)	-	-	-	4	-	-	-	1	-	.00
F	<i>Eriogonum ovalifolium</i>	-	-	-	2	-	-	-	1	-	.00
F	<i>Erigeron pumilus</i>	15	10	12	16	9	6	7	9	.09	.29
F	<i>Galium aparine</i> (a)	_b 47	_a -	_a 10	_a 3	22	-	5	1	.17	.00
F	<i>Gilia</i> spp. (a)	-	-	-	8	-	-	-	4	-	.02
F	<i>Hackelia patens</i>	_a -	_c 23	_{bc} 17	_b 7	-	12	8	5	.26	.10
F	<i>Lappula occidentalis</i> (a)	-	-	_a 1	_b 25	-	-	1	10	.00	.05
F	<i>Lomatium</i> spp.	6	-	-	3	3	-	-	3	-	.06
F	<i>Lomatium triternatum</i>	_b 15	_a 1	_a -	_a -	6	1	-	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	_a 3	_b 63	-	-	1	28	.00	.16
F	<i>Navarretia intertexta</i> (a)	-	-	_b 20	_a -	-	-	9	-	.04	-
F	<i>Penstemon cyananthus</i>	_a 3	_b 33	_c 79	_a 1	2	18	39	1	.43	.00
F	<i>Phlox longifolia</i>	_b 128	_c 172	_a 57	_a 78	48	72	28	32	.17	.58
F	<i>Schoenocrambe linifolia</i>	-	-	-	5	-	-	-	2	-	.01
F	<i>Senecio multilobatus</i>	-	-	6	-	-	-	3	-	.06	-
F	Unknown forb-perennial	-	5	-	-	-	2	-	-	-	-
Total for Annual Forbs		76	0	71	194	34	0	32	88	0.30	0.72
Total for Perennial Forbs		370	366	252	185	169	178	125	92	2.17	2.78
Total for Forbs		446	366	323	379	203	178	157	180	2.48	3.50

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

BROWSE TRENDS --
Herd unit 01 , Study no: 6

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	35	32	1.13	2.18
B	Artemisia tridentata tridentata	57	49	4.94	5.21
B	Chrysothamnus nauseosus consimilis	7	9	.36	.53
B	Chrysothamnus viscidiflorus viscidiflorus	8	10	.04	.59
B	Gutierrezia sarothrae	8	7	.04	.01
B	Juniperus osteosperma	3	6	4.12	3.54
B	Opuntia spp.	1	0	.00	-
B	Pinus monophylla	0	2	.38	.15
B	Purshia tridentata	9	8	1.57	1.25
Total for Browse		128	123	12.61	13.48

CANOPY COVER --
Herd unit 01 , Study no: 6

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	4	5	47	76	10.7	7.0
Pinus monophylla	2	3	8	49	5.3	2.1

BASIC COVER --
Herd unit 01 , Study no: 6

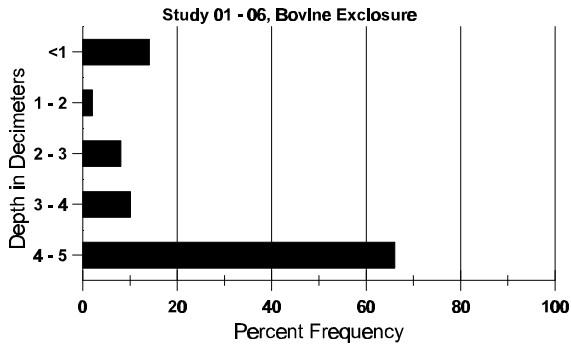
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	328	333	3.50	5.75	31.63	42.52
Rock	214	138	.75	1.00	13.21	11.49
Pavement	249	260	18.00	13.75	6.57	10.76
Litter	388	349	55.00	51.50	39.79	42.78
Cryptogams	102	96	2.00	1.75	1.90	2.28
Bare Ground	260	220	20.75	26.25	15.44	12.09

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 06, Bovine Enclosure

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.7	58.5 (17.4)	7.8	36.7	37.0	26.3	2.8	10.1	217.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 6

Type	Quadrat Frequency	
	'96	'01
Sheep	1	-
Rabbit	6	8
Deer	23	9

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
174	N/A
261	20 (50)

BROWSE CHARACTERISTICS --

Herd unit 01 , 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 nova																		
S	84	13	-	-	-	-	-	-	-	-	13	-	-	-	433		13	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	6	1	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	2	1	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	2	-	-	-	-	-	-	-	-	1	-	1	-	66	10 12	2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	10 9	1	
	96	37	18	-	-	1	-	-	-	-	56	-	-	-	1120	10 18	56	
	01	45	1	-	-	-	-	-	-	-	36	10	-	-	920	12 18	46	
D	84	3	1	-	-	-	-	-	-	-	1	-	1	2	133		4	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	96	2	3	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	11	1	-	-	-	-	-	-	-	10	1	-	1	240		12	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	420		21	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	560		28	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		17%			00%			67%			-17%							
'90		00%			00%			00%			+88%							
'96		34%			00%			00%			-10%							
'01		05%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	199	Dec:	67%				
											'90	166		80%				
											'96	1360		7%				
											'01	1220		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 tridentata																		
S	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	16	-	-	1	-	-	-	-	-	17	-	-	-	566		17	
	'96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	'84	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	'90	48	-	-	1	-	-	-	-	-	48	1	-	-	1633		49	
	'96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
	'01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	'84	8	3	2	-	-	-	-	-	-	10	-	1	2	433	15	11	13
	'90	22	3	-	-	-	-	-	-	-	23	2	-	-	833	18	18	25
	'96	45	10	-	1	-	-	1	-	-	57	-	-	-	1140	22	28	57
	'01	51	10	-	-	-	-	-	-	-	57	4	-	-	1220	27	32	61
D	'84	9	12	7	-	-	-	-	1	-	1	-	10	18	966		29	
	'90	19	2	-	1	-	-	-	-	-	18	1	1	2	733		22	
	'96	13	12	3	-	-	-	-	-	-	25	-	-	3	560		28	
	'01	26	2	1	-	-	-	-	-	-	21	-	-	8	580		29	
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	1700		85	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	1520		76	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		33%			20%			67%			+52%							
'90		05%			00%			03%			-36%							
'96		22%			03%			03%			-7%							
'01		13%			01%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1532	Dec:	63%			
												'90	3199		23%			
												'96	2040		27%			
												'01	1900		31%			

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 consimilis																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	2	-	2	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	20	5	
	01	4	1	-	-	-	-	-	-	-	5	-	-	-	100	17	5	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	5	-	1	1	-	-	-	-	-	5	-	-	2	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%			22%			+25%							
'01		08%			08%			17%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	33	Dec:	0%				
											'90	0		0%				
											'96	180		0%				
											'01	240		58%				

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	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	2	1	1	-	-	-	-	-	-	4	-	-	-	133	10	15	4
	90	4	2	-	1	-	-	-	-	-	7	-	-	-	233	11	15	7
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	12	18	11
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200	13	24	10
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	3	-	3	-	-	-	-	-	4	-	-	3	140		7	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		14%			14%			00%			+42%							
'90		17%			00%			00%			-45%							
'96		00%			00%			00%			+42%							
'01		16%			00%			16%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	232	Dec:	14%			
												'90	399		8%			
												'96	220		0%			
												'01	380		37%			

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	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	31	-	-	-	-	-	-	-	-	31	-	-	-	620	5	7	31
	01	26	-	-	-	-	-	-	-	-	26	-	-	-	520	4	7	26
% 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%			-42%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	900		-			
												'01	520		-			

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		
Juniperus osteosperma																	
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	4	-	-	-	-	-	-	-	-	-	-	-	80			4
M	84	-	-	-	1	-	-	-	1	-	-	-	-	66	69	187	2
	90	1	-	-	-	-	-	-	-	-	-	-	-	33	236	276	1
	96	3	-	-	-	-	-	-	-	-	-	-	-	60	-	-	3
	01	2	-	-	-	-	-	-	-	-	-	-	-	40	4	7	2
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%				-50%			
'90		00%				00%				00%				+45%			
'96		00%				00%				00%				+57%			
'01		00%				00%				14%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%		
												'90	33		0%		
												'96	60		0%		
												'01	140		14%		
Opuntia spp.																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	-	33			1
	96	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	4	-	-	-	-	-	-	-	-	-	-	-	133	4	8	4
	90	5	-	-	-	-	-	-	-	-	-	-	-	166	6	15	5
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	5	13	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%				+33%			
'90		00%				00%				00%				-90%			
'96		00%				00%				00%							
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	-		
												'90	199		-		
												'96	20		-		
												'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			
Pinus monophylla																	
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	2	-	-	-	-	-	-	-	-	1	1	-	-	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		-		
Purshia tridentata																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40		2
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	96	3	3	3	-	-	-	-	-	-	9	-	-	-	180	17	39
	01	5	2	2	-	-	-	-	-	-	9	-	-	-	180	19	38
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	1	-	1	-	-	-	-	-	-	1	-	-	1	40		2
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6
	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		38%			31%			08%			-15%						
'01		18%			18%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%		
												'90	0		0%		
												'96	260		15%		
												'01	220		9%		

Trend Study 1-7-01

Study site name: South Side Emigrant Pass

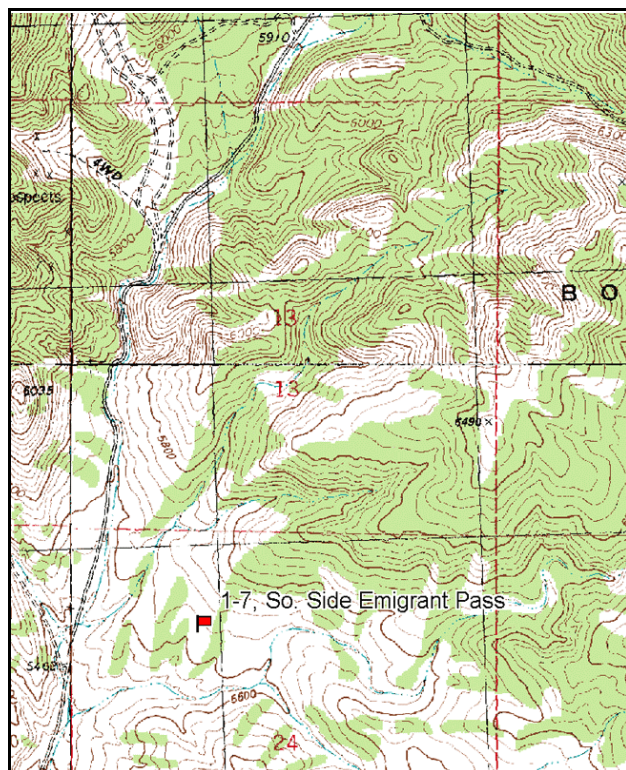
Vegetation type: Black Sagebrush

Compass bearing: frequency baseline 162 degrees magnetic.

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

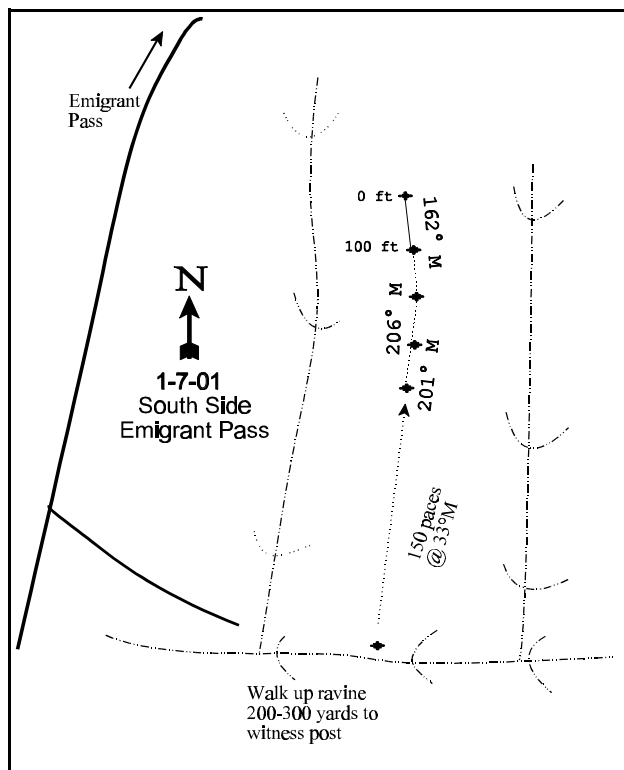
LOCATION DESCRIPTION

From the cattleguard at the summit of Emigrant Pass Road, travel 2.6 miles southwest to a cheatgrass flat on the east side of the road. Turn left crossing the flat and drive east to the wash. Walk up the wash approximately 200-300 yards to a witness post. Take a bearing of 33 degrees magnetic and walk 150 paces up the ridge to the 400-foot stake of the baseline. The 0-foot stake is marked with a red browse tag, #7911. The baseline runs at a bearing of 162 degrees magnetic. The 300-foot baseline runs 206 degrees magnetic. The 400-foot baseline runs 201 degrees magnetic.



Map Name: Bovine

Township 9N, Range 17W, Section 24



Diagrammatic Sketch

UTM 4596664 N, 270911 E

DISCUSSION

Trend Study No. 1-7

The South Side Emigrant Pass trend study samples a black sagebrush ridge within critical deer winter range on Emigrant Pass. The area has a 10% slope to the southwest. Shallow draws containing a few junipers are located to either side of the study area. Elevation is approximately 5,610 feet. The area is also used as winter sheep range as part of the White Lakes allotment. This allotment is grazed from December 1 to March 31. A pellet-group transect read in conjunction with the vegetation transect in 2001 estimated 5 deer days use/acre (13 deer days use/ha) and 71 elk days use/acre (175 elk days use/ha).

Soil is very rocky on the surface and appears almost "armored" with extensive areas of erosion pavement. The soil is relatively shallow with an estimated effective root depth of only about 10 inches. The soil is a sandy-clay with a slightly alkaline soil reaction (7.7 pH). The amount of phosphorus in the soil could be a limiting factor at only 3.9 ppm. Litter cover is scarce and vegetative cover is limited almost exclusively to black sagebrush crowns. Pedestalling of sagebrush plants is common but not extreme. The erosion condition classification determined the site to be in stable condition in 2001.

Black sagebrush is the obvious key browse species. Although a variety of other shrubs can be found, they are either in low numbers, are poor forage producers, or are so poor in palatability that they are unsatisfactory for management purposes. The black sagebrush population is stable or even expanding which, although heavily hedged, the population appears to turn-over rather rapidly. Seedlings and young plants were numerous and percent decadency was low (9%) in 1996. However, in 2001 this has turned around with the extended drought coupled with a moderately high density (intraspecific competition) as seedlings and young decreased substantially and percent decadence doubled (18%). Mature shrubs average less than one foot in height and tend to be evenly spaced. Annual average growth for black sagebrush is slightly below the norm for this management area. Most reproduction occurs under or very near existing sagebrush crowns. In spite of heavy use, black sagebrush exhibits good vigor. Other associated shrub species include: narrowleaf low rabbitbrush, shadscale, bud sagebrush, and green molley summer cypress.

Herbaceous plants make up only 14% of the total vegetation cover and constitute a small portion of the vegetative composition. The most abundant species are two low-growing forbs, Cryptantha spp. and longleaf phlox. Neither have much value as forage plants. Grasses occur infrequently and produce on average about 2% cover. The most common species are Indian ricegrass, bottlebrush squirreltail, and a significantly increasing amount of annual cheatgrass.

1984 APPARENT TREND ASSESSMENT

Soil appears stable. Ongoing erosion is enough to result in some pedestalling of black sagebrush plants. However, erosion is slowed by the gentle terrain and the prevalence of erosion pavement. Vegetative trend appears stable but at a relatively low condition rating. Plant diversity is low and shows few signs of improvement or further degradation. The dominant black sagebrush stand, although low-growing, is heavily hedged and not highly productive, yet appears self-sustaining.

1990 TREND ASSESSMENT

Trend for browse appears stable even after extended years of drought. The shrubs showed mostly light hedging. Canopy cover from black sagebrush averages about 13%. The low rabbitbrush has not increased, although the population remains dominated by young plants. There is a high frequency of forbs, but none of the native species are especially valuable as forage. Herbaceous vegetation is somewhat restricted by the

extensive pavement cover on the ground surface. Some soil loss through sheet erosion is evident. Most grasses are increasing slowly, but Indian ricegrass is increasing much faster. It has gone from a quadrat frequency of 14% up to 31% and represents the most common grass on the site.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - stable (3)

herbaceous understory - improving slightly, but in poor condition (4)

1996 TREND ASSESSMENT

Trend for soil is stable but poor condition. Percent bare ground increased slightly from 7% to 9%, while pavement and rock cover declined from 67% to 45%. Some sheet erosion is still occurring but due to the gentle terrain, it is not severe. Trend for the key browse species, black sagebrush, is up slightly. Utilization is moderate to heavy with 29% of the population displaying heavy use. Vigor is good and percent decadency has declined from 30% to 9%. The proportion of young plants declined from 41% to 25% and biotic potential (number of seedlings) dropped from 26% to 3%, but there are still sufficient numbers to maintain the population. Trend for the herbaceous understory is slightly up with an increase in the sum of nested frequency for grasses and forbs. Indian ricegrass declined significantly, while the nested frequency for Sandberg bluegrass and squirreltail increased. The dominant forbs, cryptantha and longleaf phlox, both increased significantly in their nested frequency values. However, the herbaceous understory is still depleted and in poor condition.

TREND ASSESSMENT

soil - stable but poor condition (3)

browse - up slightly (4)

herbaceous understory - up slightly (4)

2001 TREND ASSESSMENT

Trend for soil continues to be stable, but still in poor condition. Percent bare ground increased slightly, although vegetation cover increased slightly. Pavement and rock cover is still around 50% with some sheet erosion still occurring. Due to the gentle terrain, erosion it is not severe and the erosion condition class was determined to be stable. In addition, the ratio of bare soil to protective ground cover remains almost unchanged. Trend for the key browse species, black sagebrush, is stable with a slight increase in density offset with slight increases in percent decadence and an increase in proportion of dead plants within the population. Utilization is mostly light to moderate with good vigor. The proportion of young plants continues to decline for the third time in a row (1990, 1996, and 2001). Biotic potential (proportion of seedlings in the population) also dropped for the third consecutive sampling period. There still appears to be sufficient numbers of young and seedlings to maintain the population. Trend for the herbaceous understory is stable with slight increases for perennial grasses and slight decreases for perennial forbs. Indian ricegrass has been declining since 1990, while cheatgrass has been steadily increasing. Cheatgrass is not abundant however, producing less than 1% cover. The dominant forbs include cryptantha, Cymopterus, and longleaf phlox. The herbaceous understory is still depleted and in poor condition.

TREND ASSESSMENT

soil - stable but poor condition (3)

browse - stable (3)

herbaceous understory - stable, but depleted (3)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 7

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	a-	2	a-	b35	-	1	-	19	.00	.32
G	Bromus tectorum (a)	-	-	a51	b99	-	-	21	36	.13	.60
G	Oryzopsis hymenoides	a26	b70	b54	a20	14	31	27	9	.84	.37
G	Poa secunda	a3	a6	a19	b43	2	3	9	17	.23	.74
G	Sitanion hystrix	ab15	a9	bc31	c45	9	5	15	23	.26	.49
Total for Annual Grasses		0	0	51	99	0	0	21	36	0.12	0.60
Total for Perennial Grasses		44	87	104	143	25	40	51	68	1.34	1.93
Total for Grasses		44	87	155	242	25	40	72	104	1.47	2.53
F	Allium spp.	5	-	3	-	3	-	1	-	.00	-
F	Astragalus newberryi	a-	a-	b23	a-	-	-	10	-	.18	-
F	Astragalus spp.	-	-	-	6	-	-	-	4	-	.02
F	Astragalus utahensis	ab18	b23	a9	a4	9	12	3	3	.01	.04
F	Balsamorhiza hookeri	-	-	1	-	-	-	1	-	.00	-
F	Castilleja chromosa	5	-	-	-	2	-	-	-	.00	-
F	Caulanthus crassicaulis	a-	a-	b14	a-	-	-	6	-	.06	-
F	Crepis acuminata	3	-	-	-	3	-	-	-	-	-
F	Cryptantha spp.	c116	b58	c92	a18	57	28	42	7	.47	.13
F	Cymopterus spp.	a-	a-	a8	b30	-	-	3	16	.01	.13
F	Descurainia pinnata (a)	-	-	-	1	-	-	-	1	-	.00
F	Erigeron argentatus	-	2	1	-	-	1	1	-	.00	-
F	Erigeron spp.	-	-	3	-	-	-	1	-	.03	-
F	Eriogonum ovalifolium	-	-	3	6	-	-	1	4	.00	.02
F	Erigeron pumilus	a-	a-	a3	b39	-	-	1	18	.00	.29
F	Gilia spp. (a)	-	-	38	34	-	-	16	15	.08	.10
F	Haplopappus acaulis	a4	b32	a18	a6	2	17	7	2	.08	.03
F	Malcolmia africana	-	-	5	-	-	-	3	-	.01	-
F	Pedicularis centranthera	-	-	-	4	-	-	-	1	-	.03
F	Phlox hoodii	57	43	34	28	29	24	16	15	.37	.22
F	Phlox longifolia	a90	ab124	b133	ab126	47	56	63	55	.56	.32
F	Ranunculus testiculatus (a)	-	-	a2	b16	-	-	1	6	.00	.03
F	Sphaeralcea coccinea	1	2	-	-	1	1	-	-	-	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
	Total for Annual Forbs	0	0	40	51	0	0	17	22	0.08	0.13
	Total for Perennial Forbs	299	284	350	267	153	139	159	125	1.84	1.25
	Total for Forbs	299	284	390	318	153	139	176	147	1.93	1.39

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

BROWSE TRENDS --

Herd unit 01 , Study no: 7

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	99	99	17.45	19.28
B	Atriplex confertifolia	33	24	1.37	.95
B	Chrysothamnus viscidiflorus stenophyllus	75	68	2.51	2.30
B	Ephedra nevadensis	0	22	-	.10
B	Juniperus osteosperma	0	1	-	-
B	Kochia americana	23	0	.06	-
B	Tetradymia nuttallii	14	14	.30	1.83
	Total for Browse	244	228	21.71	24.48

BASIC COVER --

Herd unit 01 , Study no: 7

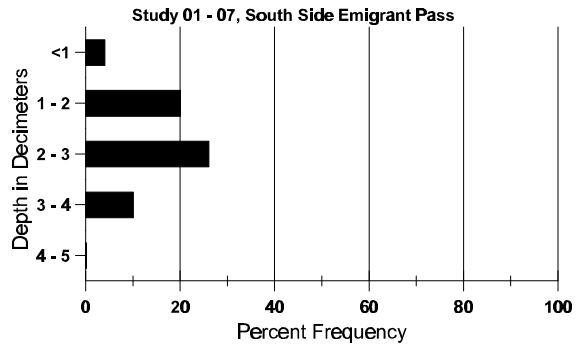
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	290	289	3.25	9.75	25.04	30.18
Rock	263	222	5.75	11.00	11.69	5.50
Pavement	366	354	62.75	56.00	33.71	46.00
Litter	351	330	23.50	14.75	12.81	13.06
Cryptogams	235	122	1.50	1.50	2.55	2.16
Bare Ground	276	248	3.25	7.00	8.89	11.87

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 07, South Side Emigrant Pass

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.2	62.8 (9.7)	7.7	55.9	9.1	35.0	1.44	3.9	172.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 7

Type	Quadrat Frequency	
	'96	'01
Rabbit	16	5
Elk	-	48
Deer	17	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
26	N/A
922	71 (175)
61	5 (12)

BROWSE CHARACTERISTICS --

Herd unit 01 , 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				
Artemisia nova																		
S	84	28	-	-	-	-	-	-	-	-	28	-	-	-	1866		28	
	90	38	-	-	-	-	-	-	-	-	38	-	-	-	2533		38	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	84	40	23	6	-	-	-	-	-	-	68	-	1	-	4600		69	
	90	54	1	-	4	-	-	-	-	-	59	-	-	-	3933		59	
	96	79	63	1	-	1	-	-	-	-	144	-	-	-	2880		144	
	01	27	1	-	-	-	-	-	-	-	28	-	-	-	560		28	
M	84	9	46	10	-	-	-	-	-	-	62	-	3	-	4333	8	11	65
	90	35	6	-	2	-	-	-	-	-	42	-	1	-	2866	11	14	43
	96	20	176	143	-	34	3	5	-	-	381	-	-	-	7620	9	23	381
	01	196	230	52	1	-	-	-	-	-	474	5	-	-	9580	7	18	479
D	84	3	8	6	-	-	1	-	-	5	12	-	11	-	1533		23	
	90	38	-	-	5	-	-	-	-	-	41	-	-	2	2866		43	
	96	5	23	20	-	-	2	-	-	-	39	-	-	11	1000		50	
	01	72	30	8	2	-	-	-	-	-	85	-	-	27	2240		112	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	620		31	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		49%			18%			10%			- 8%							
'90		05%			00%			02%			+16%							
'96		52%			29%			02%			+ 7%							
'01		42%			10%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	10466	Dec:	15%			
												'90	9665		30%			
												'96	11500		9%			
												'01	12380		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				
Artemisia spinescens																		
Y	84	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	9	8	-	-	-	-	-	1	18	-	1	-	1266	6	8	19
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	13	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	1	-	-	-	-	-	-	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		31%			34%			03%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1932	Dec:	3%			
												'90	0		0%			
												'96	0		0%			
												'01	0		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	3			
Atriplex confertifolia																				
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	5	-	-	-	-	-	-	-	-	-	-	-	-	5	333		5		
	96	2	-	-	-	-	-	-	-	-	-	-	-	-	2	40		2		
	01	1	-	-	-	-	-	-	-	-	-	-	-	-	1	20		1		
Y	84	4	6	1	-	-	-	-	-	-	-	-	-	11	733		11			
	90	-	-	-	-	-	-	1	-	-	-	-	-	1	66		1			
	96	6	-	-	-	-	-	-	-	-	-	-	-	6	120		6			
	01	10	-	-	1	-	-	-	-	-	-	-	-	11	220		11			
M	84	1	8	3	1	-	-	-	-	-	-	-	-	13	866	7 10	13			
	90	5	-	-	1	-	-	-	-	-	-	-	-	5	400	10 8	6			
	96	9	7	-	8	10	4	-	-	-	-	-	-	38	760	9 15	38			
	01	8	-	-	4	-	-	-	-	-	-	-	-	12	240	8 12	12			
D	84	-	4	3	1	1	-	-	-	-	6	-	-	5	1000		15			
	90	16	-	-	5	-	-	-	-	-	-	-	-	10	1400		21			
	96	-	1	-	-	1	-	-	-	-	-	-	-	2	40		2			
	01	5	-	-	12	-	-	2	-	-	-	-	-	11	380		19			
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1			
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5			
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>						
'84		49%				33%				26%				-28%						
'90		00%				00%				43%				-51%						
'96		41%				09%				00%				-9%						
'01		00%				00%				19%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2599	Dec:	38%					
												'90	1866		75%					
												'96	920		4%					
												'01	840		45%					

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																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	3	-	-	10	-	-	2	-	-	15	-	-	-	300		15	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	22	1	1	-	-	-	-	-	-	24	-	-	-	1600		24	
	90	21	-	-	6	-	-	-	-	-	27	-	-	-	1800		27	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	2	5	9	-	-	-	-	-	1	17	-	-	-	1133	7 11	17	
	90	5	-	-	3	-	-	-	-	-	8	-	-	-	533	11 13	8	
	96	122	4	-	-	-	-	-	-	-	125	-	1	-	2520	8 15	126	
	01	72	1	2	1	-	-	1	-	-	75	2	-	-	1540	5 10	77	
D	84	1	-	-	-	-	-	-	-	1	1	-	1	-	133		2	
	90	12	-	-	3	-	-	-	-	-	13	-	-	2	1000		15	
	96	18	-	-	2	-	-	-	-	-	17	-	-	3	400		20	
	01	41	2	-	4	-	-	-	-	-	34	-	-	13	940		47	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		14%			28%			02%			+14%							
'90		00%			00%			04%			- 7%							
'96		03%			00%			03%			-17%							
'01		02%			02%			10%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	2866	Dec:	5%				
											'90	3333		30%				
											'96	3100		13%				
											'01	2580		36%				

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 nevadensis</i>																	
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	22	2	-	-	-	-	-	-	-	22	2	-	-	480		24
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	19
	01	28	-	-	-	-	-	-	-	-	28	-	-	-	560	5	6
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	4	-	-	-	-	-	-	-	-	2	-	-	2	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%									
'01		04%			00%			04%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%		
												'90	0		0%		
												'96	0		0%		
												'01	1120		7%		
<i>Juniperus osteosperma</i>																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
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				
Kochia americana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	14	1	1	-	-	-	-	-	-	15	-	1	-	1066		16	
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	96	19	-	-	-	-	-	-	-	-	19	-	-	-	380		19	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	6	1	2	-	-	-	-	-	-	9	-	-	-	600	2	2	9
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	28	-	-	1	-	-	-	-	-	29	-	-	-	580	4	6	29
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	1	1	-	-	-	1	-	-	-	1	-	1	1	200		3	
	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		11%			14%			11%			-79%							
'90		00%			00%			00%			+58%							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1866	Dec:	11%			
												'90	400		0%			
												'96	960		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				
Tetradymia nuttallii																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40	16	24	
	01	1	-	-	3	-	-	-	-	-	4	-	-	-	80	13	15	
D	84	1	-	-	1	-	-	-	-	1	1	-	2	-	200		3	
	90	6	-	-	2	-	-	-	-	-	5	-	-	3	533		8	
	96	7	1	-	2	-	-	2	-	-	7	-	-	5	240		12	
	01	4	1	-	4	-	-	-	-	-	2	-	-	7	180		9	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		25%			25%			50%			+69%							
'90		00%			00%			23%			-68%							
'96		07%			00%			36%			+ 0%							
'01		07%			00%			50%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	75%			
												'90	866		62%			
												'96	280		86%			
												'01	280		64%			

Trend Study 1-8-01

Study site name: Mud Springs Basin.

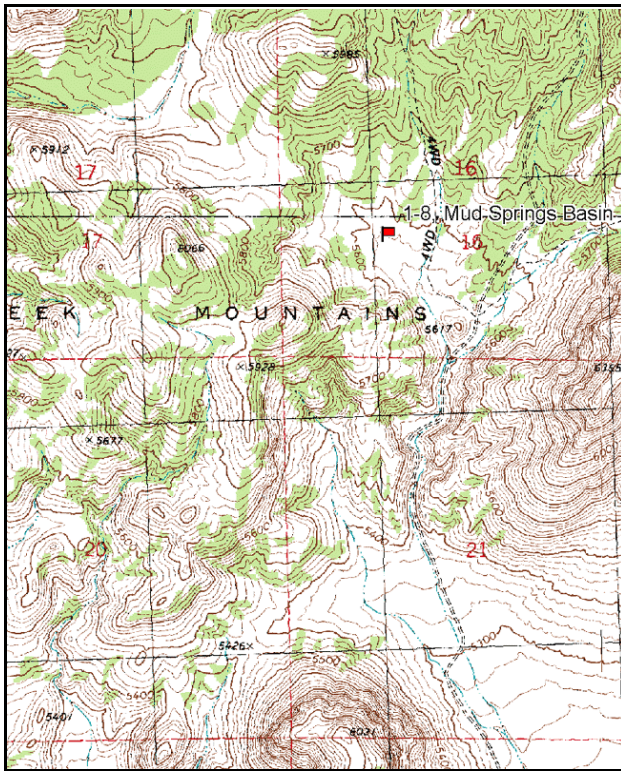
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 180 degrees magnetic.

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

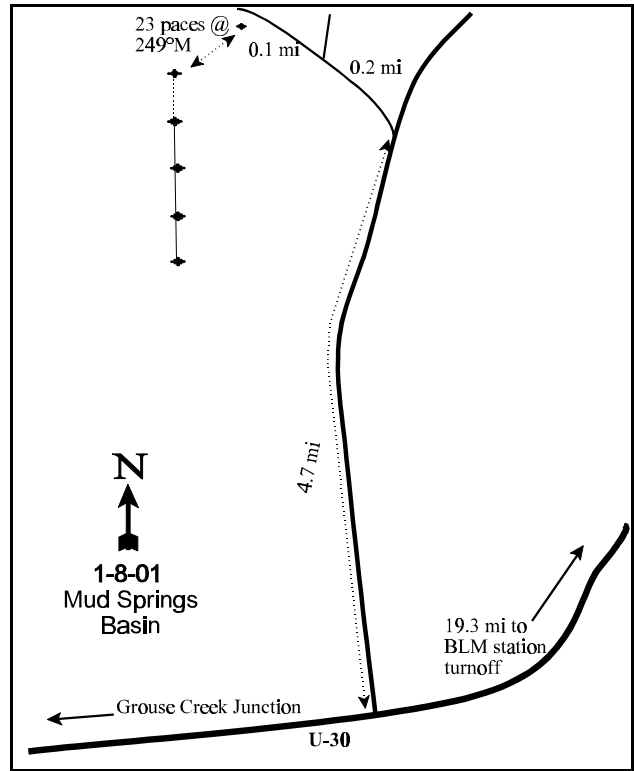
LOCATION DESCRIPTION

On U-30 proceed 19 miles southwest from the Rosebud BLM station turn-off and turn right (north) onto a gravel road just before mile marker 14. Proceed 4.7 miles and take a fork to the left for 0.2 miles. Take a very faint road to the left for 0.1 miles to a witness post on the left side of the road. From the witness post, walk 17 paces on an azimuth of 182 degrees magnetic to the 0-foot stake of the frequency baseline marked by browse tag #7913. Bearing of the baseline is 180 degrees true.



Map Name: Lucin NE

Township 9N, Range 17W, Section 16



Diagrammatic Sketch

UTM 4597734 N, 266042 E

DISCUSSION

Trend Study No. 1-8

The Mud Springs Basin trend study is located on critical deer winter range near the south end of the Grouse Creek Mountains, approximately 2 miles southwest of Mud Springs Basin. The site has an elevation of 5,600 feet and slight southwest aspect. The small basin in which the study is located contains numerous small ridges occupied by sparse fingers of juniper and black sagebrush separated by low areas (swales) occupied by the more deep rooted basin big sagebrush. The study samples a large sagebrush swale because of their obvious importance during winters with deeper snow like the winter of 1983-84. The pellet-group transect read in conjunction with the vegetative transect in 2001, estimated 29 deer days use/acre (73 deer days use/ha).

Soil is moderately deep and alluvially deposited with minimal surface rockiness. The soil has a loam texture and slightly alkaline reaction (7.8 pH). The amount of phosphorus could be a limiting factor as there is only 6.3 ppm where values less than 10 ppm have been shown to limit plant growth and development. Bare interspaces have pavement covering the surface, but the soil beneath is easily erodible. Ground cover is principally sagebrush crowns, native grasses, and cheatgrass. The ratio of bare soil to protective ground cover is fair and the erosion condition class was determined to be moderate in 2001. Most signs of erosion are from pedestalling, flow patterns, and abundant rills. The ample vegetation and litter cover combined with the lack of steep slope prevents more serious soil erosion problems. A number of small drainage channels traverse the area, however none are deep or highly active. Most appear relatively stable.

Browse composition consists mostly of Wyoming big sagebrush. Density was estimated at 5,866 in 1984. There was a considerable amount of rodent damaged plants encountered that year, yet percent decadency was still relatively low at 14%. The sagebrush stand appeared over-mature and decadent at first glance in 1984, but examination of the shrub density data suggested an age structure more typical of an expanding or regenerating population. The surviving mature and decadent plants received heavy deer use on those portions of the crown which protruded above the snow line yet vigor was not seriously depressed. Thus, the surviving plants looked ragged but nonetheless exhibited good vigor when examined in June of 1984. Population density declined 36% and percent decadency increased to 29% in 1990. Utilization was light and vigor was good on all but 50% of the decadent plants. Density continued to decline in 1996, while the number of mature plants increased from 1,400 plants/acre to 2,060. The lower density for sagebrush continues through 2001 where the population decreased from 3,240 to 2,540 plants/acre. The percentage of dead plants within the population has increased from 16% to 32%. Utilization, except for 1984, has mostly been light. Percent decadency has varied through the years, from a low of 14% in 1984 to a high of 29% in 1990. Percent decadence is currently 19%. Canopy cover of big sagebrush has gone from about 12% in 1996 to 14% in 2001.

Other shrubs, such as prickly phlox, narrowleaf low rabbitbrush, black sagebrush, and Nevada ephedra are distinctly secondary in importance. Density of narrowleaf rabbitbrush increased dramatically from 199 plants/acre to 3,300 since 1990. Some of the increase is due to the larger sample used in 1996 which better estimates shrub populations which have aggregated and/or discontinuous distributions. Currently ('01) it has shown a 42% decrease in its population, probably the effects of prolonged drought.

Understory composition was dominated by a moderately dense stand of native perennial grasses in 1996, consisting of bluebunch wheatgrass, Indian ricegrass, Sandberg bluegrass, and bottlebrush squirreltail. These grasses produced nearly 15% cover in 1996. Currently ('01), they produce only about 11% cover. Cheatgrass brome, an annual, has increased in cover from 5% cover in the 1996, to 13% in 2001. Cheatgrass is becoming significantly more abundant. Forb diversity depends on timing and amounts of precipitation as species

numbers vary from each year it has been sampled. Species numbers have varied from a high of 29 species in 1996 to a low of only 9 species in 1990. Eighteen forb species were sampled in 2001. Nine species of annual forbs also occur on the site, combining to produce 22% of the herbaceous cover. Cheatgrass should be watched closely as it significantly increased in nested frequency and cover more than doubled since 1996.

1984 APPARENT TREND ASSESSMENT

Long term trend seems relatively stable. Although the dominant browse species suffered heavy damage in 1983-84, regeneration and recovery should occur rapidly. In this deteriorated condition, high numbers of wildlife could cause further losses to the big sagebrush population. Soil is potentially highly erodible even though the current rate of soil loss is low.

1990 TREND ASSESSMENT

Trend for soil is down due to a major increase in percent bare ground (13% to 30%). Litter cover also declined from 70% to 39%. Trend for big sagebrush is down. The number of mature plants declined from 3,066 to 1,400. Density of seedlings and young plants declined as well, but there appears to be sufficient numbers to maintain the population. Utilization of the sagebrush was light but percent decadency increased from 14% to 29%. Nearly half (44%) of the decadent plants appeared to be dying. The currently balanced age class structure, would indicate that the sagebrush population, heavily impacted by the harsh winters of the early 1980's is stabilizing. Trend for the herbaceous understory is up. All five perennial grasses increased in nested frequency and quadrat frequency values. For the forbs, a little over half had improved nested and quadrat frequency's.

TREND ASSESSMENT

soil - down (1)

browse - down (1)

herbaceous understory - up (5)

1996 TREND ASSESSMENT

Trend for soil is up slightly. Percent bare ground declined from 30% to 13%, while litter and cryptogamic cover increased slightly. Trend for the key browse species, Wyoming sagebrush, is fairly stable since 1990. Density of mature plants increased while the number of seedling and young declined. Utilization was mostly light and percent decadence fell slightly from 29% to 25%. Vigor was good on all but 28% of the decadent sagebrush which were classified as dying. One cause for concern is the increase in density of narrowleaf low rabbitbrush which rose from 199 to 3,300 plants/acre. Due to the lack of seedlings and young during previous readings, some of the increase is likely due to the increased sample size used in 1996. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses declined slightly while frequency of perennial forbs increased.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil would be considered stable because the proportion of protective cover to bare soil has remained fairly stable. Trend for the key browse species, Wyoming sagebrush, is slightly down with continuing decreases in density, percent young have decreased from 12% down to only 3%. Percentage of decadent plants classified as dying have increased from 28% up to 67%, and percent dead within the population have also increased from 16% to 32%. Utilization was classified as mostly light. Those classified with poor vigor has increased from 7% to 13%. One cause of concern in 1996 was the increase in density of narrowleaf low rabbitbrush which rose from 199 plants/acre in 1990 to 3,300 plants/acre in 1996. Currently it has decreased by 42% to 1,900 plants/acre. Trend for the herbaceous understory is considered stable. However, even though the perennial grass component has remained stable, the forbs have decreased from making up 18% of the herbaceous cover down to only 7%. Cheatgrass has increased significantly in nested frequency, while its percent cover has more than doubled since the last reading.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable overall (3)

HERBACEOUS TRENDS --

Herd unit 01 , 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	-	-	-	-	-	-	-	-	-	-
G	Agropyron smithii	a-	b16	a-	b30	-	5	-	13	-	.58
G	Agropyron spicatum	46	84	78	77	23	39	37	32	3.88	3.45
G	Bromus tectorum (a)	-	-	a154	b268	-	-	55	80	5.38	12.92
G	Oryzopsis hymenoides	24	27	34	35	13	13	15	17	2.56	1.57
G	Poa secunda	a51	b182	b176	b179	26	73	70	68	6.24	4.49
G	Sitanion hystrix	b58	b63	b57	a21	26	28	24	10	1.89	.45
Total for Annual Grasses		0	0	154	268	0	0	55	80	5.38	12.92
Total for Perennial Grasses		179	372	345	342	88	158	146	140	14.59	10.55
Total for Grasses		179	372	499	610	88	158	201	220	19.97	23.47
F	Agoseris glauca	1	-	-	1	1	-	-	1	-	.00
F	Alyssum alyssoides (a)	-	-	6	-	-	-	2	-	.01	-
F	Allium spp.	-	-	-	2	-	-	-	1	-	.00
F	Ambrosia artemisifolia	-	2	-	-	-	1	-	-	-	-
F	Antennaria rosea	-	-	6	4	-	-	4	3	.07	.01
F	Androsace septentrionalis (a)	-	-	-	1	-	-	-	1	-	.00
F	Arenaria spp.	-	-	-	1	-	-	-	1	-	.00
F	Astragalus beckwithii	8	-	6	3	4	-	2	1	.18	.03
F	Astragalus cibaricus	ab5	a6	c32	bc18	2	2	15	11	.47	.22

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Astragalus newberryi</i>	-	-	10	-	-	-	4	-	.07	-
F	<i>Astragalus utahensis</i>	-	8	1	-	-	4	1	-	.00	-
F	<i>Balsamorhiza hookeri</i>	2	-	7	1	1	-	5	1	.30	.00
F	<i>Castilleja chromosa</i>	3	-	-	-	1	-	-	-	-	-
F	<i>Calochortus flexuosus</i>	3	-	-	-	1	-	-	-	-	-
F	<i>Camelina microcarpa</i> (a)	-	-	71	26	-	-	32	13	.18	.14
F	<i>Chaenactis douglasii</i>	-	-	1	-	-	-	1	-	.00	-
F	<i>Crepis acuminata</i>	a1	b15	ab10	a1	1	7	5	1	.25	.00
F	<i>Cryptantha</i> spp.	-	-	32	-	-	-	16	-	.35	-
F	<i>Descurainia pinnata</i> (a)	-	-	a46	b79	-	-	17	36	.47	.33
F	<i>Eriogonum ovalifolium</i>	-	-	1	-	-	-	1	-	.00	-
F	<i>Erigeron pumilus</i>	a-	a-	b14	b5	-	-	6	5	.05	.07
F	<i>Gayophytum ramosissimum</i> (a)	-	-	19	-	-	-	8	-	.04	-
F	<i>Gilia</i> spp. (a)	-	-	8	4	-	-	4	2	.02	.01
F	<i>Haplopappus acaulis</i>	a-	a-	b20	a-	-	-	7	-	.46	-
F	<i>Halogeton glomeratus</i> (a)	-	10	-	-	-	4	-	-	-	-
F	<i>Hackelia patens</i>	a-	b16	c71	a-	-	8	28	-	.18	-
F	<i>Lapula occidentalis</i> (a)	-	-	29	41	-	-	13	22	.11	.13
F	<i>Macolmia africana</i>	-	-	4	-	-	-	2	-	.01	-
F	<i>Metzelia albicaulis</i> (a)	-	-	b21	a-	-	-	11	-	.08	-
F	<i>Penstemon cyananthus</i>	a-	a-	b17	a-	-	-	6	-	.05	-
F	<i>Penstemon</i> spp.	-	-	1	-	-	-	1	-	.00	-
F	<i>Phlox hoodii</i>	a3	a13	b54	b49	1	5	26	21	.72	.45
F	<i>Phlox longifolia</i>	a29	b66	a30	a37	12	28	12	18	.16	.21
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	7	-	-	-	3	-	.01
F	<i>Sisymbrium altissimum</i> (a)	-	-	b14	a3	-	-	6	1	.05	.00
F	<i>Sphaeralcea grossulariaefolia</i>	3	-	-	-	1	-	-	-	-	-
F	<i>Taraxacum officinale</i>	-	-	3	-	-	-	1	-	.00	-
F	<i>Tragopogon dubius</i>	-	-	3	-	-	-	1	-	.03	-
F	Unknown forb-perennial	a-	b27	a-	a-	-	12	-	-	-	-
F	<i>Veronica biloba</i> (a)	-	-	3	-	-	-	2	-	.01	-
Total for Annual Forbs		0	10	217	161	0	4	95	78	0.98	0.64
Total for Perennial Forbs		58	153	323	122	25	67	144	64	3.40	1.03
Total for Forbs		58	163	540	283	25	71	239	142	4.39	1.68

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

BROWSE TRENDS --
Herd unit 01 , Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	6	15	1.54	1.28
B	Artemisia tridentata wyomingensis	75	65	11.66	13.98
B	Chrysothamnus viscidiflorus stenophyllus	48	39	5.67	1.29
B	Juniperus osteosperma	2	1	.15	.15
B	Leptodactylon pungens	5	7	.33	.48
B	Opuntia polyacantha	0	2	.00	.03
Total for Browse		136	129	19.35	17.22

Point-Quarter Tree Data
Herd unit 01, Study no: 8

Species	Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01
Juniperus osteosperma	26	52	9.8	6.7

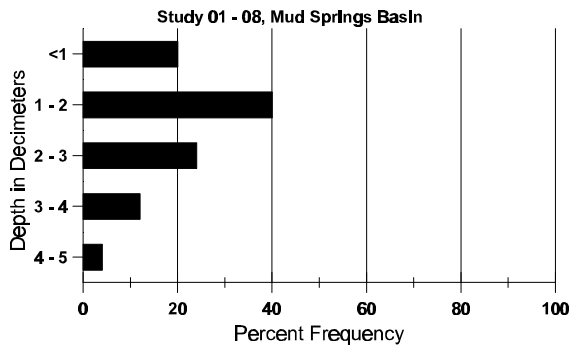
BASIC COVER --
Herd unit 01 , Study no: 8

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	342	354	2.25	7.00	47.15	42.79
Rock	170	103	1.75	1.75	3.30	1.93
Pavement	241	268	12.00	21.25	13.01	12.39
Litter	390	346	70.25	39.00	41.55	31.90
Cryptogams	66	80	1.00	1.25	1.82	2.78
Bare Ground	243	264	12.75	29.75	12.91	19.01

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 08, Mud Springs Basin

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
20.3	56.6 (19.7)	7.8	43.4	32.4	25.3	2.3	6.3	540.8	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 8

Type	Quadrat Frequency	
	'96	'01
Rabbit	10	2
Elk	-	1
Deer	53	22
Antelope	-	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
52	N/A
-	-
383	30 (73)
35	N/A

BROWSE CHARACTERISTICS --

Herd unit 01 , 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				
Artemisia nova																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	3	-	-	-	-	-	-	4	-	-	-	80	8	25	
	01	23	-	-	-	-	-	-	-	-	23	-	-	-	460	7	22	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	2	8	-	-	-	-	-	-	6	-	-	5	220		11	
	01	15	-	-	2	-	-	-	-	-	12	-	-	5	340		17	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	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>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		19%			69%			31%			+62%							
'01		00%			00%			12%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	320		69%			
												'01	840		40%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total					
		1	2	3	4		1	2						
<i>Artemisia tridentata wyomingensis</i>														
S	84	380	-	-	-	-	-	-	380	-	-	25333		380
	90	7	-	-	-	-	-	-	7	-	-	466		7
	96	1	-	-	-	-	-	-	1	-	-	20		1
	01	3	-	-	-	-	-	-	3	-	-	60		3
Y	84	14	14	2	-	-	-	-	30	-	-	2000		30
	90	18	-	-	1	-	-	-	19	-	-	1266		19
	96	15	-	-	4	-	-	-	19	-	-	380		19
	01	4	-	-	-	-	-	-	4	-	-	80		4
M	84	8	20	18	-	-	-	-	44	-	2	3066	26 34	46
	90	21	-	-	-	-	-	-	21	-	-	1400	22 22	21
	96	90	2	2	9	-	-	-	103	-	-	2060	23 37	103
	01	93	6	-	-	-	-	-	98	-	1	1980	22 28	99
D	84	2	3	7	-	-	-	-	8	-	1	800		12
	90	16	-	-	-	-	-	-	8	-	1	1066		16
	96	34	3	-	3	-	-	-	29	-	-	800		40
	01	21	1	1	1	-	-	-	8	-	-	480		24
X	84	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	620		31
	01	-	-	-	-	-	-	-	-	-	-	1200		60
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>			
'84		42%			31%			07%			-36%			
'90		00%			00%			14%			-13%			
'96		03%			01%			07%			-22%			
'01		06%			.78%			13%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	5866	Dec:	14%		
									'90	3732		29%		
									'96	3240		25%		
									'01	2540		19%		
<i>Atriplex canescens</i>														
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%						
'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					
Chrysothamnus viscidiflorus stenophyllus													
S	84	1	-	-	-	-	-	-	1	66		1	
	90	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	0			0	
	01	-	-	-	-	-	-	-	0			0	
Y	84	-	-	-	-	-	-	-	0			0	
	90	1	-	-	-	-	-	-	66			1	
	96	14	-	-	-	-	-	-	280			14	
	01	9	-	-	-	-	-	-	180			9	
M	84	-	4	-	-	-	-	-	266	12	14	4	
	90	2	-	-	-	-	-	-	133	10	9	2	
	96	139	-	-	8	-	-	-	2940	12	20	147	
	01	54	-	-	3	-	-	-	1140	9	14	57	
D	84	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	0			0	
	96	4	-	-	-	-	-	-	80			4	
	01	25	-	-	4	-	-	-	580			29	
X	84	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	20			1	
	01	-	-	-	-	-	-	-	120			6	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'84		100%		00%		75%		-25%					
'90		00%		00%		00%		+94%					
'96		00%		00%		.60%		-42%					
'01		00%		00%		11%							
Total Plants/Acre (excluding Dead & Seedlings)										'84	266	Dec:	0%
										'90	199		0%
										'96	3300		2%
										'01	1900		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
Juniperus osteosperma																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	1	-	-	-	-	-	20	-	-	1
	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%				-50%			
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	40		-		
												'01	20		-		
Leptodactylon pungens																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	1	-	-	-	-	-	-	-	-	80	5	11	4
	01	10	-	-	3	-	-	1	-	-	-	-	-	280	6	7	14
% 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%				+64%			
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	100		-		
												'01	280		-		

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 polyacantha																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	14	0
	'01	2	-	-	-	-	-	-	-	-	-	-	-	2	40	3	6	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		-			

Trend Study 1-9-01

Study site name: Southwest Rosette.

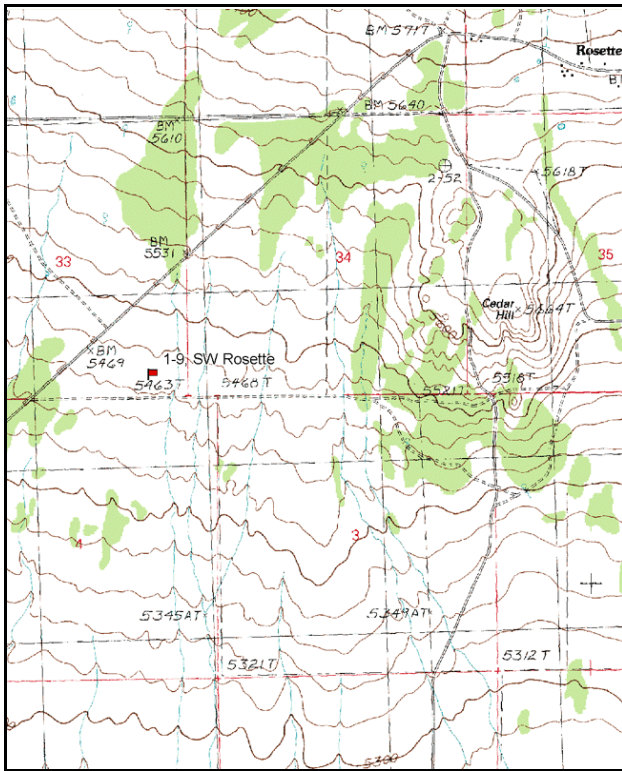
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 146 degrees magnetic.

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

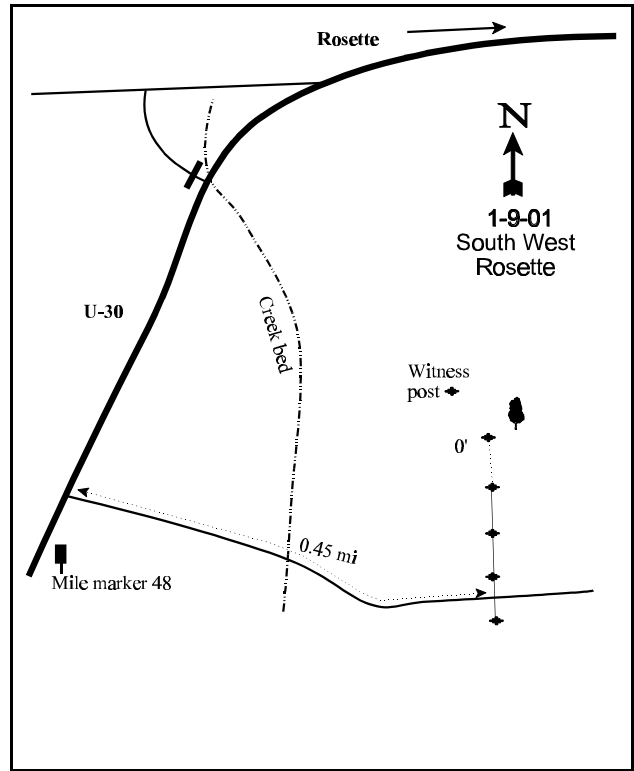
LOCATION DESCRIPTION

On U-30, proceed northeast towards Rosette. There is a dirt road just north of mile marker 48 that goes to the east. Drive 0.45 miles on this road to the 300-foot stake which is just off the road on the north side of the road. The 0-foot post of the baseline is 300 feet to the north a few paces south of a witness post and is marked by browse tag #7914.



Map Name: Rosette

Township 12N, Range 14W, Section 33



Diagrammatic Sketch

UTM 4630500 N, 296666 E

DISCUSSION

Trend Study No. 1-9

The Southwest Rosette study is a sagebrush-grass site which is located on nearly flat terrain at an elevation of 5,460 feet. This site represents a compromise from the original goal to sample a winter deer concentration area north or northwest of Rosette. The initial area, however, was on private land for which we were unable to obtain permission to enter. The Southwest Rosette study site is on BLM land slightly south of the optimum location at a point where the density of juniper trees begins to thin out. Range type varies from sagebrush-grass and scattered Utah juniper to swales where perennial grasses have replaced the woody plants. The area is part of the Rosette allotment which is assigned for 60 cattle to use the area from mid-October through January. However, the area also appears to be used by sheep. Pellet groups and cattle droppings were initially noted as infrequent. A pellet group transect read in conjunction with vegetative transect corroborates this initial observation estimating only 8 deer days use/acre (20 deer days use/ha).

Soil effective rooting depth (almost 13 inches) is relatively shallow compared to the average for the manage unit which is nearly 17 inches. The soil has a texture classified as a sandy clay loam with a slightly alkaline soil reaction (7.5 pH). The soil is alluvially deposited with little visible surface rock. The amount of phosphorus in the soil may be a limiting factor at only 7.3 ppm. At the time the study was established (i.e., mid-June 1984), the soil was exceptionally wet. A small irrigation canal located one-quarter mile north may be the source of excess moisture, either as a result of sub-irrigation or occasional overflow. The net result was a development of a lush growth of perennial grass and death of big sagebrush in the lower swale areas. In addition, there were also patches of dead sagebrush in the vicinity which appear to have been sprayed with herbicide.

Status of the browse population was reported as questionable in 1984. Wyoming big sagebrush, which is the dominant browse species, had been damaged by possible excess soil moisture and herbicides. With this loss, the increaser species, narrowleaf low rabbitbrush was almost twice as numerous and apparently increasing. The sagebrush population had a decadent appearance (32%) in 1984. Utilization was reported moderate to heavy with 32% of the population displaying heavy use. Utilization has been mostly light since 1996. The number of decadent plants was similar in 1990 yet 40% of the decadent shrubs were classified as dying (666 plants/acre). The proportion of decadent plants classified as dying has been steadily, but slowly decreasing since 1990. Density of the increaser, narrowleaf low rabbitbrush, has continued to decline in density since 1984, when 10,065 plants/acre were estimated. It is currently ('01) at 3,940 plants/acre.

Grass cover and composition vary widely between microsites. However, even on the drier portion of the site, grasses are an important component. On these areas, vigorous clumps of Sandberg bluegrass, bottlebrush squirreltail, bluebunch wheatgrass, and western wheatgrass provide moderately good cover (varying from 10% to 14%). Forbs are not abundant and include a number of annuals, especially on the drier parts of the site. On average, they only provide about 13-14% of the herbaceous cover. Most annual forbs are members of the mustard and borage families. The more prevalent perennials are longleaf phlox, hoods phlox, and Douglas chaenactis. None of these have appreciable forage value. Hoods phlox by itself makes up on average a little over 70% of the deficient forb cover.

1984 APPARENT TREND ASSESSMENT

Soil appears stable. There is very little erosion due primarily to the lack of slope. Vegetative trend is more difficult to predict. Our best assessment is that there is a stable to perhaps a slightly declining stand of Wyoming big sagebrush. Conversely, narrowleaf low rabbitbrush and perennial grasses appear to be increasing over much of the area.

1990 TREND ASSESSMENT

Wyoming big sagebrush is declining. Density of mature plants decreased 30% and the percentage of decadent sagebrush has increased from 32% to 53% since 1984, yet the sagebrush is only moderate to lightly hedged. The average canopy cover was estimated at 17%. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses is stable while frequency of perennial forbs declined slightly. There is a high percentage of bare soil, but this has decreased from 44% to 38% and basal vegetative cover increased from 2% to 14.5%. There are no obvious signs of erosion that would be a concern to management.

TREND ASSESSMENT

soil - up slightly (4)

browse - down slightly (2)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Trend for soil is up with a decrease in percent bare ground (38% to 21%) and an increase in litter cover (30% to 37%). Trend for browse is up slightly. Utilization is mostly light to moderate and percent decadency has declined from 53% to 30%. Density of mature plants nearly doubled since 1990 (1,333 plants/acre to 2,320). Another positive aspect to the browse trend is the decline in density of the increaser, narrowleaf low rabbitbrush (from 6,732 plants/acre to 5,460 plants/acre). The herbaceous trend is up slightly. Sum of nested frequency for all three perennial grass species increased since 1990 but not significantly. The grasses make up 87% of the herbaceous understory cover. Frequency of forbs declined slightly but the most numerous forb, hood's phlox, increased.

TREND ASSESSMENT

soil - up (5)

browse - up slightly (4)

herbaceous understory - up slightly (4)

2001 TREND ASSESSMENT

Trend for soil is considered stable with nearly the same amounts of bare soil and litter. Trend for browse is stable. Utilization is mostly light (99%) and percent decadency has remained almost the same (30% vs 31%). The sagebrush density has remained the same as 1996. Another positive aspect to the browse trend is the continuing decline in density of the increaser, narrowleaf low rabbitbrush (5,460 plants/acre down to 3,940 plants/acre). The herbaceous trend is stable, with the sum of nested frequency going down slightly for perennial grasses and up a small amount for perennial forbs. The only grass species that significantly increased was cheatgrass. The grasses on average make up 86-87% of the herbaceous understory cover.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 9

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron smithii	_a 47	_{ab} 55	_{ab} 70	_b 81	15	19	23	26	1.91	2.49
G	Agropyron spicatum	-	-	-	-	-	-	-	-	-	.00
G	Bromus tectorum (a)	-	-	_a 45	_b 193	-	-	18	73	.19	3.29
G	Poa secunda	_a 167	_b 223	_b 252	_b 242	67	79	85	82	5.60	8.42
G	Sitanion hystrix	_c 186	_{ab} 135	_{bc} 154	_a 108	77	62	65	48	2.81	2.87
Total for Annual Grasses		0	0	45	193	0	0	18	73	0.18	3.29
Total for Perennial Grasses		400	413	476	431	159	160	173	156	10.33	13.79
Total for Grasses		400	413	521	624	159	160	191	229	10.52	17.09
F	Allium spp.	1	-	-	2	1	-	-	1	-	.01
F	Arabis spp.	1	2	1	1	1	2	1	1	.00	.00
F	Astragalus beckwithii	-	2	4	-	-	1	2	-	.01	-
F	Astragalus utahensis	-	1	3	1	-	1	1	1	.03	.00
F	Balsamorhiza hookeri	-	-	-	2	-	-	-	2	-	.03
F	Castilleja chromosa	-	1	-	3	-	1	-	1	-	.00
F	Chaenactis douglasii	_b 41	_a -	_a -	_a 7	21	-	-	3	-	.01
F	Crepis acuminata	2	-	-	-	1	-	-	-	-	-
F	Cryptantha spp.	-	-	7	-	-	-	3	-	.01	-
F	Cymopterus spp.	_a -	_c 46	_{ab} 7	_b 24	-	22	3	12	.01	.08
F	Delphinium nuttallianum	3	-	-	4	1	-	-	2	-	.03
F	Descurainia pinnata (a)	-	-	_a 6	_b 21	-	-	2	12	.01	.08
F	Erigeron pumilus	-	-	2	-	-	-	1	-	.00	-
F	Gayophytum ramosissimum (a)	-	-	3	-	-	-	1	-	.00	-
F	Gilia congesta	-	5	-	2	-	3	-	2	-	.01
F	Lappula occidentalis (a)	-	-	2	2	-	-	2	2	.01	.01
F	Lygodesmia spinosa	-	-	1	-	-	-	1	-	.00	-
F	Machaeranthera canescens	-	-	1	3	-	-	1	1	.00	.00
F	Phlox hoodii	_a 14	_{ab} 31	_b 67	_b 69	7	17	28	29	1.28	1.77
F	Phlox longifolia	_b 112	_{ab} 85	_a 59	_a 65	46	35	27	28	.16	.32
F	Polygonum douglasii (a)	-	-	3	-	-	-	1	-	.00	-
F	Ranunculus testiculatus (a)	-	-	_a -	_b 36	-	-	-	16	-	.15
F	Trifolium gymnocarpon	18	8	15	17	7	4	8	6	.04	.13
F	Unknown forb-perennial	-	-	2	-	-	-	1	-	.00	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
	Total for Annual Forbs	0	0	14	59	0	0	6	30	0.02	0.25
	Total for Perennial Forbs	192	181	169	200	85	86	77	89	1.58	2.43
	Total for Forbs	192	181	183	259	85	86	83	119	1.61	2.68

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

BROWSE TRENDS --

Herd unit 01 , Study no: 9

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Artemisia tridentata wyomingensis</i>	82	77	12.09	18.69
B	<i>Chrysothamnus nauseosus consimilis</i>	10	16	.38	.82
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	76	74	4.44	4.30
B	<i>Juniperus osteosperma</i>	0	0	-	.00
B	<i>Leptodactylon pungens</i>	17	13	.30	.91
B	<i>Opuntia spp.</i>	9	9	.21	.21
	Total for Browse	194	189	17.44	24.95

BASIC COVER --

Herd unit 01 , Study no: 9

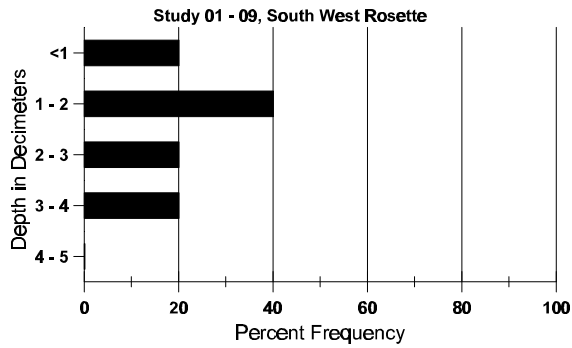
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	351	353	2.00	14.50	27.70	45.83
Rock	161	61	.75	2.25	1.90	.37
Pavement	318	288	7.25	13.25	6.67	6.14
Litter	383	350	43.75	30.25	36.87	35.61
Cryptogams	145	74	2.25	2.00	2.69	.92
Bare Ground	266	288	44.00	37.75	20.89	22.61

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 09, South West Rosette

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.7	63.0 (11.0)	7.5	47.3	22.4	30.4	1.9	7.3	406.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 9

Type	Quadrat Frequency	
	'96	'01
Sheep	11	-
Rabbit	18	1
Deer	9	2
Cattle	1	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
26	N/A
104	8 (20)
-	-

BROWSE CHARACTERISTICS --

Herd unit 01 , 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.		
Artemisia tridentata wyomingensis																		
S	'84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	'84	1	5	4	-	-	-	-	-	-	10	-	-	-	666		10	
	'90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	'01	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	'84	3	28	9	-	-	-	-	-	-	39	-	1	-	2666	23 33	40	
	'90	6	14	-	-	-	-	-	-	-	20	-	-	-	1333	22 25	20	
	'96	71	44	1	-	-	-	-	-	-	111	-	3	2	2320	23 33	116	
	'01	106	1	-	2	-	-	-	-	-	109	-	-	-	2180	28 38	109	
D	'84	3	10	11	-	-	-	-	-	-	22	1	1	-	1600		24	
	'90	12	13	-	-	-	-	-	-	-	15	-	-	10	1666		25	
	'96	26	26	-	-	-	-	-	-	-	34	-	2	16	1040		52	
	'01	47	-	-	4	-	-	3	-	-	36	1	3	14	1080		54	
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	1520		76	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	880		44	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		58%			32%			03%			-36%							
'90		57%			00%			21%			+ 9%							
'96		40%			.57%			13%			+ 0%							
'01		.57%			00%			10%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	4932	Dec:	32%			
												'90	3132		53%			
												'96	3460		30%			
												'01	3460		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		1	2								
Chrysothamnus nauseosus consimilis																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	3	-	-	-	-	-	-	-	3	-	-	-	60		3
	01	2	-	-	-	-	-	-	-	2	-	-	-	40		2
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	6	-	-	1	-	-	-	-	7	-	-	-	140	22	27
	01	16	-	-	-	-	-	-	-	16	-	-	-	320	21	24
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	2	-	-	-	-	-	-	-	1	-	-	1	133		2
	96	2	-	-	-	-	-	-	-	2	-	-	-	40		2
	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%			50%			+45%					
'96		00%			00%			00%			+48%					
'01		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'84		0	Dec:		0%	
										'90		133			100%	
										'96		240			17%	
										'01		460			22%	

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
Chrysothamnus viscidiflorus stenophyllus												
S	84	1	-	-	-	-	-	-	1	66		1
	90	-	-	-	-	-	-	-	0		0	
	96	8	-	-	14	-	-	-	22		22	
	01	6	-	-	-	-	-	-	6		6	
Y	84	27	5	3	-	-	-	-	34		35	
	90	7	-	-	1	-	-	-	8		8	
	96	3	-	-	1	-	-	-	4		4	
	01	14	-	-	-	-	-	-	14		14	
M	84	62	26	-	-	-	-	-	88	11	14	88
	90	40	-	-	6	-	-	-	46	9	11	46
	96	243	5	-	16	-	-	-	264	10	15	264
	01	138	-	-	9	-	-	-	147	12	17	147
D	84	15	12	1	-	-	-	-	26		28	
	90	45	-	-	2	-	-	-	38		47	
	96	2	3	-	-	-	-	-	1		5	
	01	34	-	-	2	-	-	-	29		36	
X	84	-	-	-	-	-	-	-	-		0	
	90	-	-	-	-	-	-	-	-		0	
	96	-	-	-	-	-	-	-	-		1	
	01	-	-	-	-	-	-	-	-		4	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		28%		03%		02%		-33%				
'90		00%		00%		09%		-19%				
'96		03%		00%		01%		-28%				
'01		00%		00%		04%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	10065	Dec:	19%
									'90	6732		47%
									'96	5460		2%
									'01	3940		18%
Juniperus osteosperma												
S	84	1	-	-	-	-	-	-	1		1	
	90	1	-	-	-	-	-	-	1		1	
	96	-	-	-	-	-	-	-	-		0	
	01	1	-	-	-	-	-	-	1		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 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	
Leptodactylon pungens									
Y	84	3	-	-	-	-	-	-	3
	90	-	-	-	-	-	-	-	0
	96	2	-	-	-	-	-	-	2
	01	-	-	-	-	-	-	-	0
M	84	7	-	-	-	-	-	-	7
	90	7	-	-	1	-	-	-	8
	96	27	-	-	6	-	-	-	33
	01	14	-	-	5	-	2	-	21
D	84	-	-	-	-	-	-	-	0
	90	3	-	-	-	-	-	-	3
	96	-	-	-	-	-	-	-	0
	01	2	-	-	-	-	-	-	2
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>				
'84		00%	00%	00%	+ 9%				
'90		00%	00%	18%	- 5%				
'96		00%	00%	00%	-34%				
'01		00%	00%	09%					
Total Plants/Acre (excluding Dead & Seedlings)					'84	666	Dec:	0%	
					'90	733		27%	
					'96	700		0%	
					'01	460		9%	
Opuntia spp.									
Y	84	-	-	-	-	-	-	-	0
	90	-	-	-	-	-	-	-	0
	96	1	-	-	-	-	-	-	1
	01	1	-	-	1	-	-	-	2
M	84	-	-	-	-	-	-	-	0
	90	-	-	-	-	-	-	-	0
	96	8	-	-	2	-	-	-	10
	01	7	-	-	-	-	-	-	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%	-18%				
'01		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'84	0	Dec:	-	
					'90	0		-	
					'96	220		-	
					'01	180		-	

Trend Study 1-10-01

Study site name: Kilgore Basin.

Vegetation type: Black Sagebrush.

Compass bearing: frequency baseline 155 degrees magnetic.

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

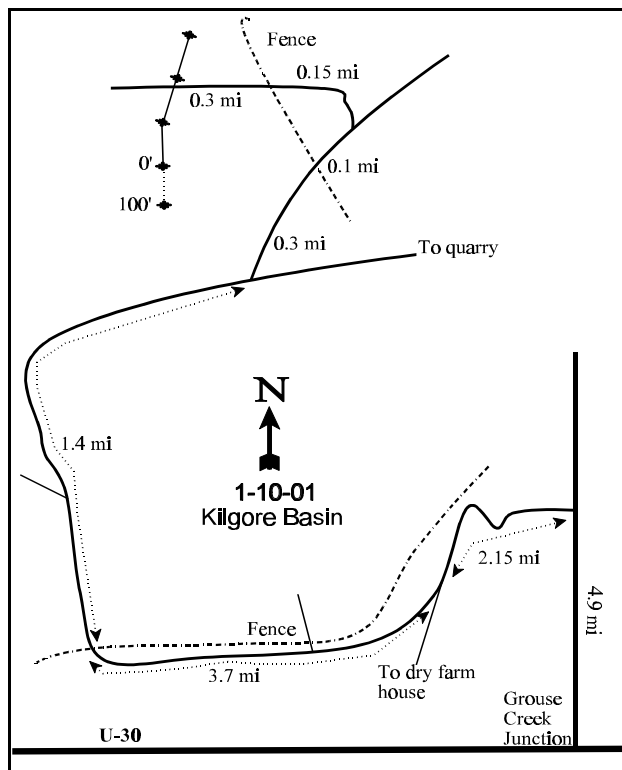
LOCATION DESCRIPTION

From the U-30/Grouse Creek Road junction, proceed north 4.9 miles. Turn left (west) and travel 2.15 miles to a fork that leads to a dry farm. Stay on the main road at this fork (right) and continue 3.7 miles to a gate. Continue 1.4 miles to another fork. Turn left and travel 0.3 miles to a gate. Proceed 0.1 miles to a fork. Turn left here and go 0.15 miles to another gate. Continue 0.3 miles to a witness post on the south side of the road. Walk 36 paces from the witness post at a bearing of 148 degrees magnetic to the 0-foot stake of the frequency baseline. This stake marked by a red browse tag #7910. The baseline bearing is 155 degrees magnetic.



Map Name: Lucin NW

Township 9N, Range 19N, Section 23



Diagrammatic Sketch

UTM 4596520 N, 249668 E

DISCUSSION

Trend Study No. 1-10

The Kilgore Basin study is located west of Grouse Creek. It samples what is considered critical deer winter range. Terrain ranges from nearly level to gentle south facing slopes. Elevation is approximately 5,300 feet. The study lies within a large basin surrounded by low hills that are nearly barren of tree cover. The sampled range type is a uniform, low-growing, evenly spaced stand of black sagebrush. Shrub interspecies are essentially barren of other vegetation. Within the basin, plant diversity is minimal. The bulk of the area is occupied by the black sagebrush type. The only variation is in small swales where the deeper rooted Wyoming and basin big sagebrush predominates along with a few isolated patches of juniper trees. This area is within the Kilgore allotment. It is used by 268 cattle and 30 horses during the winter (11/01 to 04/30). Deer pellet groups were moderately high with a quadrat frequency of 17% in 1996. Some elk sign was also noted. A pellet-group transect read in conjunction with the vegetative transects in 2001 estimated 21 deer days use/acre (51 deer days use/ha) and 5 cow days use/acre (13 cow days use/ha). Some sage grouse droppings were also seen but not hit in the pellet group transect.

Soil is alluvially deposited and has a long history of steady erosion. The soil texture is a sandy clay loam with a moderately alkaline soil reaction (8.1 pH). A limiting factor for the site may be the low amounts of phosphorus (6.3 ppm) where values of less than 10 ppm can limit normal plant growth and development. Effective rooting depth is moderately shallow with an average reading of only about 12 inches. The bulk of the ground surface is occupied by rock and erosion pavement. Apart from shrub crowns there is very little herbaceous cover. Erosion continues at a slow but steady rate in spite of the gentle terrain. Plant pedestalling, exposed plant roots and exposed lichen lines on rocks are all common. Soil erosion, however, has not seriously effected reproduction of black sagebrush, the key browse species. The soil erosion condition was determined as stable in 2001.

Black sagebrush dominates the site with scattered amounts of narrowleaf low rabbitbrush, shadscale saltbush, winterfat, and spiny hopsage. All show evidence of use, although intensity is markedly greater on black sagebrush and winterfat. The population of black sagebrush appears relatively stable, but showed a predominance of decadent plants in 1984 and 1990. Density of black sagebrush was estimated at 15,932 plants/acre in 1984, remaining stable at 15,960 plants/acre in 2001. Utilization was heavy on 93% of the population and percent decadency was relatively high at 47% in 1984. Use has been mostly light to moderate since then and percent decadency has declined to 22% in 2001. The average annual growth rate for this black sagebrush site is below the average for sites measured in this management unit. The percentage of dead within the population has remained stable since 1996, at 6%. There continues to be good numbers of seedlings and young within the population.

The herbaceous understory is sparsely distributed and has poor species diversity. Total herbaceous cover equaled less than 4% cover in 1996 declining to only 2% total cover in 2001. Most are low-growing xeric species with low palatability. The most prominent grasses include bottlebrush squirreltail, Sandberg bluegrass, and Indian ricegrass. Cheatgrass is present but rather infrequent. Forbs include longleaf phlox, milkvetch, and rockcress. Livestock use historically, which has included horses in the past, has had a negative effect on herbaceous density and composition.

1984 APPARENT TREND ASSESSMENT

Nearly all of the indicators used to evaluate soil trend suggest a declining condition. Although, it appears at least superficially that widespread sheet erosion has been occurring for a long time and has not greatly affected the plant community. This is a very dry site with low potential for producing grass or forbs under even the best of conditions. The current plant community appears quite stable. Black sagebrush should continue to dominate the site, even though the population is subject to heavy utilization.

1990 TREND ASSESSMENT

The relatively small statured adult population (excluding seedlings) of black sagebrush on this site is stable. The high percentage of decadence is normal for high density stands like this one. Percent decadency has increased from 47% to 66%. This would be expected with extended drought. Sagebrush canopy cover averages about 21%. These shrubs were severely hedged in the past, but recently there has been lighter utilization and improved growth form. The majority of the mature plants have normal vigor. Nested frequency of bottlebrush squirreltail declined and the other two grasses were not sampled. All forbs except hoods phlox decreased in sum of nested and quadrat frequencies. The majority of the ground cover is rock and pavement, with the current rate of erosion appearing slow.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - stable (3)

herbaceous understory - down slightly and depleted (2)

1996 TREND ASSESSMENT

Soil condition is still poor, but trend is slightly up due to a decrease in percent bare ground (17% to 9%) and an increase in litter cover (14% to 20%). Trend for black sagebrush is slightly up. Total density has declined a little, but the number of mature plants has doubled while the percentage of decadent plants has decreased substantially. Utilization is more moderate and vigor good on all but a few of the decadent plants. The herbaceous understory is still depleted, yet sum of nested frequency for perennial grasses and forbs has increased.

TREND ASSESSMENT

soil - slightly up but in poor condition (4)

browse - slightly up (4)

herbaceous understory - slightly up but depleted (4)

2001 TREND ASSESSMENT

Soil condition is still poor, trend appears to be slightly down with an increase in percent bare ground (9% to 23%) and a decrease in litter cover (20% to 11%). Overall, the ratio of protective cover to bare soil has decreased substantially since 1996. Trend for black sagebrush is stable. Total density has increased slightly, percent dead within the population has remained the same, and percent decadence has decreased. Utilization is mostly light at this time. The herbaceous understory is still depleted. The sum of nested frequency for perennial grasses has remained stable while frequency of perennial forbs has decreased substantially.

TREND ASSESSMENT

soil - slightly down and in poor condition (2)

browse - stable (3)

herbaceous understory - slightly down and depleted (2)

HERBACEOUS TRENDS --
Herd unit 01 , 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	Bromus tectorum (a)	-	-	53	53	-	-	20	26	.20	.52
G	Oryzopsis hymenoides	2	-	5	-	1	-	4	-	.31	-
G	Poa secunda	_b 10	_a -	_b 22	_b 22	6	-	9	8	.30	.11
G	Sitanion hystrix	_b 73	_{ab} 50	_{bc} 89	_c 97	35	27	42	47	1.02	.86
G	Vulpia octoflora (a)	-	-	-	4	-	-	-	2	-	.01
Total for Annual Grasses		0	0	53	57	0	0	20	28	0.20	0.53
Total for Perennial Grasses		85	50	116	119	42	27	55	55	1.63	0.97
Total for Grasses		85	50	169	176	42	27	75	83	1.83	1.50
F	Allium spp.	8	-	-	-	4	-	-	-	-	-
F	Arabis drummondi	_b 12	_a -	_a -	_a 1	5	-	-	1	-	.01
F	Astragalus beckwithii	_a 7	_a 1	_b 29	_a -	3	1	16	-	.42	-
F	Cruciferae (a)	-	-	_b 11	_a -	-	-	7	-	.03	-
F	Cryptantha spp.	_a -	_a -	_b 20	_a -	-	-	10	-	.05	-
F	Gilia spp. (a)	-	-	_b 9	_a -	-	-	6	-	.03	-
F	Lappula occidentalis (a)	-	-	11	-	-	-	3	-	.04	-
F	Navarretia intertexta (a)	-	-	_b 19	_a -	-	-	9	-	.04	-
F	Phlox hoodii	_a 51	_b 87	_{ab} 61	_a 46	26	36	26	23	.65	.38
F	Phlox longifolia	_{ab} 80	_a 57	_b 94	_{ab} 51	39	26	42	30	.58	.25
F	Townsendia spp.	-	-	3	-	-	-	1	-	.03	-
Total for Annual Forbs		0	0	39	0	0	0	18	0	0.11	0
Total for Perennial Forbs		158	145	218	98	77	63	102	54	1.77	0.64
Total for Forbs		158	145	257	98	77	63	120	54	1.88	0.64

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

BROWSE TRENDS --
Herd unit 01 , Study no: 10

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	100	100	24.95	21.25
B	Artemisia tridentata wyomingensis	3	1	.03	-
B	Atriplex confertifolia	18	10	1.43	.22
B	Chrysothamnus viscidiflorus stenophyllus	0	4	5.37	3.79
B	Ephedra nevadensis	76	79	.03	-
B	Grayia spinosa	2	1	.30	-
B	Juniperus osteosperma	3	3	.15	.03
B	Kochia americana	1	1	-	-
B	Opuntia spp.	2	1	.00	-
B	Tetradymia canescens	7	2	-	-
Total for Browse		212	202	32.27	25.30

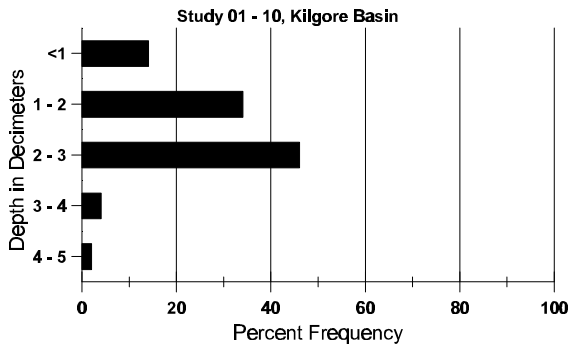
BASIC COVER --
Herd unit 01 , Study no: 10

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	296	259	0	5.50	36.16	30.06
Rock	236	211	11.00	6.75	11.82	4.40
Pavement	347	369	40.00	55.25	28.72	36.97
Litter	357	325	21.50	13.75	19.58	11.14
Cryptogams	165	109	1.50	1.50	1.84	.89
Bare Ground	252	309	26.00	17.25	9.20	22.91

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 10, Kilgore Basin

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.4	65.0 (10.8)	8.1	48.9	27.1	24.0	1.2	6.3	444.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 10

Type	Quadrat Frequency	
	'96	'01
Rabbit	2	1
Elk	1	2
Deer	17	13
Cattle	1	2

Pellet Transect	
Pellet Groups per Acre 01	Days Use per Acre (ha) 01
-	-
-	-
270	21 (51)
61	5 (13)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 10

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia nova																		
S	84	27	-	-	-	-	-	-	-	-	26	-	1	-	1800		27	
	90	14	-	-	-	-	-	-	-	-	14	-	-	-	933		14	
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560		28	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	15	-	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	90	18	1	4	-	-	-	-	-	-	23	-	-	-	1533		23	
	96	56	15	9	3	-	-	-	-	-	83	-	-	-	1660		83	
	01	77	4	-	-	-	-	-	-	-	81	-	-	-	1620		81	
M	84	-	-	112	-	-	-	-	-	-	86	-	26	-	7466	12 21	112	
	90	10	23	26	-	-	-	-	-	-	51	-	7	1	3933	9 17	59	
	96	106	185	48	6	67	5	-	-	-	417	-	-	-	8340	8 20	417	
	01	399	126	-	8	7	-	-	-	-	510	24	-	6	10800	9 20	540	
D	84	1	-	111	-	-	-	-	-	-	62	-	50	-	7466		112	
	90	55	49	57	-	-	-	-	-	-	98	2	31	30	10733		161	
	96	60	54	8	-	48	10	-	-	-	173	-	-	7	3600		180	
	01	122	25	2	14	14	-	-	-	-	125	-	1	51	3540		177	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	880		44	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1040		52	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			93%			32%			+ 2%							
'90		30%			36%			28%			-16%							
'96		54%			12%			01%			+15%							
'01		22%			.25%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	15932	Dec:	47%			
												'90	16199		66%			
												'96	13600		26%			
												'01	15960		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				
Artemisia tridentata wyomingensis																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	23	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	26	45	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	2	-	-	1	-	-	-	3	-	-	-	60			3
	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		00%			00%			00%										
'96		00%			75%			00%			-75%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	0		0%				
											'96	80		75%				
											'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				
Atriplex confertifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	84	2	3	-	-	-	-	-	-	-	5	-	-	-	333	12 12	5	
	90	6	-	-	-	-	-	-	-	-	5	-	-	1	400	7 10	6	
	96	10	8	3	1	7	-	-	-	-	29	-	-	-	580	10 14	29	
	01	3	-	-	8	-	-	-	-	-	11	-	-	-	220	8 11	11	
D	84	1	11	3	-	-	-	-	-	-	11	-	4	-	1000		15	
	90	11	-	2	-	-	-	-	-	-	9	-	-	4	866		13	
	96	-	-	-	-	1	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	1	-	-	-	1	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		67%			14%			19%			+ 0%							
'90		00%			10%			24%			-47%							
'96		43%			08%			00%			-51%							
'01		00%			06%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1399	Dec:	71%			
												'90	1399		62%			
												'96	740		3%			
												'01	360		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				
Ceratoides lanata																		
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	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	3	-	-	1	-	-	-	-	-	4	-	-	-	80	3	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%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	120		-			

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			
Chrysothamnus viscidiflorus stenophyllus																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	25	-	-	-	-	-	-	-	-	-	-	-	500		25
	01	1	-	-	-	-	-	-	-	-	-	-	-	20		1
Y	84	1	-	-	-	-	-	-	-	-	-	-	-	66		1
	90	5	5	-	-	-	-	-	-	-	-	-	-	666		10
	96	3	-	-	1	-	-	-	-	-	-	-	-	80		4
	01	5	-	-	2	-	-	1	-	-	-	-	-	160		8
M	84	9	12	3	-	-	-	-	-	-	-	-	-	1600	6 7	24
	90	33	5	-	1	-	-	-	-	-	-	-	-	2600	7 11	39
	96	208	5	-	11	1	-	-	-	-	-	-	-	4500	9 15	225
	01	163	-	-	7	-	-	-	-	-	-	-	-	3400	9 14	170
D	84	5	16	2	-	-	-	-	-	-	-	-	-	1533		23
	90	2	-	-	-	-	-	-	-	-	-	-	-	133		2
	96	2	-	-	-	-	-	-	-	-	-	-	-	40		2
	01	19	-	-	3	-	-	3	-	-	-	5	-	500		25
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		58%				10%				15%				+ 6%		
'90		20%				00%				00%				+26%		
'96		03%				00%				00%				-12%		
'01		00%				00%				02%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	3199	Dec:	48%	
												'90	3399		4%	
												'96	4620		1%	
												'01	4060		12%	

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		
Ephedra nevadensis																	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	2	-	-	-	-	-	-	-	-	-	40	9	13	2
	01	1	-	-	-	-	-	-	-	-	-	-	-	20	7	15	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		33%				67%				00%				-67%			
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%		
												'90	0		0%		
												'96	60		33%		
												'01	20		0%		
Grayia spinosa																	
M	84	-	-	1	-	-	-	-	-	-	-	-	-	66	16	4	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	2	-	-	-	-	-	-	-	-	-	-	40	15	33	2
	01	3	-	-	-	-	-	-	-	-	-	-	-	60	11	10	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	2	-	-	1	-	-	-	-	-	-	3	60			3
	01	-	-	-	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%				100%				100%							
'90		00%				00%				00%							
'96		100%				00%				60%				-20%			
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%		
												'90	0		0%		
												'96	100		60%		
												'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				
Juniperus osteosperma																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
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%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	20		-			
Kochia americana																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	4	2
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	7	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:	-			
												'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				
Opuntia spp.																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	4	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	3	4	1
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	4	8	4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
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%			+50%							
'90		00%			00%			00%			+ 6%							
'96		00%			00%			00%			-71%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	132		0%			
												'96	140		14%			
												'01	40		0%			
Sarcobatus vermiculatus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	38	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 1-11-01

Study site name: Kimber Ranch.

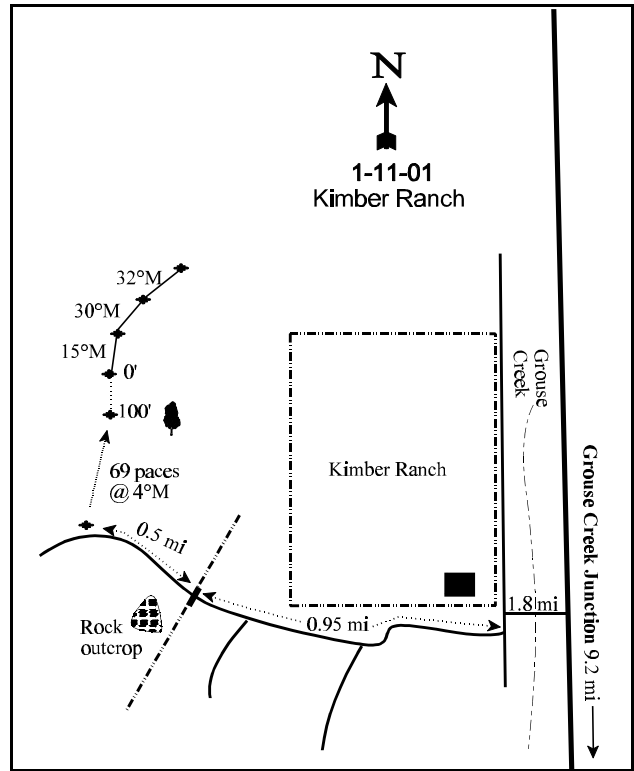
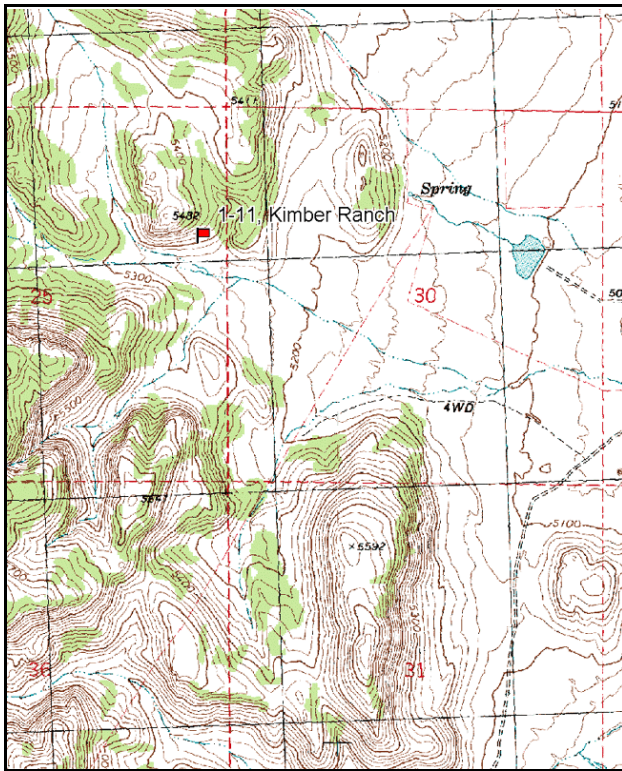
Vegetation type: Black Sagebrush.

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

Proceed on U-30 to Grouse Creek junction, turn right and travel north 9.2 miles. Turn left at the ranch complex and proceed 1.8 miles to the Kimber Ranch. At the ranch house stay left for 0.05 miles. Stay left for another 0.25 miles, then turn right going west for 0.6 miles. Turn right for 0.1 miles to a gate. Continue up the road 0.5 miles to a witness post on the right side of the road. From the witness post walk 69 paces at 4 degrees magnetic to the 100-foot post. The 0-foot stake is 100 feet to the north and is marked by browse-tag #7912.



Map Name: Toms Cabin Spring

Diagrammatic Sketch

Township 10N, Range 19W, Section 25

UTM 4605076 N, 252701 E

DISCUSSION

Trend Study No. 1-11

The Kimber Ranch trend study samples a similar range type as study #10, Kilgore Basin. The study is on a moderately steep (20%) south slope, just west of the Kimber Ranch at an elevation of approximately 5,300 feet. Winter use from deer on this black sagebrush type was very heavy in 1984. Additional use can come from cattle and horses. A pellet-group transect read in conjunction with the vegetative transect in 2001, estimated 27 deer days use/acre (66 deer days use/ha) and 2 cow days use/acre (5 cow days use/ha).

Soil, which is derived from alluvially deposited basalt, is very well drained and has considerable surface rockiness. Soil texture is a clay loam that has a slightly alkaline soil reaction (7.8 pH). The average soil temp is the highest of any site within this management unit (73° F), where the average for the unit is 58° F. This high of a soil temperature would be advantageous to winter annuals like cheatgrass. Protective ground cover (vegetation and litter cover) is poor and comprised primarily of dead cheatgrass litter and shrub crowns with large amounts of rock and erosion pavement. Apart from cheatgrass, herbaceous cover is insufficient.

Browse composition is dominated by a low-growing, evenly spaced stand of black sagebrush. The population was noted as heavily hedged in 1984. Aside from the mostly moderate use in 1996, use since then has been mostly light. Young plants have averaged over 12% between 1990 and 2001, while seedlings have been found infrequently with the exception of 1996. The increasing denseness of cheatgrass appears to be offering significant competition to seedling establishment in association with the extended drought. Percent decadency was high at 69% in 1990. It declined to 17% in 1996 then increased slightly to 23% in 2001. The percentage of dead within the population has remained almost unchanged since 1996 at about 6%, which is a very low value for sagebrush. This site has a relatively low growth potential as illustrated by the fact that the average annual leader growth for this site is less than 1 inch.

Other associated shrubs include Wyoming big sagebrush and shadscale. Although, together they provide less than 1% total cover, or only about 5% of the total shrub cover. The Wyoming big sagebrush number only about 60 plants/acre and show light use. This is a marginal site for Wyoming big sagebrush and with extended drought conditions and shallow rocky soils, they may not survive through the duration of the drought. The shadscale are also in a declining condition on this marginal site. However, neither species is of any special importance because they are not abundant and provide only a small portion of the total browse cover.

Herbaceous composition consists chiefly of grasses, especially cheatgrass which made up 64% of the grass cover in 1996 and 89% in 2001. The most important perennials include: bluebunch wheatgrass, Thurber needlegrass, bottlebrush squirreltail, Indian ricegrass, and Sandberg bluegrass. Together these species provide on average only 1-2% total cover. Grasses are understandably not an important source of forage. Perennial forbs are even more rare and together provide less than ½ of 1% cover. The most conspicuous perennial forbs include desert Indian paintbrush and longleaf phlox.

1984 APPARENT TREND ASSESSMENT

Excessive, almost year-round use by deer, cattle, and horses have severely impacted this site, along with winter injury through the harsh winters of 1983 and 1984. The apparent result is increased soil movement, increased abundance of cheatgrass and other annual plants, and an apparent decline in the key browse species. Vigor of most plants is predominantly poor. Overall trend appears to be declining.

1990 TREND ASSESSMENT

Trend for black sagebrush is declining. Density has declined slightly, decadent black sagebrush have increased from 34% to 69%, and vigor is poor on 36% of the decadent plants sampled. The sagebrush showed light to moderate hedging but had low reproduction potential. This low production would be expected with the extended drought. The high density of cheatgrass also inhibits sagebrush reproduction and growth. The grasses have been heavily grazed yet sum of nested frequency has increased slightly. Cheatgrass is still fairly dense (there are no quantitative measures for annuals before 1992). The forb component is depleted and decreasing, although it only provides less than ½ of 1% total cover. Also typical of this range site type, the soil surface is dominated by erosion pavement.

TREND ASSESSMENT

soil - stable, but in poor condition (3)

browse - stable (3)

herbaceous understory - stable but depleted (3)

1996 TREND ASSESSMENT

Protective ground cover conditions are still poor with relatively low values for vegetative cover and a decrease in litter cover. Percent bare ground increased from 3% to 7%, while pavement and litter cover declined, probably the result of some overland flows covering some of the rock and pavement. Sum of nested frequency for grasses also declined. Trend for soil is considered slightly down. Browse trend is slightly up due to increased density, improved vigor and reduced decadence (69% to 17%). Trend for the herbaceous understory is slightly down. Sum of nested frequency of perennial grasses declined slightly while that of forbs increased, but forbs only make up less than 1% total cover. Sum of nested frequency for bluebunch wheatgrass and Indian ricegrass increased, while frequency of squirreltail and Thurber needlegrass declined. Overall, perennial grass trend is slightly down and contributes to 93% of the herbaceous cover.

TREND ASSESSMENT

soil - slightly down and poor condition (2)

browse - slightly up (4)

herbaceous understory - slightly down and in very poor condition (2)

2001 TREND ASSESSMENT

Protective ground cover conditions are still poor with relatively low values for vegetative cover and a decrease in litter cover. Percent bare ground increased from 7% to 10% while pavement and litter cover declined. The ratio of bare soil to protective ground cover has decreased substantially. Trend for soil is considered slightly down. Browse trend is considered slightly down due to a decrease in density. In addition, those plants classified with poor vigor increased and percent decadence increased (17% to 23%). Trend for the herbaceous understory is slightly down. Sum of nested frequency of perennial grasses declined slightly while that of perennial forbs also decreased. However, altogether the perennial herbaceous species make up less than 2% total cover. Cheatgrass has increased significantly since 1996. In 1996 it made up 64% of the grass cover, now it contributes to almost 90% of the grass cover.

TREND ASSESSMENT

soil - slightly down and poor condition (2)

browse - slightly down (2)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 11

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron smithii	-	-	-	2	-	-	-	1	-	.00
G	Agropyron spicatum	a-	b9	c62	c61	-	5	27	30	.73	.74
G	Bromus tectorum (a)	-	-	a321	b362	-	-	99	100	3.11	11.06
G	Oryzopsis hymenoides	a4	ab21	b25	a8	3	10	16	4	.34	.10
G	Poa secunda	6	8	-	10	2	3	-	4	.00	.07
G	Sitanion hystrix	c79	bc58	ab43	a21	40	29	20	10	.41	.16
G	Stipa thurberiana	b99	b106	a28	a13	47	47	12	7	.21	.16
G	Vulpia octoflora (a)	-	-	22	21	-	-	9	8	.04	.06
Total for Annual Grasses		0	0	343	383	0	0	108	108	3.15	11.13
Total for Perennial Grasses		188	202	158	115	92	94	75	56	1.70	1.23
Total for Grasses		188	202	501	498	92	94	183	164	4.86	12.37
F	Antennaria rosea	-	-	-	2	-	-	-	1	-	.03
F	Astragalus beckwithii	1	-	4	-	1	-	2	-	.01	-
F	Astragalus utahensis	ab11	a3	b23	a3	6	2	13	2	.14	.03
F	Balsamorhiza hookeri	-	-	-	1	-	-	-	1	-	.03
F	Castilleja chromosa	b28	a-	a6	a-	13	-	3	-	.02	-
F	Chaenactis douglasii	1	-	-	-	1	-	-	-	-	-
F	Crepis acuminata	-	-	-	1	-	-	-	1	-	.03
F	Cryptantha spp.	-	-	3	-	-	-	2	-	.01	-
F	Descurainia pinnata (a)	a-	a-	a3	b12	-	-	1	8	.00	.06
F	Erigeron aphanactis	4	-	-	-	2	-	-	-	-	-
F	Eriogonum caespitosum	5	2	3	-	2	2	1	-	.00	-
F	Erigeron pumilus	-	-	-	1	-	-	-	1	-	.00
F	Gilia spp. (a)	-	-	a2	b114	-	-	1	48	.00	.34
F	Hymenopappus spp.	-	-	8	-	-	-	3	-	.06	-
F	Lappula occidentalis (a)	-	-	a-	b9	-	-	-	6	-	.03
F	Lygodesmia spp.	-	-	3	-	-	-	2	-	.03	-
F	Navarretia intertexta (a)	-	-	2	-	-	-	2	-	.01	-
F	Orobanche fasciculata	-	1	6	2	-	1	2	1	.01	.00
F	Phlox longifolia	13	9	6	14	9	4	4	6	.02	.03
F	Streptanthus cordatus	-	1	-	-	-	1	-	-	-	-
F	Unknown forb-perennial	-	1	-	-	-	1	-	-	-	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
	Total for Annual Forbs	0	0	7	135	0	0	4	62	0.01	0.43
	Total for Perennial Forbs	63	17	62	24	34	11	32	13	0.31	0.16
	Total for Forbs	63	17	69	159	34	11	36	75	0.34	0.59

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

BROWSE TRENDS --

Herd unit 01 , Study no: 11

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	98	93	14.88	15.18
B	Artemisia tridentata wyomingensis	0	3	-	.53
B	Atriplex confertifolia	15	10	1.27	.48
B	Chrysothamnus viscidiflorus stenophyllus	16	20	.42	.46
B	Gutierrezia sarothrae	8	6	.00	-
B	Juniperus osteosperma	2	3	1.62	1.63
B	Kochia americana	9	9	.07	.07
B	Opuntia spp.	0	1	.00	-
	Total for Browse	148	145	18.29	18.36

CANOPY COVER --

Herd unit 01 , Study no: 11

Species	Percent Cover	
	'96	'01
Juniperus osteosperma	-	2

Point-Quarter Tree Data

Trees per Acre	
'96	'01
39	60

Average diameter (in)	
'96	'01
4.0	5.0

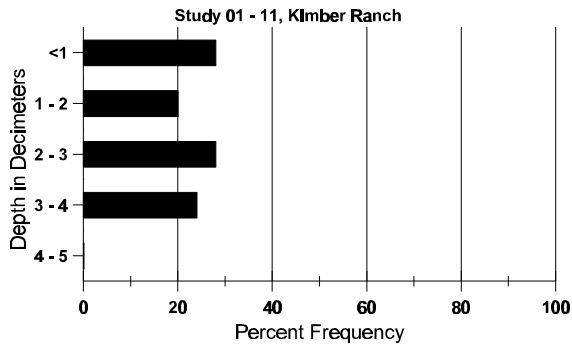
BASIC COVER --
Herd unit 01 , Study no: 11

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	335	363	1.75	9.00	25.21	31.16
Rock	315	294	19.50	26.50	17.69	19.26
Pavement	352	344	40.50	43.50	37.90	35.37
Litter	366	301	35.75	17.75	12.99	16.33
Cryptogams	14	5	0	0	.08	.01
Bare Ground	187	230	2.50	3.25	6.77	10.06

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 11, Kimber Ranch

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.9	73.0 (10.5)	7.8	42.9	29.1	28.0	1.9	7.0	134.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 11

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Rabbit	6	-	52	N/A
Horse	1	-	-	-
Deer	17	15	348	27 (66)
Cattle	-	7	26	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 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			
Artemisia nova																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	2	3	8	-	-	-	-	-	-	13	-	-	-	866		13
	90	5	1	-	-	-	-	-	-	-	6	-	-	-	400		6
	96	40	4	-	1	-	-	-	-	-	45	-	-	-	900		45
	01	54	-	-	2	-	-	-	-	-	55	-	1	-	1120		56
M	84	1	3	39	-	-	-	-	-	-	35	-	5	3	2866	7 17	43
	90	12	6	-	-	-	-	-	-	-	16	1	1	-	1200	9 15	18
	96	107	169	8	-	4	-	-	-	-	288	-	-	-	5760	12 24	288
	01	210	6	7	-	-	-	-	-	-	223	-	-	-	4460	9 20	223
D	84	-	1	28	-	-	-	-	-	-	24	-	5	-	1933		29
	90	43	9	-	1	-	-	-	-	-	31	1	2	19	3533		53
	96	19	47	-	-	-	-	-	-	-	56	-	-	10	1320		66
	01	70	5	-	6	-	-	-	-	-	53	-	-	28	1620		81
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	620		31
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	440		22
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		08%			88%			15%			- 9%						
'90		21%			00%			29%			+36%						
'96		56%			02%			03%			-10%						
'01		03%			02%			08%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	5665	Dec:	34%		
												'90	5133		69%		
												'96	7980		17%		
												'01	7200		23%		

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	84	5	1	6	-	-	-	-	-	-	12	-	-	-	800		12	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	3	3	-	-	-	-	-	-	7	-	-	-	466	17	21	7
	90	1	-	-	1	-	-	-	-	-	1	-	1	-	133	11	14	2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	24	23	2
D	84	-	1	3	-	-	-	-	-	-	2	-	2	-	266			4
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	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		22%			52%			09%			-74%							
'90		00%			00%			17%										
'96		00%			00%			00%										
'01		00%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1532	Dec:	17%			
												'90	399		50%			
												'96	0		0%			
												'01	60		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				
Atriplex confertifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	6	-	-	-	-	-	-	-	-	-	-	-	120			6	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	24	-	-	-	1	-	-	-	-	-	-	-	500			25	
	01	6	-	-	-	-	-	-	-	-	-	-	-	120			6	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	13	3	-	-	3	-	-	-	-	-	-	-	380	9	17	19	
	01	1	-	-	6	-	-	-	-	-	-	-	-	140	14	26	7	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	1	-	-	5	-	-	-	-	-	-	-	-	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%										
'90		00%			00%			00%										
'96		16%			00%			00%			-57%							
'01		00%			00%			21%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	880		0%			
												'01	380		32%			
Chrysothamnus nauseosus hololeucus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	26	51	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				
Chrysothamnus viscidiflorus stenophyllus												
S	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	0		0	
Y	84	1	-	-	-	-	-	-	66		1	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	0		0	
	01	3	-	-	-	-	-	-	60		3	
M	84	12	4	-	-	-	-	-	1066	11	15	16
	90	12	-	-	-	-	-	-	800	11	16	12
	96	20	-	-	1	-	-	-	420	11	20	21
	01	17	-	-	3	-	-	-	400	8	16	20
D	84	1	4	-	-	-	-	-	333			5
	90	3	-	-	-	-	-	-	200			3
	96	-	-	-	-	-	-	-	0			0
	01	2	-	-	-	-	1	-	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		36%		00%		05%		-32%				
'90		00%		00%		20%		-58%				
'96		00%		00%		00%		+19%				
'01		00%		00%		04%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	1465	Dec:	23%			
						'90	1000		20%			
						'96	420		0%			
						'01	520		12%			

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			
<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	1	-	-	-	-	-	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	96	17	-	-	-	-	-	-	-	-	-	-	-	340	7	17
	01	4	-	-	-	-	-	-	-	-	-	-	-	80	4	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	4	-	-	-	-	-	-	-	-	-	-	3	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%				-56%		
'01		00%				00%				38%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%	
												'90	0		0%	
												'96	360		0%	
												'01	160		50%	
<i>Juniperus osteosperma</i>																
Y	84	1	-	-	-	-	-	-	-	-	-	-	-	66		1
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	1	-	-	-	-	-	-	-	-	-	-	-	20		1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	1	-	-	-	-	-	-	-	-	-	-	-	66	65	1
	96	2	-	-	-	-	-	-	-	-	-	-	-	40	-	2
	01	-	-	-	1	-	-	-	1	-	-	-	-	40	-	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%				00%				-39%		
'96		00%				00%				00%				+33%		
'01		00%				00%				00%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-	
												'90	66		-	
												'96	40		-	
												'01	60		-	

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			
<i>Kochia americana</i>																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	1	-	-	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	7	-	-	-	-	-	-	-	-	-	-	-	140		7
	01	8	-	-	-	-	-	-	-	-	-	-	-	160		8
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	15	-	-	-	-	-	-	-	-	-	-	-	300	4	6
	01	9	-	-	-	-	-	-	-	-	-	-	-	180	4	4
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		04%				00%				00%				-26%		
'01		00%				00%				00%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%	
												'90	0		0%	
												'96	460		4%	
												'01	340		0%	
<i>Opuntia spp.</i>																
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	1	-	-	-	-	-	-	-	-	-	1	-	66		1
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	01	1	-	-	-	-	-	-	-	-	-	1	-	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%				100%						
'96		00%				00%				00%						
'01		00%				00%				00%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-	
												'90	66		-	
												'96	0		-	
												'01	20		-	

Trend Study 1-12-01

Study site name: Red Butte Exclosure.

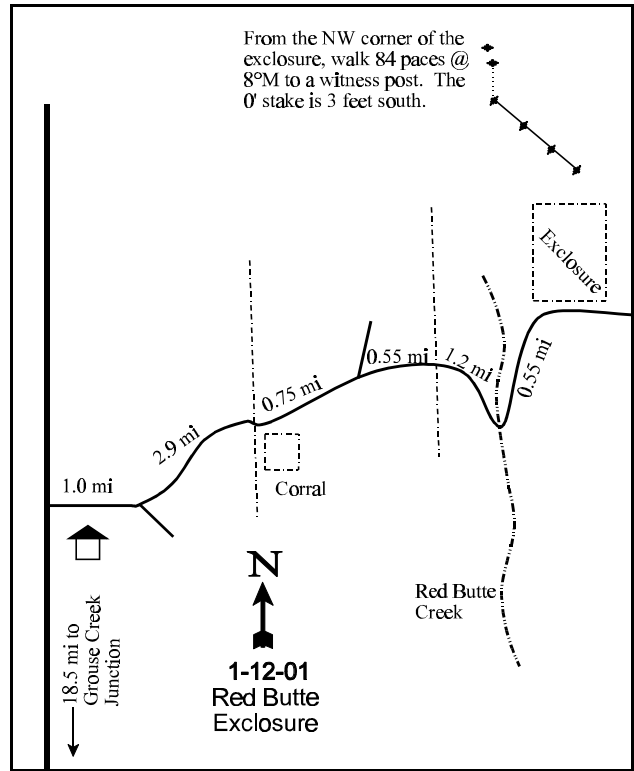
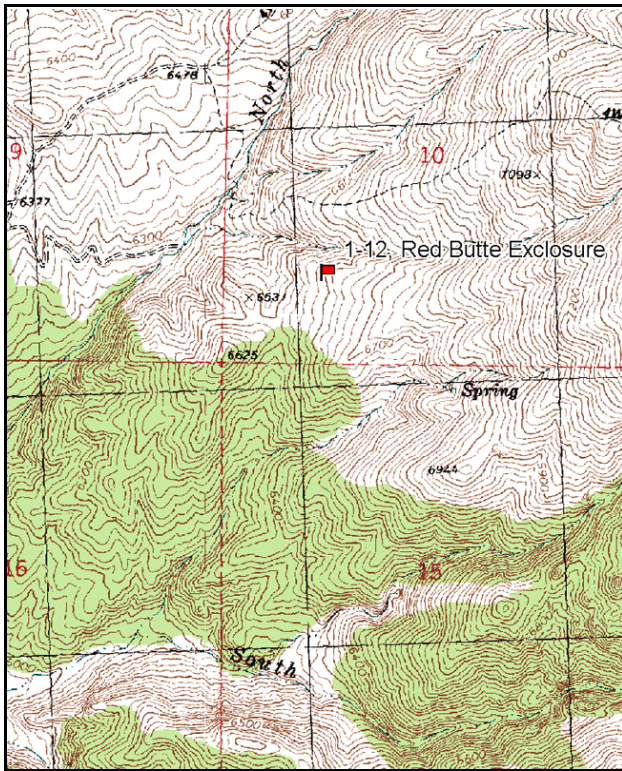
Vegetation type: Mountain Brush.

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

A four-wheel drive vehicle is needed to access this study. Proceed about 18.5 miles north from Grouse Creek Junction and turn right onto Ingham Canyon Road. Travel 1.0 miles to the first significant fork and turn left. Proceed 2.9 miles to a fence with a corral on the east side. Continue east and north for 0.75 miles to a fork and turn right. Proceed 0.55 miles to a fence. From the fence go 1.2 miles, staying right, to the bottom of the creek. From the creek, proceed up the dugway 0.55 miles to the southwest corner of the Red Butte exclosure. From the northwest corner of the exclosure, walk 84 paces at 8 degrees magnetic to the 0-foot stake of the baseline, which is marked by browse-tag #7915. Bearing of the baseline is 165 degrees magnetic and turns to 91 degrees magnetic.



Map Name: Ingham Canyon

Diagrammatic Sketch

Township 11N, Range 17W, Section 10

UTM 4618669 N, 268169 E

DISCUSSION

Trend Study No. 1-12

The Red Butte Exclosure study is located on the west slope of the Grouse Creek Mountains adjacent to the Red Butte exclosure. Elevation (6,540 ft.) is such that the study site constitutes "preferred" winter range. During most years it is used as a key "staging" area, where deer remain in fall and winter as long as snow conditions permit. As snow depths increase, deer migrate further south to Mud Springs Basin, Bovine, and Devils Playground. Vegetative and topographic characteristics suggest that spring use and fawning are also possibilities. The range type is basin big sagebrush-grass with significant associations with antelope bitterbrush, mountain Snowberry, and Saskatoon serviceberry. The study site has a gentle (15%) south to southwest facing slope. Deer use, as judged from pellet group frequency and browse utilization, appears light. Probably more significant is summer cattle grazing. Cattle were on the area at the time the study was established in 1984 and had already made a noticeable impact, especially on grasses and forbs. This area is within the Ingham allotment which is used from May 1 to September 15 by 802 cattle. A pellet-group transect read in conjunction with the vegetative transect in 2001 estimated light deer use at 21 days use/acre (53 deer days use/ha) and cow use at 2 days use/acre (4 cow days use/ha). Most of the deer pellet groups appeared to be from late winter and early spring use. Some sage grouse scat was also seen along the study site baseline but not sampled within the pellet group transect.

The soil is relatively deep and fertile with a sandy loam texture and a moderate amount of surface rock. Soil reaction is neutral (6.8 pH). Effective rooting depth estimates taken in 1996 averages just over 20 inches. The average soil temperature is 53°F at nearly that depth. Although numerous areas of bare ground are exposed, the thickness and permanence of vegetation and litter cover on the remaining area has prevented serious soil loss. The erosion condition is classified as stable for this site in 2001.

Shrubs are abundant and on average account for over 50% of the vegetation cover on this site. The key browse species for this site would be basin big sagebrush and bitterbrush which contribute to about 50% of the browse cover. Even though shrubs such as narrowleaf low rabbitbrush and mountain Snowberry are more numerous, the combination of big sagebrush and bitterbrush's relative palatability, larger size, and abundance are more vital to management. Of interest is an apparent mixture of sagebrush subspecies or ecotypes. Although the bulk of big sagebrush plants appear to be subspecies *tridentata*, there is a substantial portion (10%-20%) which more closely resembles the *vaseyana* subspecies. Utilization of sagebrush has been mostly light to moderate from 1984 through 1996 and light in 2001. The overall big sagebrush population has declined in density, but it is on average less decadent and displays better vigor than in 1984 or 1990. The percent dead in the population has remained about the same at 24-26%. Bitterbrush has remained fairly stable since 1996, with densities around 750 plants/acre, good vigor and mostly moderate use.

Populations of mountain snowberry and stickleaf low rabbitbrush appear to have maintained fairly stable populations. Preferred shrubs such as bitterbrush and serviceberry occur in lower numbers and like almost all other shrubs, suffered some vole and pocket gopher damage in 1983-84.

Perennial grasses comprise an important part of the understory. Unfortunately, annual cheatgrass is the most abundant grass on the site. It accounted for 74% of the grass cover in 1996 and 66% of the grass cover in 2001. The most abundant perennial species is thickspike wheatgrass, an open sod former that tends to increase with heavy livestock use. Sandberg bluegrass is also fairly abundant. Other grass species occur much less frequently but almost all showed evidence of use during past readings. Perhaps most notable is Great Basin wildrye a robust bunchgrass, which although not encountered on the study plots, is obviously the most preferred grass species in midsummer.

The study site has a good mixture of forbs that includes a few conspicuous and desirable species in addition to larger numbers of less desirable ones. Showy forbs include: arrowleaf balsamroot, narrowleaf Lomatium, tapertip hawksbeard, and Penstemon.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Although there is some surface disturbance and exposed bare ground, the erosion rate is limited by a generally good vegetative and litter cover. Vegetative trend is more difficult to access. It appears that several undesirable increaser shrub, grass, and forb species are expanding. Although basin big sagebrush seems relatively stable, it is difficult to see how it can persist if species such as snowberry, low rabbitbrush, and western wheatgrass continue to increase in density.

1990 TREND ASSESSMENT

The soil condition appears stable, even with 30% cover of bare soil which hasn't really changed much since 1984. Narrowleaf low rabbitbrush is the most abundant shrub on this moderately high site. The big sagebrush population is essentially stable. The sagebrush shows light to moderate hedging but an unsatisfactory 53% decadency rate. However, this is lower than in 1984 when decadency was estimated at 60%. Bitterbrush has shown little changed except that percent decadency has declined from 50% to 25%. The bitterbrush is more heavily hedged but still maintains good vigor. Low rabbitbrush has not increased. There is a fair diversity of grasses and forbs. Thickspike wheatgrass and Mutton bluegrass both increased significantly in nested frequency. This increase would be expected on a high elevation site. Sum of nested frequency for forbs has also increased slightly. Sum of nested frequency for arrowleaf balsamroot has remained constant while the most numerous forb, long leaf phlox, has increased significantly. Trend for the herbaceous understory is considered up slightly.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly (4)

1996 TREND ASSESSMENT

The soil trend has improved due to a major decline in percent bare ground (30% to 6%) and an increase in litter cover (54% to 60%). Trend for the key browse species overall is stable. With basin big sagebrush and bitterbrush showing basically stable populations. Utilization is mostly light on both species and percent decadency has also declined. Changes in density of these two species is partly due to the larger sample used in 1996. Snowberry appears to have a stable trend also. The increaser, narrowleaf low rabbitbrush, shows a stable trend with the only major change being a reduced decadency rate (27% to 0%). Trend for the herbaceous understory is slightly down due to a decline in the sum of nested frequency for both perennial grasses and forbs. Thickspike wheatgrass declined significantly in sum of nested frequency. The majority of the decline in sum of nested frequency is due to significant declines in less desirable forbs including tapertip hawksbeard, larkspur, and longleaf phlox.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

The soil trend is stable with only slight changes in cover. The ratio of bare soil to protective cover is still very good with values of more than 1 to 4. Trend for the key browse species, basin big sagebrush and bitter brush is fairly stable. Utilization is mostly light and percent decadency still remains within satisfactory limits. The increaser, narrowleaf low rabbitbrush, continues to show slight decreases in its density. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses declined slightly while frequency of perennial forbs has remained stable. However, the 2 key grass species, thickspike wheatgrass and Sandberg bluegrass have remained stable while annual cheatgrass has declined significantly. Cheatgrass still makes up 66% of the grass cover. The majority of the forb cover comes from two species, arrowleaf balsam root and the annual, blue eyed Mary. Both species have remained stable since 1996.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 12

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	bc237	c267	ab185	a176	89	95	67	64	2.44	3.51
G	Agropyron spicatum	a-	a-	b21	a-	-	-	8	-	.56	-
G	Bromus anomalus	-	-	-	3	-	-	-	1	-	.03
G	Bromus tectorum (a)	-	-	b320	a273	-	-	86	85	15.28	10.79
G	Koeleria cristata	2	-	5	-	1	-	2	-	.18	-
G	Oryzopsis hymenoides	-	-	8	4	-	-	3	1	.04	.03
G	Poa fendleriana	a7	b102	a-	a-	4	44	-	-	-	-
G	Poa secunda	a47	a47	b91	b92	23	23	38	43	2.19	1.93
G	Sitanion hystrix	-	1	13	5	-	1	4	2	.04	.03
G	Stipa comata	-	1	-	-	-	1	-	-	-	-
Total for Annual Grasses		0	0	320	273	0	0	86	85	15.28	10.79
Total for Perennial Grasses		293	418	323	280	117	164	122	111	5.47	5.54
Total for Grasses		293	418	643	553	117	164	208	196	20.75	16.34
F	Agoseris glauca	b66	ab43	ab57	a31	34	19	24	14	.15	.17
F	Allium acuminatum	b94	a36	a21	b107	50	17	12	49	.06	.42
F	Antennaria rosea	-	8	3	-	-	3	1	-	.15	-
F	Arabis spp.	-	1	10	-	-	1	5	-	.02	-
F	Astragalus beckwithii	b13	a-	ab5	ab8	5	-	2	4	.03	.21
F	Astragalus cibarius	ab16	b26	ab25	a7	7	13	11	3	.18	.07
F	Astragalus convallarius	-	2	-	-	-	1	-	-	-	-
F	Balsamorhiza sagittata	60	60	56	45	27	32	26	20	5.59	6.66

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Camelina microcarpa</i> (a)	-	-	1	3	-	-	1	1	.00	.00
F	<i>Chenopodium fremontii</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Collomia linearis</i> (a)	-	-	15	19	-	-	9	8	.04	.04
F	<i>Comandra pallida</i>	2	7	1	7	2	3	1	3	.00	.18
F	<i>Collinsia parviflora</i> (a)	-	-	217	230	-	-	78	71	1.45	5.28
F	<i>Cordylanthus ramosus</i> (a)	-	-	-	3	-	-	-	1	-	.15
F	<i>Crepis acuminata</i>	_b 56	_b 70	_a 9	_a 17	31	34	4	10	.02	.48
F	<i>Cryptantha</i> spp.	-	-	27	-	-	-	11	-	.08	-
F	<i>Delphinium nuttallianum</i>	_b 22	_b 18	_a -	_b 21	15	10	-	11	-	.06
F	<i>Descurainia pinnata</i> (a)	-	-	-	2	-	-	-	1	-	.00
F	<i>Eriogonum umbellatum</i>	-	6	6	4	-	3	3	2	.18	.03
F	<i>Gayophytum ramosissimum</i> (a)	-	-	1	12	-	-	1	4	.00	.04
F	<i>Gilia</i> spp. (a)	-	-	-	-	-	-	-	-	-	.00
F	<i>Haplopappus acaulis</i>	-	-	7	-	-	-	2	-	.03	-
F	<i>Hackelia patens</i>	11	13	16	1	6	7	7	1	.14	.03
F	<i>Holosteum umbellatum</i> (a)	-	-	3	-	-	-	1	-	.00	-
F	<i>Lappula occidentalis</i> (a)	-	-	-	2	-	-	-	1	-	.00
F	<i>Lithospermum ruderale</i>	-	-	-	3	-	-	-	2	-	.01
F	<i>Lomatium triternatum</i>	_{ab} 21	_b 24	_a 3	_b 24	11	11	3	13	.01	.22
F	<i>Lupinus argenteus</i>	-	-	-	1	-	-	-	1	-	.03
F	<i>Machaeranthera</i> spp	-	-	4	-	-	-	2	-	.01	-
F	<i>Microsteris gracilis</i> (a)	-	-	-	92	-	-	-	39	-	.72
F	<i>Phlox longifolia</i>	_b 154	_c 217	_a 81	_a 54	68	80	34	23	.56	.46
F	<i>Polygonum douglasii</i> (a)	-	-	_b 46	_a -	-	-	20	-	.10	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	2	-	-	-	1	-	.00	-
F	<i>Sedum lanceolatum</i>	-	-	6	-	-	-	2	-	.01	-
F	<i>Tragopogon dubius</i>	_a -	_a -	_a -	_b 3	-	-	-	1	.00	.03
F	Unknown forb-perennial	_{ab} 4	_a -	_b 13	_a -	3	-	5	-	.07	-
F	<i>Veronica biloba</i> (a)	-	-	3	8	-	-	1	3	.00	.06
F	<i>Viguiera multiflora</i>	-	-	8	11	-	-	4	4	.04	.04
Total for Annual Forbs		0	0	288	372	0	0	112	130	1.62	6.33
Total for Perennial Forbs		519	531	358	344	259	234	159	161	7.39	9.16
Total for Forbs		519	531	646	716	259	234	271	291	9.02	15.50

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

BROWSE TRENDS --

Herd unit 01 , Study no: 12

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier utahensis	3	1	.30	.00
B	Artemisia tridentata tridentata	48	51	9.52	8.38
B	Chrysothamnus nauseosus consimilis	2	1	.15	-
B	Chrysothamnus viscidiflorus viscidiflorus	76	73	6.46	6.42
B	Eriogonum microthecum	2	2	.15	.15
B	Opuntia spp.	49	45	3.35	2.71
B	Purshia tridentata	31	31	6.71	10.81
B	Symphoricarpos oreophilus	53	50	6.17	8.47
Total for Browse		264	254	32.82	36.95

BASIC COVER --

Herd unit 01 , Study no: 12

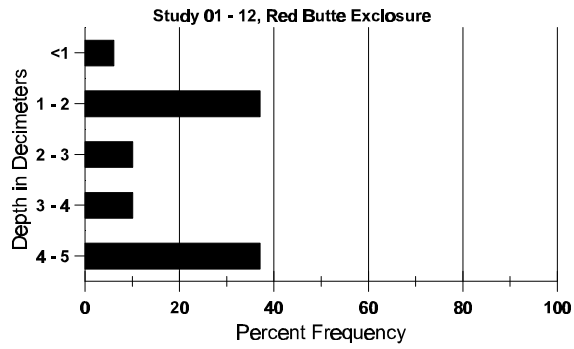
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	376	365	3.00	11.50	56.69	62.91
Rock	113	51	1.75	1.00	4.32	3.58
Pavement	205	168	3.00	2.50	4.30	4.63
Litter	389	373	59.25	54.25	59.50	47.27
Cryptogams	19	20	2.50	.75	.34	.25
Bare Ground	159	165	30.50	30.00	6.39	10.42

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 12, Red Butte Exclosure

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
20.3	52.6 (17.1)	6.8	68.6	15.4	16.0	2.6	20.7	201.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 12

Type	Quadrat Frequency	
	'96	'01
Rabbit	-	2
Deer	6	7
Cattle	4	4

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
278	21 (53)
17	1 (4)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 12

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	1	-	-	-	1	-	-	-	20	24	26	1
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20	27	26	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	1	-	-	1	-	-	2	-	-	-	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		00%			00%			00%			-77%							
'96		00%			33%			00%			-67%							
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	266		0%			
												'96	60		67%			
												'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					
<i>Artemisia tridentata tridentata</i>													
S	84	10	-	-	-	-	-	-	10	-	10		
	90	-	-	-	-	-	-	-	0	-	0		
	96	4	-	-	-	-	-	-	80	-	4		
	01	-	-	-	-	-	-	-	0	-	0		
Y	84	4	-	-	-	-	-	-	266	-	4		
	90	4	-	-	-	-	-	-	266	1	4		
	96	9	-	-	2	-	-	-	220	-	11		
	01	3	-	-	-	-	-	-	60	-	3		
M	84	6	4	-	-	-	-	-	666	33	33	10	
	90	13	1	-	-	-	-	-	933	24	30	14	
	96	34	6	-	4	-	-	-	880	28	35	44	
	01	39	1	-	-	-	-	-	800	28	37	40	
D	84	8	11	1	-	-	1	-	1400	-	5	21	
	90	15	4	1	-	-	-	-	1333	1	-	20	
	96	12	5	-	-	-	-	-	340	-	6	17	
	01	19	-	-	4	-	-	-	460	-	8	23	
X	84	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	520	-	-	26	
	01	-	-	-	-	-	-	-	420	-	-	21	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'84		43%		06%		23%		+ 8%					
'90		13%		03%		03%		-43%					
'96		15%		00%		08%		- 8%					
'01		02%		00%		12%							
Total Plants/Acre (excluding Dead & Seedlings)										'84	2332	Dec:	60%
										'90	2532		53%
										'96	1440		24%
										'01	1320		35%
<i>Chrysothamnus nauseosus consimilis</i>													
M	84	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	0	-	-	0	
	96	2	-	-	3	-	-	-	100	21	20	5	
	01	2	-	-	-	-	-	-	40	21	30	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%		-60%					
'01		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	-
										'90	0		-
										'96	100		-
										'01	40		-

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4		1	2				
Chrysothamnus viscidiflorus viscidiflorus												
S	84	2	-	-	-	-	-	-	2	2		
	90	4	-	-	-	-	-	-	4	4		
	96	-	-	-	-	-	-	-	0	0		
	01	1	-	-	-	-	-	-	1	1		
Y	84	16	1	-	-	-	-	-	17	17		
	90	21	3	1	-	-	-	-	25	25		
	96	14	-	-	3	-	-	-	17	17		
	01	6	-	-	-	-	-	-	5	6		
M	84	22	2	-	-	-	-	-	23	11 10	24	
	90	16	1	1	-	-	-	-	16	15 17	18	
	96	158	3	-	4	-	-	-	165	17 27	165	
	01	117	-	-	3	-	-	-	120	15 19	120	
D	84	11	9	-	-	-	-	-	19	- 1	20	
	90	11	3	2	-	-	-	-	15	- 1	16	
	96	-	-	-	-	-	-	-	-	-	0	
	01	15	2	-	3	-	-	1	14	1 - 6	21	
X	84	-	-	-	-	-	-	-	-	-	0	
	90	-	-	-	-	-	-	-	-	-	0	
	96	-	-	-	-	-	-	-	-	-	0	
	01	-	-	-	-	-	-	-	-	-	60	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		20%		00%		02%		- 3%				
'90		12%		07%		05%		- 7%				
'96		02%		00%		00%		-19%				
'01		01%		00%		05%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	4066	Dec:	33%
									'90	3932		27%
									'96	3640		0%
									'01	2940		14%
Eriogonum microthecum												
M	84	-	-	-	-	-	-	-	-	-	0	
	90	-	-	-	-	-	-	-	-	-	0	
	96	2	1	-	-	-	-	-	3	-	60 10 11	
	01	2	-	-	-	-	-	-	2	-	40 10 17	
% 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%		-33%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'84	0	Dec:	-
									'90	0		-
									'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	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	1	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	1	-	-	4	-	-	-	-	-	5	-	-	-	100		5	
	01	7	-	-	2	-	-	1	-	-	10	-	-	-	200		10	
M	84	24	-	-	-	-	-	-	-	-	24	-	-	-	1600	4	3	24
	90	5	-	-	-	-	-	-	-	-	4	-	1	-	333	4	10	5
	96	74	-	-	9	-	-	-	-	-	81	-	2	-	1660	5	16	83
	01	83	-	-	6	-	-	-	-	-	89	-	-	-	1780	4	12	89
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	-	-	3	-	200		3	
	96	3	-	-	-	-	-	-	-	-	-	-	-	3	60		3	
	01	5	-	-	-	-	-	-	-	-	1	-	-	4	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%			-50%							
'90		08%			00%			33%			+56%							
'96		00%			00%			05%			+13%							
'01		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1600	Dec:	0%			
												'90	799		25%			
												'96	1820		3%			
												'01	2080		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				
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	1	2	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	1	1	-	-	-	-	-	-	2	-	-	-	133	11	13	2
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200	13	17	3
	96	17	14	1	2	-	-	-	-	-	34	-	-	-	680	24	47	34
	01	2	6	3	2	7	2	-	-	-	22	-	-	-	440	30	62	22
D	84	-	-	2	-	-	-	-	-	-	1	-	1	-	133			2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
	01	2	1	1	4	3	-	-	-	-	11	-	-	-	220			11
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		25%			75%			25%			+ 0%							
'90		00%			00%			00%			+66%							
'96		36%			03%			03%			- 8%							
'01		53%			17%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	50%			
												'90	266		25%			
												'96	780		5%			
												'01	720		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		1	2								
Symphoricarpos oreophilus																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	4	-	-	-	-	-	-	-	4	-	-	-	266		4
	96	5	-	-	2	-	-	-	-	7	-	-	-	140		7
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	57	-	-	-	-	-	-	-	57	-	-	-	3800		57
	90	-	1	-	-	-	-	-	-	1	-	-	-	66		1
	96	71	-	-	4	-	-	1	-	76	-	-	-	1520		76
	01	17	-	-	5	-	-	-	-	22	-	-	-	440		22
M	84	10	-	-	-	-	-	-	-	10	-	-	-	666	17 46	10
	90	6	1	-	-	-	-	-	-	7	-	-	-	466	10 15	7
	96	92	3	-	15	-	-	2	-	112	-	-	-	2240	17 38	112
	01	106	1	-	7	-	-	4	-	114	4	-	-	2360	19 38	118
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	1	-	2	-	-	-	-	-	2	-	-	1	60		3
	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%			-88%					
'90		25%			00%			00%			+86%					
'96		02%			01%			.52%			-26%					
'01		.70%			00%			.70%								
Total Plants/Acre (excluding Dead & Seedlings)										'84	4466	Dec:	0%			
										'90	532		0%			
										'96	3820		2%			
										'01	2820		1%			

Trend Study 1-13-01

Study site name: Raft River Narrows.

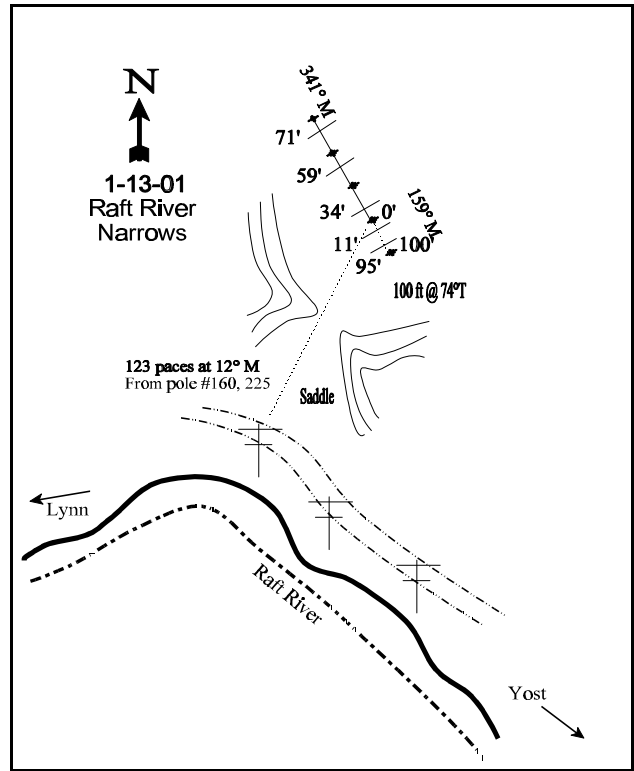
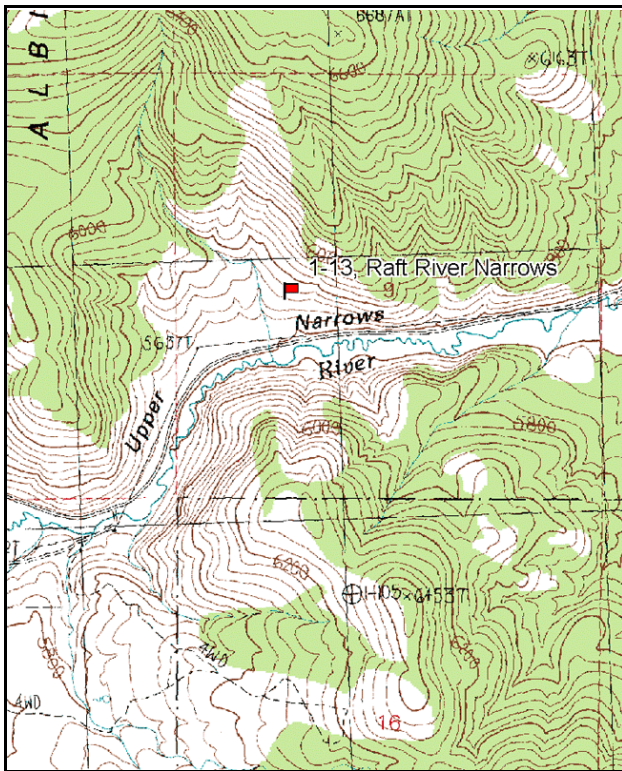
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 160 degrees magnetic.

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

LOCATION DESCRIPTION

From Lynn proceed to the bridge over the Raft River just before the Upper Narrows. Proceed east 0.95 miles from the bridge to a set of double power poles (#'s 160 and 225). From the northernmost pole, walk 123 paces at 13 degrees magnetic, to the 0-foot stake of the frequency baseline, marked with browse tag #7917. The bearing of the baseline is 160 degrees magnetic. The rest of the baseline runs 341 degrees magnetic from the 0 foot baseline stake.



Map Name: Buck Hollow, Utah-Idaho

Diagrammatic Sketch

Township 14N, Range 16W, Section 9

UTM 4647835 N, 276805 E

DISCUSSION

Trend Study No. 1-13

The Raft River Narrows study samples one of the more unique sites on the herd unit. Located on the north side of the Raft River Narrows, the site was thought to be critical deer winter range subject to perhaps the most intense browsing use seen on the unit in 1984. It is within the big sagebrush-grass range type and is located on a moderately steep (30% to 35%) southwest facing slope at 5,800 feet elevation. The area is in the Junction Creek allotment which is grazed by 589 cattle in the spring and fall. Cattle were observed grazing along the river bottom when the transect was put in 1984, but no sign of livestock grazing was noted on the steeper slopes. A pellet-group transect read on site in 2001 estimated 11 deer days use/acre (28 deer days use/ha). There has been no cow use noted on the site due to the steep slope. Part of the site was burned in 2000 as part of a back fire that was intended to stop a wildfire from crossing Raft River Canyon. As a result, the first 100 feet of the study site baseline was burned.

Soils are rocky on the surface and throughout the profile. Soil texture is a sandy clay loam. Soil reaction is moderately alkaline (8.2 pH) with a low amount of phosphorus (3.6 ppm), where values lower than 10 ppm can limit normal plant growth and development. The parent material appears to be metamorphic rock, perhaps a granite schist. Soil effective rooting depth is fairly shallow at 9 inches. However, the underlying parent material must contain numerous fractures to allow the deeper rooted Wyoming big sagebrush to establish. Erosion, although ongoing, is not excessive. A uniform litter cover composed primarily of dead cheatgrass seems effective in enhancing penetration of water into the soil and thus reducing runoff. The erosion condition was classified as stable in 2001.

Browse composition is dominated by Wyoming big sagebrush which contributed 63% of the browse cover in 1996 increasing to 87% in 2001. Basin big sagebrush dominates the flat areas down slope where the soil is significantly deeper. The sagebrush were very heavily hedged in 1984 with 92% of the population showing heavy use. Many of these shrubs displayed a club-like growth form due to persistent heavy use. During the 1990 reading, density and percent decadence remained similar, yet use was mostly light to moderate. In 1996, the original baseline was lengthened from 100 ft to 400 ft. This increased sample estimated a much larger density for Wyoming big sagebrush at 21,340 plants/acre, 61% of which were young plants. Seedlings were also extremely numerous (14,200 plants/acre). There has been a large die-off of the young plants since 1996 with a decrease of more the 75% (13,080 to 3,300 plants/acre). The percent young within the population was still moderately high at 47% in 2001. The Wyoming big sagebrush population is currently ('01) estimated at 7,020 plants/acre which will likely level off at a lower density in the future.

Greasewood is also found in greater numbers at the bottom of the hill, but some plants are encountered up-slope. Narrowleaf low rabbitbrush was initially very numerous, however it has declined in density since 1996 (6,360 plants/acre in 1996, to 1,120 plants/acre in 2001). Other shrubs occasionally seen include shadscale, broom snakeweed, threadleaf rubber rabbitbrush, and greasewood. With respect to trend, it will be important to monitor age and form class structure of the dominant sagebrush and low rabbitbrush.

The herbaceous understory is depleted to the point where cheatgrass comprises the most significant component, 63% of the grass cover. Currently ('01) it provides 87% of the grass cover. Perennial grasses are sparse and consist of isolated clumps of bluebunch wheatgrass, bottlebrush squirreltail, needle-and-thread, and Sandberg bluegrass. Perennial forbs are even more rare.

1984 APPARENT TREND ASSESSMENT

The remaining soil on this site is protected by four factors. These include sagebrush crowns, cheatgrass litter, rock and erosion pavement. Although these would not normally be adequate to prevent widespread runoff and erosion, there is little evidence that such has occurred. Apparent trend is therefore stable, but could easily decline. Vegetative trend appears down. The intensity of deer use has had a significant effect, especially on the sagebrush. The existing stand appears to be gradually thinning and being replaced by less desirable browse plants.

1990 TREND ASSESSMENT

The soil is easily disturbed on the 30-35% slope and erosion potential is moderately high. However, protective ground cover is sufficient to control erosion. Trend for soil is up slightly due to a reduction in bare ground and an increase in basal vegetative cover. Density and age class structure of the key browse species (Wyoming big sagebrush) appears stable. Utilization is light to moderate and percent decadency has declined slightly. Narrowleaf low rabbitbrush decreased in density. Although the data shows slight increases in the sum of nested quadrat frequency for perennial grasses and forbs, the understory remains in a depleted and poor condition with very high densities of cheatgrass.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - slightly upward but still poor (4)

1996 TREND ASSESSMENT

Ground cover conditions appear fairly stable. Since 1990, percent bare ground increased due a reduction in cover of pavement. Ground cover numbers from 1996 are very similar to 1984 data. Data from 1990, show increased pavement and less bare ground. Some of the changes could be expected because of modifications in methodology. Trend for the Wyoming big sagebrush is up. Density increased while heavy use and decadency declined. Seedlings and young are abundant indicating a dynamic reproductive potential. Some of the change in density may be partially due to the lengthening of the baseline which increased the area sampled. Density of mature plants increased from 1,133 plants/acre to 7,620. Vigor is good on most plants. Trend for the undesirable narrowleaf low rabbitbrush appears stable. Trend for the herbaceous understory appears slightly up. Sum of nested frequency for perennial grasses and forbs increased since 1990. Annual cheatgrass is still dominant providing 63% of the grass cover. Forbs are nearly absent but frequency has increased.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - slightly up but in poor condition (4)

2001 TREND ASSESSMENT

Ground cover conditions appear stable. The ratio of bare soil to protective cover has seen little change since 1996. Trend for Wyoming big sagebrush is considered stable even with the decrease in density where most of the individuals were young plants (down from 13,080 to 3,300 plants/acre). Utilization is now entirely classified as light. Percent decadence is low at only 7% and vigor is good on almost all plants. Trend for the undesirable narrowleaf low rabbitbrush now appears at its lowest density since 1984. Trend for the herbaceous understory appears slightly down. Sum of nested frequency for perennial grasses is stable but

frequency of perennial forbs decreased substantially since 1996. Annual cheatgrass is becoming more dominant. It has increased significantly in nested frequency and it currently contributes 87% of the grass cover and 75% of the total herbaceous cover.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down and in poor condition (2)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 13

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	8	10	12	19	3	8	5	7	.31	.28
G	Bromus tectorum (a)	-	-	_a 287	_b 334	-	-	92	98	3.48	13.07
G	Oryzopsis hymenoides	5	8	11	9	2	5	5	5	.07	.45
G	Poa secunda	_a 3	_b 35	_b 44	_b 55	2	18	18	25	.68	.53
G	Sitanion hystrix	16	13	35	14	10	8	17	7	.56	.11
G	Stipa comata	_a -	_a -	_b 16	_b 17	-	-	7	6	.31	.64
G	Vulpia octoflora (a)	-	-	11	-	-	-	5	-	.07	-
Total for Annual Grasses		0	0	298	334	0	0	97	98	3.55	13.07
Total for Perennial Grasses		32	66	118	114	17	39	52	50	1.94	2.02
Total for Grasses		32	66	416	448	17	39	149	148	5.50	15.10
F	Alyssum alyssoides (a)	-	-	11	5	-	-	4	2	.02	.01
F	Arabis spp.	-	3	4	-	-	1	3	-	.01	-
F	Astragalus beckwithii	_a 6	_a 4	_b 19	_a 3	2	2	10	1	.22	.00
F	Castilleja chromosa	-	-	5	1	-	-	2	1	.06	.00
F	Caulanthus crassicaulis	-	-	2	-	-	-	1	-	.03	-
F	Chaenactis douglasii	_a 1	_a 16	_b 36	_a 4	1	8	17	2	.16	.03
F	Collinsia parviflora (a)	-	-	4	-	-	-	2	-	.01	-
F	Cryptantha spp.	-	-	9	-	-	-	4	-	.04	-
F	Delphinium nuttallianum	-	-	-	1	-	-	-	1	-	.00
F	Descurainia pinnata (a)	-	-	_a 23	_b 100	-	-	14	45	.07	1.49
F	Eriogonum caespitosum	-	3	5	-	-	1	3	-	.04	-
F	Erigeron pumilus	_a 1	_a -	_b 11	_{ab} 6	1	-	7	2	.10	.03
F	Gayophytum ramosissimum (a)	-	-	-	3	-	-	-	1	-	.00
F	Gilia spp. (a)	-	-	_a 7	_b 106	-	-	4	45	.02	.43
F	Lappula occidentalis (a)	-	-	15	26	-	-	7	14	.03	.12
F	Lactuca serriola	-	-	1	11	-	-	1	5	.00	.10
F	Machaeranthera spp	-	-	3	-	-	-	1	-	.00	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Oenothera caespitosa	-	-	5	-	-	-	2	-	.03	-
F	Phlox hoodii	5	5	9	6	4	3	6	2	.15	.06
F	Tragopogon dubius	-	-	1	-	-	-	1	-	.00	-
Total for Annual Forbs		0	0	60	240	0	0	31	107	0.15	2.05
Total for Perennial Forbs		13	31	110	32	8	15	58	14	0.89	0.24
Total for Forbs		13	31	170	272	8	15	89	121	1.05	2.29

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

BROWSE TRENDS --

Herd unit 01 , Study no: 13

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	96	60	14.67	9.76
B	Atriplex confertifolia	2	3	-	-
B	Chrysothamnus viscidiflorus stenophyllus	91	37	7.21	.36
B	Leptodactylon pungens	1	0	-	-
B	Opuntia spp.	16	8	1.12	.41
B	Sarcobatus vermiculatus	2	2	.15	.63
Total for Browse		208	110	23.16	11.17

BASIC COVER --

Herd unit 01 , Study no: 13

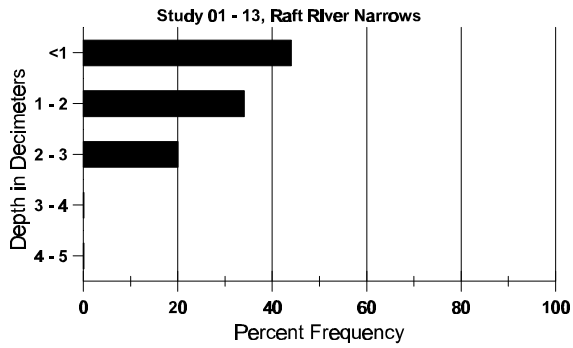
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	330	342	2.00	5.50	30.90	29.56
Rock	317	280	18.25	24.50	26.53	21.75
Pavement	320	325	10.50	31.00	8.90	19.43
Litter	378	299	56.50	31.75	29.68	21.09
Cryptogams	146	128	.50	2.25	2.19	3.12
Bare Ground	250	246	12.25	5.00	12.53	10.47

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 13, Raft River Narrows

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.6	59.6 (7.8)	8.2	46.5	23.4	30.0	1.7	3.6	441.6	1.9

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 13

Type	Quadrat Frequency	
	'96	'01
Rabbit	4	6
Deer	15	2

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
17	N/A
148	11 (28)

BROWSE CHARACTERISTICS --

Herd unit 01 , 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				
Artemisia tripartita tripartita																		
M	'84	-	-	5	-	-	-	-	-	-	5	-	-	-	166	13	17	5
	'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		00%			100%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	17%			
												'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			
Artemisia tridentata wyomingensis																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	2	-	-	-	-	-	-	-	-	-	-	-	66		2
	96	694	-	-	16	-	-	-	-	-	-	-	-	710		710
	01	2	-	-	-	-	-	-	-	-	-	-	-	40		2
Y	84	-	1	3	-	-	-	-	-	-	-	1	166		5	
	90	5	-	-	-	-	-	-	-	-	-	-	166		5	
	96	654	-	-	-	-	-	-	-	-	-	-	13080		654	
	01	164	-	-	1	-	-	-	-	-	-	-	3300		165	
M	84	-	3	30	-	-	-	-	-	-	-	-	1100	26 42	33	
	90	22	7	3	2	-	-	-	-	-	-	-	1133	27 31	34	
	96	75	305	1	-	-	-	-	-	-	-	-	7620	24 37	381	
	01	162	-	-	-	-	-	-	-	-	-	-	3240	23 27	162	
D	84	-	1	37	-	1	-	-	-	-	1	1333		40		
	90	31	4	-	1	-	-	-	-	-	-	1200		36		
	96	20	11	-	1	-	-	-	-	-	-	640		32		
	01	22	1	-	1	-	-	-	-	-	-	480		24		
X	84	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	500		25	
	01	-	-	-	-	-	-	-	-	-	-	-	1860		93	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>		
'84		08%				92%				09%				- 4%		
'90		15%				04%				20%				+88%		
'96		30%				.09%				.46%				-67%		
'01		.28%				00%				03%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	2599	Dec:	51%	
												'90	2499		48%	
												'96	21340		3%	
												'01	7020		7%	

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				
Atriplex confertifolia																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	9	9	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	21	1
	01	2	-	-	1	-	-	-	-	-	3	-	-	-	60	10	13	3
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%			00%			00%			+ 0%							
'90		00%			00%			00%			+18%							
'96		00%			00%			00%			+33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	0%			
												'90	33		100%			
												'96	40		0%			
												'01	60		0%			
Chrysothamnus nauseosus consimilis																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	36	40	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	25	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	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				
Chrysothamnus viscidiflorus stenophyllus																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	29	-	-	3	-	-	-	-	-	32	-	-	-	640		32	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	37	2	-	-	-	-	-	-	-	39	-	-	-	1300		39	
	90	12	-	-	3	-	-	-	-	-	15	-	-	-	500		15	
	96	63	-	-	8	-	-	-	-	-	71	-	-	-	1420		71	
	01	2	-	-	1	-	-	-	-	-	3	-	-	-	80		4	
M	84	26	45	6	1	-	-	-	-	-	78	-	-	-	2600	7	9	78
	90	97	-	-	19	-	-	7	-	-	117	-	6	-	4100	8	10	123
	96	180	2	-	13	-	-	-	-	-	195	-	-	-	3900	12	19	195
	01	19	-	-	6	-	-	2	-	-	27	-	-	-	540	8	11	27
D	84	26	55	21	1	-	-	-	-	-	98	1	2	2	3433		103	
	90	58	-	-	4	-	-	-	-	-	53	-	6	3	2066		62	
	96	37	11	-	4	-	-	-	-	-	39	-	-	13	1040		52	
	01	20	-	-	5	-	-	-	-	-	8	-	-	17	500		25	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	660		33	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		46%			12%			02%			- 9%							
'90		00%			00%			08%			- 5%							
'96		04%			00%			04%			-82%							
'01		00%			00%			30%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	7333	Dec:	47%			
												'90	6666		31%			
												'96	6360		16%			
												'01	1120		45%			

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																		
Y	84	15	-	-	-	-	-	-	-	-	15	-	-	-	500		15	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	84	3	-	-	-	-	-	-	-	-	3	-	-	100	3	2	3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	20	9	10	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	600	Dec:	-			
												'90	0		-			
												'96	20		-			
												'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				
Opuntia spp.																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	5	-	-	6	-	-	-	200		6	
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166	6	7	5
	90	7	-	-	2	-	-	-	-	-	9	-	-	-	300	5	9	9
	96	10	-	-	3	-	-	-	-	-	13	-	-	-	260	4	14	13
	01	3	-	-	2	-	-	1	-	-	6	-	-	-	120	4	9	6
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% 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%			-32%							
'96		00%			00%			06%			-53%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	166	Dec:	0%			
												'90	500		0%			
												'96	340		12%			
												'01	160		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				
Sarcobatus vermiculatus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	35	35	1
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	36	62	2
	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		100%			00%			00%			+ 0%							
'90		00%			00%			00%			+18%							
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	100%			
												'90	33		0%			
												'96	40		0%			
												'01	40		0%			

Trend Study 1-14-01

Study site name: Broad Hollow.

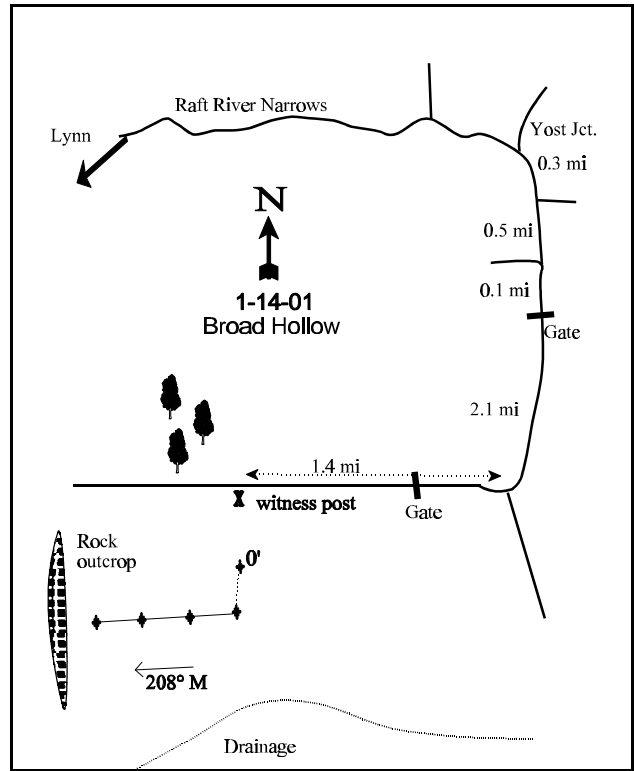
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 160 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of U-30 and the Morris Ranch Road, proceed 29.2 miles to Yost junction, passing through Lynn and crossing the Raft River. Turn right and proceed past the creek and the cattleguard for 0.3 miles. Turn right and travel 0.45 miles and take the left fork (right fork leads to a bridge). Proceed 0.1 miles and pass through the gate, continue 1.1 miles to the Forest Service fence and sign. Continue 0.9 miles, turn right and proceed 1.4 miles to a witness post on left (road is steep, winding and rough). From the rockpile, walk five paces at a bearing of 137 degrees magnetic, to the 0-foot stake of the baseline marked by browse tag #7916. Bearing of the baseline is 160 degrees magnetic. From the 100-foot baseline stake, the baseline doglegs and runs 208 degrees magnetic.



Map Name: Buck Hollow, Utah-Idaho

Diagrammatic Sketch

Township 14N, Range 16W, Section 21

UTM 4644711 N, 277642 E

DISCUSSION

Trend Study No. 1-14

The Broad Hollow study is located at an elevation of 6,500 feet on normal or preferred winter range in upper Broad Hollow. Slope is 20% and faces southeast. Initially the browse utilization and pellet group frequency indicated that deer use was relatively intense, although depending on weather conditions, sometimes less than at the nearby Raft river Narrows location. The area is currently occupied by mixed mountain brush, however, evidence of a fire before study establishment in 1984, suggests the area once had a dispersed stand of Utah juniper. A pellet-group transect read on the site in 2001 estimated 29 deer days use/acre (71 deer days use/ha) and 11 cow days use/acre (27 cow days use/ha). One elk pellet group was also encountered.

Soil is fairly deep with an effective rooting depth of almost 16 inches. It has a sandy loam texture and a neutral soil reaction (7.2 pH). Phosphorus is marginal at 9.1 ppm where values lower than 10 ppm can limit normal plant growth and development. The soil surface is quite rocky in places. Vegetative and litter cover are adequate to protect the soil from erosion except in some of the larger shrub interspaces where bare soil can be found. Soil erosion does not currently appear to be a serious problem. The erosion condition was classified as stable in 2001.

As is typical of mountain brush types, browse composition consists of several preferred forage species. The key browse species are antelope bitterbrush, serviceberry, and mountain big sagebrush. Together, these species comprise on average 43% of the estimated browse cover. Serviceberry occurs in relatively low numbers. The average mature plant measures approximately a 4 feet in height with a 4 ½ foot crown. Utilization was extremely heavy in 1990, mostly moderate in 1996, and almost entirely light in 2001. There have been no plants classified as decadent during any reading. Bitterbrush has varied somewhat since 1984, but basically it appears stable. It has a low growing spreading growth form which sometimes makes determining density difficult. Density was estimated at 540 plants/acre in 2001, 75% of which were mature. Utilization has been mostly moderate since 1984 with heavy use ranging from 30% to 22%. Decadence has remained low and vigor good during all sampling periods. Mountain big sagebrush is the most numerous preferred species. It accounts on average for 26% of the shrub cover. Density was estimated at 2,880 plants/acre in 1996, decreasing to 1,340 plants/acre by 2001. Sagebrush use has been highly variable since 1990, but overall mostly classified as light use. Percent decadency has remained low ranging from 20% in 1990 to 5% in 1996. Annual leader growth rates for bitterbrush and sagebrush were above the norm on this site in 2001.

The most numerous browse on the site is the strong increaser, stickyleaf low rabbitbrush. It accounted for 19% of the browse cover in 1996, increasing to 24% in 2001. These shrubs show mostly light use. The population has declined in density from 7,066 plants/acre in 1984 to 4,100 by 2001. Since 1984, the population has shown a steady decline in its density.

The herbaceous understory has a diverse composition which provides substantial ground cover. Unfortunately, annual cheatgrass was the dominate species, accounting for 65% of the grass cover in 1996. During the 2001 reading, annual species have decreased to where they only make up 30% of the grass cover. The nested frequency value for cheatgrass has also significantly declined since 1996. Among perennial grasses, the most prevalent are thickspike wheatgrass and Sandberg bluegrass. Other grasses include: Indian ricegrass, bottlebrush squirreltail, bluebunch wheatgrass, needle and thread, and occasional clumps of Great Basin wildrye. Forbs are also productive and include several desirable species. Important forbs include: arrowleaf balsamroot, narrowleaf Lomatium, yampa, sulfur eriogonum, and tapertip hawksbeard. Arrowleaf balsamroot is the dominant forb, making up most of the forb cover each sampling period. Utilization of grasses and forbs is light.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable or even improving. The rate of erosion is slow and further site stabilization is likely as shrub density and cover continue to improve. Vegetatively, secondary or post-fire succession is still in progress. Vegetative cover and density are increasing and are especially noticeable within the shrub component. Two species, mountain snowberry and stickyleaf low rabbitbrush, may eventually gain a measure of dominance on the site. This would be an unfavorable development if deer winter habitat was the only thing being considered.

1990 TREND ASSESSMENT

Trend for soil is stable. Even with the substantial decrease in litter cover and a slight increase in percent bare ground. This is somewhat offset by an increase in basal vegetation cover, an increase in cryptogamic cover, and a higher sum of nested frequency for grasses. The key browse species, sagebrush, bitterbrush, and serviceberry, show evidence of moderate to heavy hedging. Vigor is good, but the populations of these shrubs all appear to be slightly decreasing. Snowberry and low rabbitbrush densities have also declined slightly. Overall, trend for browse is considered slightly down. The herbaceous understory has a high species diversity with 6 species of perennial grasses and 15 species of perennial forbs encountered. All of the grasses except squirreltail have increasing sum of nested and quadrat frequencies. Sum of nested frequency of forbs declined slightly, but they only contribute 26% of the herbaceous cover. Overall trend is up slightly.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly up (4)

1996 TREND ASSESSMENT

The soil trend appears slightly up due to a decline in percent bare ground and an increase in litter cover. The browse trend is also slightly up with increased densities and decreases in percent decadency for the key browse species, serviceberry, mountain big sagebrush, and antelope bitterbrush. Utilization is mostly light to moderate. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses declined slightly but frequency of perennial forbs increased. Annual cheatgrass continues to dominate the site but nested frequency of most perennial grasses remained stable.

TREND ASSESSMENT

soil - slightly up (4)

browse - up (5)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

The soil trend is considered stable even though the percent bare soil has increased slightly because the ratio of bare soil to protective cover has actually improved. The browse trend is slightly down with decreases in density for both sagebrush and bitterbrush with correspondingly higher percent decadency. This has come about even with lower rates of utilization. However, the effects of prolonged drought still continue. Trend for the herbaceous understory is mixed with good increases in nested frequency for perennial grasses (mostly thickspike and Sandberg bluegrass), but losses for perennial forbs offset these gains. The best event occurring on this site is that cheatgrass has decreased significantly in nested frequency since 1996. Cover of cheatgrass has also declined nearly 2 fold. Overall, the herbaceous trend is considered stable.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , 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 dasystachyum	a152	a135	a131	b194	53	54	50	67	1.80	6.03
G	Agropyron spicatum	ab9	a-	b21	b14	3	-	9	5	.47	.18
G	Bromus tectorum (a)	-	-	b363	a290	-	-	98	88	12.29	6.40
G	Elymus cinereus	3	-	1	1	1	-	1	1	.03	.15
G	Melica bulbosa	-	-	-	3	-	-	-	1	-	.03
G	Oryzopsis hymenoides	ab1	ab4	b15	a-	1	3	6	-	.54	.01
G	Poa fendleriana	b27	ab20	a2	a-	13	8	1	-	.00	-
G	Poa secunda	a55	b174	b150	b204	24	69	56	79	3.32	8.05
G	Sitanion hystrix	4	1	9	-	2	1	4	-	.02	-
G	Stipa comata	ab26	b42	a10	a16	13	21	6	6	.28	.56
G	Vulpia octoflora (a)	-	-	3	-	-	-	1	-	.00	-
Total for Annual Grasses		0	0	366	290	0	0	99	88	12.30	6.40
Total for Perennial Grasses		277	376	339	432	110	156	133	159	6.48	15.02
Total for Grasses		277	376	705	722	110	156	232	247	18.78	21.43
F	Agoseris glauca	bc39	a12	c52	ab10	17	6	22	6	.11	.03
F	Alyssum alyssoides (a)	-	-	a10	b51	-	-	4	23	.02	.26
F	Arabis spp.	a3	a4	b27	a4	2	3	11	2	.08	.03
F	Astragalus beckwithii	5	3	3	-	2	1	3	-	.18	-
F	Astragalus utahensis	-	2	-	-	-	1	-	-	-	-
F	Balsamorhiza sagittata	a9	a11	b35	b28	4	5	17	16	3.65	4.26
F	Calochortus nuttallii	-	3	-	-	-	1	-	-	-	-
F	Chaenactis douglasii	6	6	4	-	3	3	2	-	.01	-
F	Collomia linearis (a)	-	-	2	6	-	-	1	2	.00	.01
F	Comandra pallida	-	-	5	3	-	-	2	1	.01	.00
F	Collinsia parviflora (a)	-	-	a155	b221	-	-	65	76	.47	2.85
F	Crepis acuminata	ab54	b66	ab43	a39	25	29	25	18	.51	1.16
F	Cryptantha spp.	-	-	55	-	-	-	25	-	.15	-
F	Descurainia pinnata (a)	-	-	4	9	-	-	2	5	.01	.17
F	Eriogonum umbellatum	b12	ab7	a1	a3	8	4	1	1	.03	.03
F	Gayophytum ramosissimum (a)	-	-	1	4	-	-	1	2	.00	.01

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Hackelia patens	_a 3	_b 17	_{ab} 18	_{ab} 3	1	9	8	3	1.07	.07
F	Lathyrus brachycalyx	-	-	-	1	-	-	-	1	-	.00
F	Lappula occidentalis (a)	-	-	_a 10	_b 27	-	-	4	12	.02	.11
F	Lepidium spp. (a)	-	-	3	-	-	-	1	-	.00	-
F	Lomatium triternatum	3	2	-	4	1	1	-	2	-	.03
F	Machaeranthera spp	-	-	3	-	-	-	1	-	.03	-
F	Microsteris gracilis (a)	-	-	-	9	-	-	-	5	-	.02
F	Navarretia intertexta (a)	-	-	-	1	-	-	-	1	-	.00
F	Phlox hoodii	_b 5	_a 1	_a -	_a -	3	1	-	-	-	-
F	Phlox longifolia	12	5	7	3	7	2	3	2	.01	.01
F	Polygonum douglasii (a)	-	-	5	-	-	-	3	-	.01	-
F	Ranunculus testiculatus (a)	-	-	3	3	-	-	1	2	.00	.01
F	Senecio multilobatus	-	3	1	-	-	1	1	-	.15	-
F	Tragopogon dubius	_b 18	_a 3	_a -	_a 2	9	1	-	1	-	.00
Total for Annual Forbs		0	0	193	331	0	0	82	128	0.55	3.45
Total for Perennial Forbs		169	145	254	100	82	68	121	53	6.02	5.65
Total for Forbs		169	145	447	431	82	68	203	181	6.58	9.11

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

BROWSE TRENDS --

Herd unit 01 , Study no: 14

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier utahensis	5	11	2.00	1.87
B	Artemisia nova	0	1	-	-
B	Artemisia tridentata vaseyana	70	34	9.48	7.55
B	Chrysothamnus viscidiflorus viscidiflorus	78	78	6.49	7.71
B	Eriogonum microthecum	1	2	.03	-
B	Leptodactylon pungens	4	4	.30	.18
B	Opuntia spp.	53	58	4.37	2.50
B	Purshia tridentata	28	21	4.19	3.54
B	Symphoricarpos oreophilus	35	35	7.39	9.31
Total for Browse		274	244	34.27	32.70

BASIC COVER --

Herd unit 01 , Study no: 14

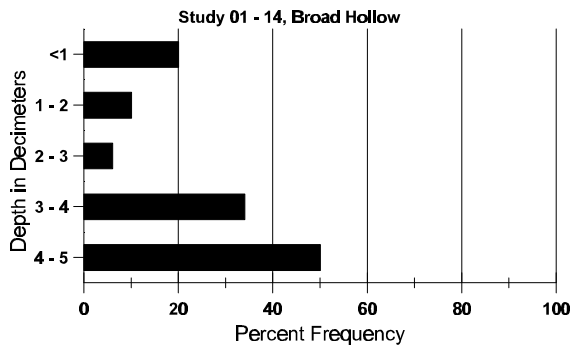
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	377	380	2.00	13.00	49.77	56.67
Rock	85	37	7.00	6.50	2.10	1.54
Pavement	127	104	1.00	1.00	1.33	.85
Litter	398	381	62.50	46.25	62.24	50.53
Cryptogams	77	71	1.00	2.50	1.36	1.20
Bare Ground	203	183	26.50	30.75	10.75	15.88

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 14, Broad Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.52	59.0 (3.9)	7.2	63.7	19.0	17.3	1.6	9.1	121.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 14

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Rabbit	17	6	26	N/A
Deer	32	17	374	29 (71)
Elk	-	-	9	1 (2)
Cattle	3	2	131	11 (27)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 14

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 utahensis																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	10	-	-	2	-	-	-	-	-	12	-	-	-	240		12	
M	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133	31	32	2
	90	-	-	1	-	-	-	-	-	-	-	-	1	-	66	33	28	1
	96	1	4	-	-	-	-	-	-	-	5	-	-	-	100	43	62	5
	01	3	1	-	-	-	-	1	-	-	5	-	-	-	100	50	55	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		100%			00%			00%			-50%							
'90		00%			100%			100%			+34%							
'96		80%			00%			00%			+71%							
'01		06%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	-			
												'90	66		-			
												'96	100		-			
												'01	340		-			
Artemisia nova																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	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%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	60		-			

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	8	3	-	-	-	-	-	-	-	-	-	-	11	-	-	-	733		11	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	7	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	5	5	-	-	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	3	3	2	1	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	96	27	-	-	-	-	-	-	-	-	-	-	-	27	-	-	-	540		27	
	01	7	1	-	1	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	84	5	5	1	-	-	-	-	-	-	-	-	-	11	-	-	-	733	14	19	11
	90	3	3	1	-	-	-	-	-	-	-	-	-	7	-	-	-	466	16	17	7
	96	94	12	-	2	2	-	-	-	-	-	-	-	110	-	-	-	2200	21	32	110
	01	43	3	2	-	-	-	-	2	-	-	-	-	50	-	-	-	1000	22	33	50
D	84	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	3	1	-	-	-	-	-	-	-	-	-	-	3	1	-	-	266		4	
	96	7	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	6	2	-	-	-	-	-	-	-	-	-	-	4	1	-	3	160		8	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	840		42	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>							
'84		50%				05%				00%				- 9%							
'90		35%				15%				00%				+54%							
'96		10%				00%				00%				-53%							
'01		09%				03%				04%											
Total Plants/Acre (excluding Dead & Seedlings)												'84	1465	Dec:	5%						
												'90	1332		20%						
												'96	2880		5%						
												'01	1340		12%						
<i>Chrysothamnus nauseosus consimilis</i>																					
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	30	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	31	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%				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	5	6	7	8	9		1	2		3	4		
Chrysothamnus viscidiflorus viscidiflorus																		
S	84	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	18	-	-	-	-	-	-	-	-	18	-	-	-	1200			18
	90	6	4	3	3	-	-	-	-	-	16	-	-	-	1066			16
	96	27	-	-	7	-	-	-	-	-	34	-	-	-	680			34
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	84	60	13	-	-	-	-	-	-	-	69	-	-	4	4866	17	26	73
	90	19	8	-	4	-	-	-	-	-	29	-	1	1	2066	16	14	31
	96	176	1	-	10	5	-	-	-	-	192	-	-	-	3840	16	22	192
	01	183	-	-	7	-	-	-	-	-	190	-	-	-	3800	14	19	190
D	84	11	4	-	-	-	-	-	-	-	11	-	-	4	1000			15
	90	32	3	2	-	-	-	-	-	-	35	-	-	2	2466			37
	96	5	4	-	-	-	-	-	-	-	9	-	-	-	180			9
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		16%			00%			08%			-21%							
'90		18%			06%			05%			-16%							
'96		04%			00%			00%			-13%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	7066	Dec:	14%				
											'90	5598		44%				
											'96	4700		4%				
											'01	4100		5%				
Eriogonum microthecum																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	9	1
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	14	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%			+67%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	20		-				
											'01	60		-				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4			
Leptodactylon pungens								
Y	84	3	-	-	-	200		3
	90	1	-	-	-	66		1
	96	-	-	-	-	0		0
	01	-	-	-	-	0		0
M	84	10	-	-	-	666	10 12	10
	90	6	-	2	-	533	5 9	8
	96	7	-	-	-	140	11 13	7
	01	6	-	-	-	120	8 9	6
D	84	-	-	-	-	0		0
	90	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%			-23%	
'90		00%	00%	10%			-79%	
'96		00%	00%	00%			-14%	
'01		00%	00%	00%				
Total Plants/Acre (excluding Dead & Seedlings)					'84	866	Dec:	0%
					'90	665		10%
					'96	140		0%
					'01	120		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	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8
	01	19	-	-	5	-	-	7	-	-	31	-	-	-	620		31
M	84	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	3 8	15
	90	14	-	-	4	-	-	-	-	-	14	-	4	-	1200	4 17	18
	96	97	-	-	9	-	-	-	-	-	106	-	-	-	2120	4 17	106
	01	81	-	-	4	-	-	84	-	-	169	-	-	-	3380	4 13	169
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1
	96	11	-	-	1	-	-	-	-	-	7	-	-	5	240		12
	01	16	-	-	1	-	-	-	-	-	5	-	-	12	340		17
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%			+46%						
'90		00%			00%			18%			+26%						
'96		00%			00%			04%			+42%						
'01		00%			00%			06%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	1000	Dec:	0%		
												'90	1866		4%		
												'96	2520		10%		
												'01	4340		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				
Purshia tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	4	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	1	3	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	2	1	-	-	-	-	1	-	-	4	-	-	-	80		4	
M	84	-	4	4	-	-	-	-	-	-	8	-	-	-	533	20 31	8	
	90	-	2	3	-	-	-	-	-	-	5	-	-	-	333	19 20	5	
	96	14	14	10	1	-	-	-	-	-	39	-	-	-	780	23 43	39	
	01	3	10	4	-	1	2	-	-	-	20	-	-	-	400	24 53	20	
D	84	-	-	-	3	-	-	-	-	-	2	-	-	1	200		3	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	3	-	-	-	-	-	-	-	1	-	-	2	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		53%			27%			07%			-33%							
'90		60%			30%			00%			+26%							
'96		31%			24%			00%			-40%							
'01		56%			22%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	999	Dec:	20%			
												'90	665		10%			
												'96	900		2%			
												'01	540		11%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total		
		1	2	3	4		1	2			
Symphoricarpos oreophilus											
S	84	-	-	-	-	-	-	-	0		0
	90	1	-	-	-	-	-	-	66		1
	96	3	-	-	-	-	-	-	60		3
	01	4	-	-	-	-	-	-	80		4
Y	84	11	-	-	-	-	-	-	733		11
	90	2	1	1	-	-	-	-	266		4
	96	12	-	-	-	-	-	-	240		12
	01	21	-	-	1	-	-	-	440		22
M	84	20	7	-	-	-	-	-	1800	23 23	27
	90	13	-	-	4	-	-	-	1133	19 29	17
	96	56	-	-	-	-	-	-	1120	27 47	56
	01	69	-	-	-	-	-	-	1380	26 45	69
D	84	-	-	-	-	-	-	-	0		0
	90	6	-	-	-	-	-	-	400		6
	96	1	2	-	-	-	-	-	60		3
	01	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'84		18%		00%		00%		-29%			
'90		04%		04%		04%		-21%			
'96		03%		00%		01%		+22%			
'01		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'84	2533	Dec:	0%		
						'90	1799		22%		
						'96	1420		4%		
						'01	1820		0%		
Tetradymia canescens											
M	84	-	-	-	-	-	-	-	0	- -	0
	90	-	-	-	-	-	-	-	0	- -	0
	96	-	-	-	-	-	-	-	0	14 36	0
	01	-	-	-	-	-	-	-	0	17 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		-		

Trend Study 1-15-01

Study site name: Cedar Hills.

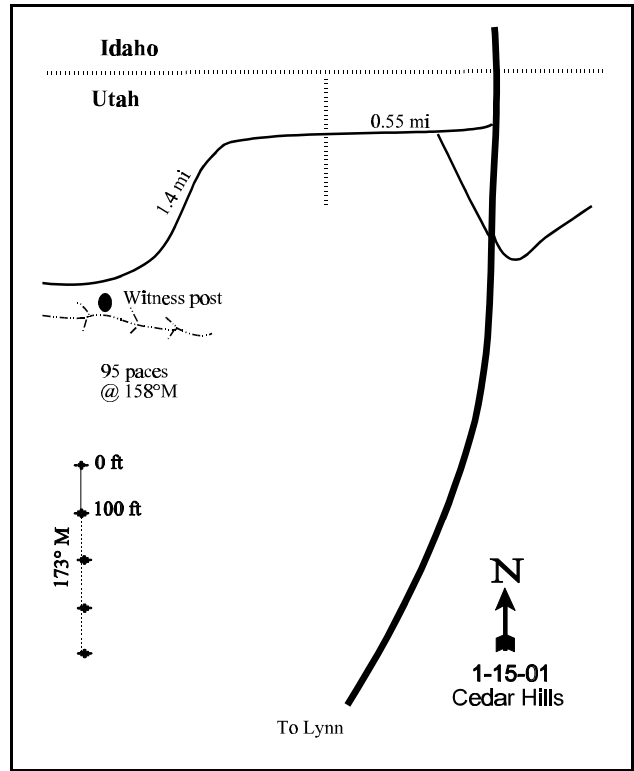
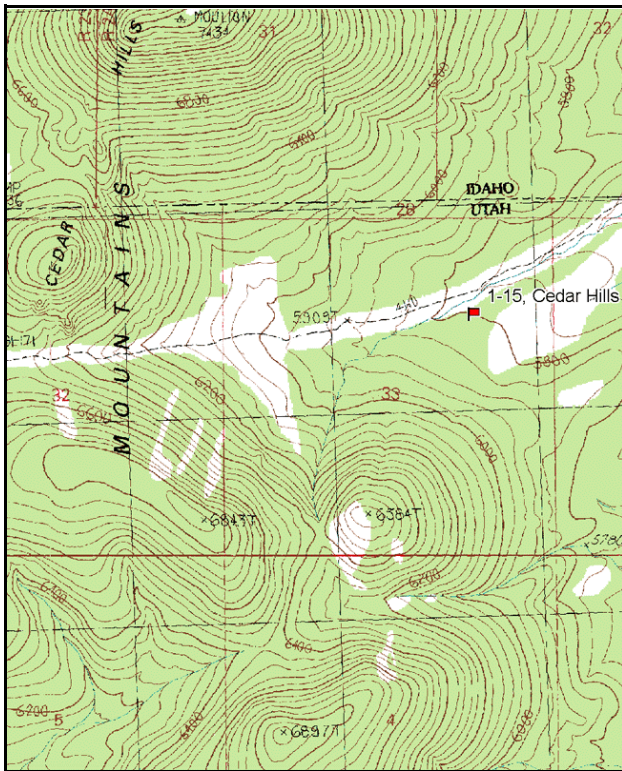
Vegetation type: Pinyon-Juniper.

Compass bearing: frequency baseline 173 degrees magnetic.

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

LOCATION DESCRIPTION

From the town of Lynn, drive north to the Utah-Idaho border to a cattleguard. From the cattleguard at the border, follow a faint road along a fence (on south side) for 0.55 miles to a gate. Go through the next seeded pasture 0.65 miles and continue as the road turns away from the fence. Proceed 0.75 miles to a small rock pile and a witness post on the south side of the road. Cross the drainage walking about 95 paces southeast to the 0-foot stake off the baseline in the trees. The 0-foot baseline stake is labeled with browse tag #49.



Map Name: Buck Hollow, Utah-Idaho

Diagrammatic Sketch

Township 15N, Range 16W, Section 33

UTM 4651431 N, 277675 E

DISCUSSION

Trend Study No. 1-15

A range trend study was established in the Cedar Hills area in 1990 to provide baseline data for a proposed habitat improvement project that would involve chaining and seeding the pinyon-juniper woodland benches in the area. However, the treatment was not done and a large wildfire burned through the area in 2000, a year before the readings done in 2001. The site is on a deer wintering area near the Utah-Idaho border. The area is managed by the BLM and is allotted for spring and fall cattle use as part of the Junction Creek allotment. The site receives limited use as there are more attractive seeded areas in the unit. There is light deer use due to the limited forage. A pellet group transect read on site in 2001 indicated no use by wildlife or livestock.

The study is on a 3-5% north-facing slope with an elevation of 5,800 feet. Originally, the site had a significant component of big sagebrush, but juniper and pinyon trees dominated the site before the fire. The site has a higher potential for successful treatment than the more shallow soils of east-facing juniper and black sagebrush slopes to the south.

The soil is a fine-textured clay loam of moderate depth. The effective rooting depth was determined to be almost 13 inches. The average effective rooting depth for the management unit is almost 17 inches. The soil reaction is slightly alkaline (7.8 pH) with the low amounts of phosphorus in the soil at only 6.7 ppm. This could be a limiting factor for the site as values less than 10 ppm can limit plant growth and development. There was abundant litter cover under the trees until the wildfire went through the area. The combined value for pavement and rock have changed little since the fire. Bare soil cover values for the site since the burn have gone from only 9% up to 72%. The erosion condition was classified as moderate in 2001 with erosion limited only by the gentle terrain.

The big sagebrush on this site in the past tended to be only lightly hedged, but had reduced vigor due to competition from the pinyon-juniper overstory and extended drought. In 1990, the sagebrush population was mostly decadent and had poor vigor. Sagebrush canopy cover was estimated at 5% in 1990 and down to 1% by 1996. Population density was estimated at 2,232 plants/acre in 1990, declining to 1,160 by 1996. Percent decadency was extremely high in 1990 when 87% of the population was classified as decadent. Fifty-seven percent of the sagebrush displayed poor vigor and 66% of the decadent shrubs were considered dying. By 1996, a small portion of these decadent plants recovered but most died. Dead shrubs, first inventoried in 1996, numbered more than those alive (1,860 plants/acre). Percent decadency was 45% with poor vigor expressed in 22% of the population. Wildlife use of these shrubs was light. Now, there are no shrubs or trees left after the burn. Browse cover is currently zero.

Singleleaf pinyon and Utah juniper originally dominated the site. Point-quarter data, taken in 1996, estimated a density of 318 pinyon/acre, 70% were seedling trees. A density of 407 juniper/acre was also determined, only 15% were seedling and young trees. Average diameter of pinyon was 5 inches while that of juniper was 4 inches. Ten percent of the pinyon and 40% of the juniper trees had diameters of 3 inches or less. Overhead canopy cover of pinyon and juniper was estimated, using line intercept, at 35% which had gone beyond where it suppresses understory species. The wildfire in 2000 eliminated all juniper and pinyon trees.

The healthy but limited perennial grasses and fair diversity of forbs indicated a good site potential prior to the burn. The grasses and forbs combined to produce about 13% cover. A year after the fire grasses and forbs combined produce only about 5% cover. The major species is thickspike. Forbs are currently almost nonexistent.

1990 APPARENT TREND ASSESSMENT

Sagebrush is declining on this range site. There are few young shrubs, poor vigor, and a high percentage of decadent plants. Production of desirable forage is lessened due to factors related to the increasing overstory of pinyon and juniper trees. Without treatment, soil and vegetative trends will continue to decline.

1996 TREND ASSESSMENT

Soil conditions have improved since 1990 due to a decline in percent bare ground. However, litter cover declined from 55% to 41% and erosion is still occurring within the interspaces. Soil trend is considered up slightly. Trend for mountain big sagebrush is in an overall state of decline but shows some improvements since 1990. Density has declined 48% since the last reading due to a reduction in decadent plants. This has improved the decadency ratio and overall vigor, but reproduction is limited. Without some sort of treatment, all of the sagebrush will eventually die out from competition with the overstory of P-J trees and prolonged drought. Trend is considered down. Trend for the herbaceous understory is up due to increased sum of nested frequency of grasses and forbs.

TREND ASSESSMENT

soil - up slightly (4)

browse - down (1)

herbaceous understory - up (5)

2001 TREND ASSESSMENT

Soil conditions have decline severely since 1996 due to a fire that has remover all tree cover, most all herbaceous cover, most all litter cover, and all cryptogamic cover. This condition should improve with time. Soil trend currently is considered down. Trend for mountain big sagebrush is down with all of it lost to the fire. Trend for the herbaceous understory is also down with nested values for both grasses and forbs being severely depressed after the fire. Cryptogamic cover was reduced from 13% to zero. Average litter cover was lowered from 41% down to only 11%.

TREND ASSESSMENT

soil - down after the fire (1)

browse - down, all lost to the fire (1)

herbaceous understory - down (1)

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	_a 76	_a 60	_b 135	36	21	53	.76	3.40
G	Agropyron spicatum	_a 37	_b 71	_a 12	15	25	4	.48	.33
G	Poa secunda	_b 256	_b 269	_a 66	90	94	29	4.23	.47
G	Sitanion hystrix	-	2	-	-	1	-	.01	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		369	402	213	141	141	86	5.49	4.21
Total for Grasses		369	402	213	141	141	86	5.49	4.21
F	Agoseris glauca	_a -	_a 2	_b 5	-	1	3	.00	.04
F	Antennaria rosea	_a 1	_b 10	_a -	1	6	-	.08	-
F	Arabis spp.	_a 3	_b 19	_a -	2	8	-	.04	-
F	Astragalus beckwithii	_a -	_b 116	_a -	-	54	-	2.27	-
F	Astragalus convallarius	-	3	-	-	1	-	.00	-
F	Astragalus spp.	6	11	7	4	6	4	.08	.02
F	Astragalus utahensis	_a 3	_b 21	_a 6	1	11	2	.13	.01
F	Castilleja chromosa	-	4	-	-	2	-	.01	-
F	Caulanthus crassicaulis	-	-	-	-	-	-	.00	-
F	Chenopodium album (a)	-	-	3	-	-	1	-	.00
F	Chaenactis douglasii	10	13	4	4	5	2	.05	.01
F	Collinsia parviflora (a)	-	_a 87	_b 127	-	32	53	.18	.65
F	Crepis acuminata	3	9	6	2	3	4	.10	.02
F	Cryptantha spp.	7	5	-	4	2	-	.04	-
F	Descurainia pinnata (a)	-	-	1	-	-	1	-	.03
F	Erigeron spp.	2	6	-	1	4	-	.04	-
F	Erigeron pumilus	-	1	-	-	1	-	.00	-
F	Haplopappus acaulis	_b 9	_c 25	_a -	6	12	-	.38	-
F	Hackelia patens	-	-	1	-	-	1	-	.00
F	Penstemon spp.	_{ab} 2	_b 14	_a -	2	6	-	.43	-
F	Phlox hoodii	_b 111	_c 178	_a 3	52	70	1	3.77	.00
F	Senecio multilobatus	_{ab} 14	_b 29	_a 3	8	14	1	.07	.00
F	Taraxacum officinale	-	-	1	-	-	1	-	.00
F	Townsendia spp.	-	4	-	-	2	-	.01	-
F	Unknown forb-perennial	-	-	5	-	-	3	-	.01
F	Zigadenus paniculatus	_a -	_a -	_b 20	-	-	9	.01	.37

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
	Total for Annual Forbs	0	87	131	0	32	55	0.18	0.68
	Total for Perennial Forbs	171	470	61	87	208	31	7.55	0.50
	Total for Forbs	171	557	192	87	240	86	7.73	1.19

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

BROWSE TRENDS --

Herd unit 01 , Study no: 15

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Artemisia tridentata vaseyana</i>	35	0	1.05	-
B	<i>Chrysothamnus nauseosus consimilis</i>	1	0	.03	-
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	7	0	.04	-
B	<i>Juniperus osteosperma</i>	34	0	9.75	-
B	<i>Opuntia spp.</i>	1	0	-	-
B	<i>Pinus monophylla</i>	9	0	1.65	-
B	<i>Symphoricarpos oreophilus</i>	7	0	.30	.00
	Total for Browse	94	0	12.84	0.00

CANOPY COVER --

Herd unit 01 , Study no: 15

Species	Percent Cover	
	'96	'01
<i>Juniperus osteosperma</i>	7	0
<i>Pinus monophylla</i>	29	0

Point-Quarter Tree Data

Trees per Acre		Average diameter (in)	
'96	'01	'96	'01
459	0	3.8	-
80	0	5.1	-

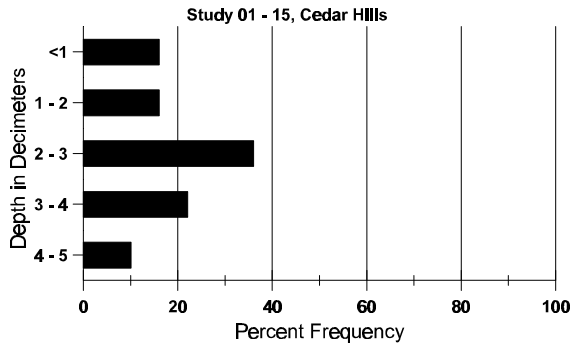
BASIC COVER --
Herd unit 01 , Study no: 15

Cover Type	Nested Frequency		Average Cover %		
	'96	'01	'90	'96	'01
Vegetation	331	220	4.00	26.79	6.07
Rock	82	21	1.50	.71	.24
Pavement	242	359	11.25	9.01	13.58
Litter	388	246	54.75	40.83	11.15
Cryptogams	249	-	7.75	12.89	0
Bare Ground	201	382	20.75	9.32	72.24

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 15, Cedar Hills

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.7	57.4 (13.0)	7.8	30.7	40	29.3	3.0	6.7	390.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 15

Type	Quadrat Frequency	
	'96	'01
Rabbit	14	-
Deer	4	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
-	-

BROWSE CHARACTERISTICS --

Herd unit 01 , 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>																		
Y	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33			1
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	90	7	-	-	1	-	-	-	-	-	7	1	-	-	266	20	18	8
	96	20	2	-	5	-	-	-	-	-	26	-	-	1	540	15	18	27
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	90	56	1	-	1	-	-	-	-	-	20	-	-	38	1933			58
	96	22	2	-	2	-	-	-	-	-	14	-	-	12	520			26
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1860			93
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		01%			00%			57%			-48%							
'96		07%			00%			22%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	2232	Dec:	87%			
												'96	1160		45%			
												'01	0		0%			
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	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>							
'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		-			

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 stenophyllus																		
Y	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	7	8	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160	7	7	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
D	90	9	-	-	4	-	-	-	-	-	7	-	-	6	433		13	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			30%			-70%							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	666	Dec:	65%				
											'96	200		0%				
											'01	0		0%				
Juniperus osteosperma																		
Y	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	13	-	-	-	-	-	-	-	-	12	-	1	-	433	108	61	
	96	25	-	-	-	-	-	1	10	-	36	-	-	-	720	-	-	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
D	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	-	-	1	20		1		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
X	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>							
'90		00%			00%			07%			+45%							
'96		00%			00%			02%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	499	Dec:	7%				
											'96	900		2%				
											'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				
Opuntia spp.																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	9	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	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		-			
Pinus monophylla																		
S	90	3	-	-	2	-	-	-	-	-	4	-	1	-	166			5
	96	8	-	-	1	-	-	-	-	-	9	-	-	-	180			9
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66	157	97	2
	96	3	-	-	-	-	-	-	1	-	4	-	-	-	80	-	-	4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			+63%							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	66	Dec:	-			
												'96	180		-			
												'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																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120		6	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	6	9	1
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	11	17	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			+79%							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	33	Dec:	-			
												'96	160		-			
												'01	0		-			

Trend Study 1-16-01

Study site name: Nut Pine Hills.

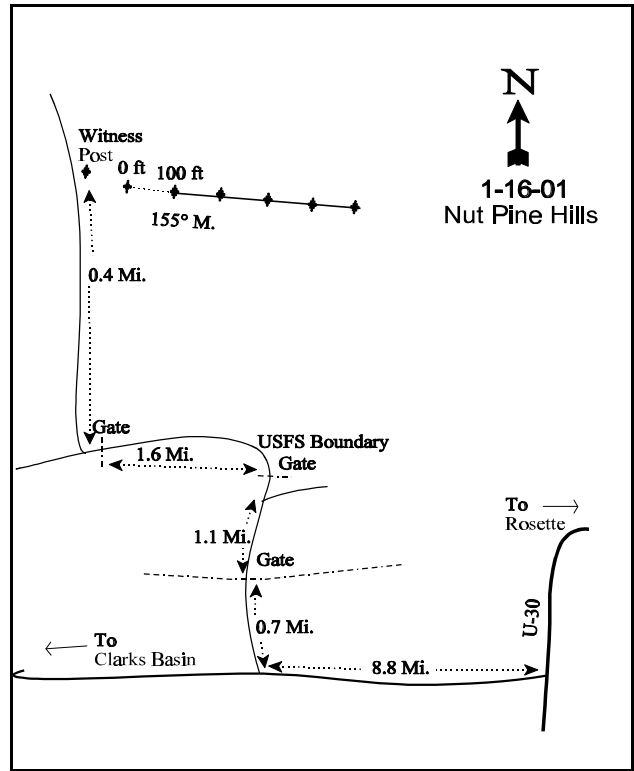
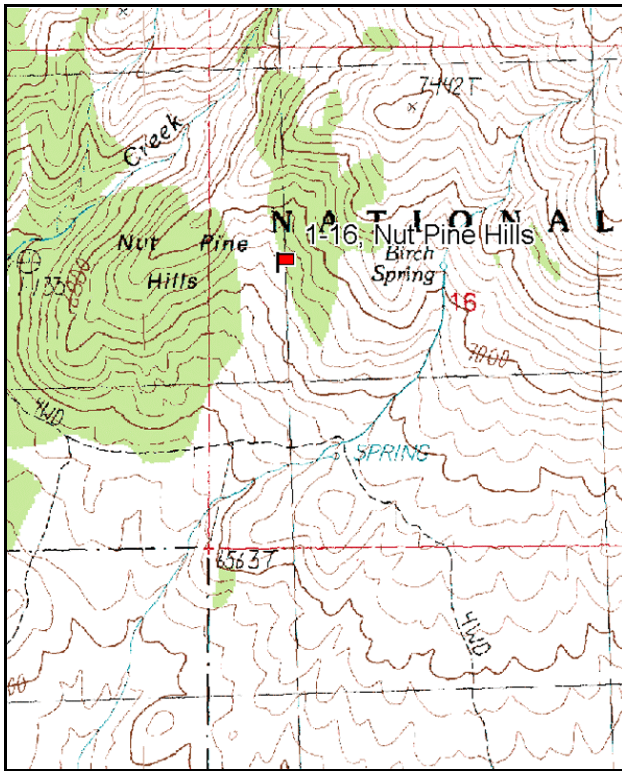
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 155 degrees magnetic.

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

LOCATION DESCRIPTION

From U-30, travel up the road to Clark's Basin for 8.8 miles. Turn right and travel 0.7 miles to a gate. Continue 1.1 miles to a gate marking the forest boundary. Continue 1.6 miles to another gate. Just after the gate turn right and proceed 0.4 miles to a witness post. The zero foot stake is just east of the witness post.



Map Name: Dennis Hill

Diagrammatic Sketch

Township 13N, Range 15W, Section 16

UTM 4636341 N, 285977 E

DISCUSSION

Trend Study No. 1-16

The Nut Pine Hills is a new trend study set up to monitor important deer winter range on the south slope of the Raft River mountains. The area supports a mixed mountain brush community type with scattered pinyon and juniper trees. The site is on U.S. Forest Service land and is part of the Sawtooth National Forest. It has a moderate slope of 20% to 23% with a southwest aspect and an elevation of approximately 7,000 feet. Deer also use this area in the spring. Deer were flushed from the site when it was being established. Pellet group frequency of deer was moderately high in 1996. Cattle also use this area as part of the large Yost allotment. This allotment has been combined with the Raft River allotment. Combined, these allotments are grazed by 1,418 cattle in the spring and fall. The pellet-group transect read on the site in 2001 estimated 38 deer days use/acre (94 deer days use/ha) 4 cow days use/acre (9 cow days use/ha). Most of the deer pellet groups were fresh indicating mostly spring and early summer use.

The soil is moderately deep with a sandy clay loam texture. The soil reaction is moderately alkaline (8.1 pH) with a limited amount of phosphorus in the soil (8.5 ppm) where values less than 10 ppm can limit normal plant growth and development. Effective rooting depth (see methods) was estimated at 19 inches, but depth must be more restricted in some areas where black sagebrush and stemless goldenweed occur. Vegetative and litter cover are abundant which adequately protect the soil from serious erosion. Pavement is concentrated on the surface in isolated open interspaces. Rocks are common throughout the profile.

The site is dominated by browse species. Fourteen shrub species combine to produce 37% shrub cover in 1996 and 51% cover in 2001. Key species include serviceberry, mountain big sagebrush, and antelope bitterbrush. Mature serviceberry average about 3 feet in height. Density is currently ('01) about 660 plants/acre with 24% displaying heavy use. Vigor is good on all plants and percent decadency is moderately low at 18%. Mountain big sagebrush presently has an estimated density of 1,480 plants/acre with almost 90% classified as mature. Utilization was heavy on a few individual plants in 1996 but mostly light overall. The population appears stable with sufficient seedlings and young combined with a low percent decadence (7%). Antelope bitterbrush is abundant and accounted for 32% of the shrub cover in 2001. Average mature bitterbrush plants measure only 2 feet in height with a 4 foot crown. Utilization of these shrubs varies from light to heavy with 35% displaying heavy use in 2001. Yet, vigor is good and percent decadency is low at only 6% of the population.

Snowberry is currently the most abundant shrub on the site contributing 32% of the shrub cover in 2001, with an estimated 3,980 plants/acre. Utilization of these less preferred shrubs is light. Other shrubs found on the site include small numbers of black sagebrush, threadleaf rubber rabbitbrush, stickyleaf low rabbitbrush, slenderbush eriogonum, broom snakeweed, chokecherry, wax currant, woods rose and gray horsebrush. Most of these shrubs were unutilized. A few tree size and high-lined curleaf mahogany occur on the site.

The herbaceous understory is diverse and presently ('01) produces a total of 20% cover or 29% of the total vegetative cover. Grasses are diverse with 8 perennial species inventoried. The more abundant species include: thickspike wheatgrass, bluebunch wheatgrass, and Sandberg bluegrass. Annual cheatgrass brome is present but only in very small numbers, producing <1% of the grass cover. Forbs are also abundant with 32 perennial and 7 annual species counted. Several useful species are present, including: paintbrush, sulfur eriogonum, lambstongue groundsel, and lobeleaf groundsel. These and other forbs provide useful spring forage for big game.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the abundant protective vegetation and litter cover. The browse component dominates the vegetational aspects of the site and provides useful forage for wintering big game. The three key species, serviceberry, mountain big sagebrush, and antelope bitterbrush appear to have stable trends with good reproductive potentials, low decadency and good vigor. Utilization of bitterbrush is heavy but not to the point that it reduces vigor of the shrubs. The herbaceous understory is very diverse with some useful species present. Increases in the shrub component could eventually cause a decline in the understory.

2001 TREND ASSESSMENT

The soil trend appears stable due to the abundant protective vegetation and litter cover. In fact, the ratio of bare soil to protective ground cover has improved from the last reading. The browse component continues to dominate the vegetational aspects of the site and provides useful forage for wintering big game. The three key species, serviceberry, mountain big sagebrush, and antelope bitterbrush appear to have stable trends with good reproductive potentials, relatively low decadency, and good vigor. Utilization of bitterbrush is moderate to heavy but not to the point that it reduces vigor. The herbaceous understory is very diverse with some useful species present. The sum of nested frequency for perennial grasses has increased with a corresponding decrease for perennial forbs, offsetting each other. Overall, trend for the herbaceous understory is stable. However, increases in the shrub component could eventually cause a decline in the understory.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 16

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron dasystachyum	140	186	48	56	.88	3.29
G	Agropyron spicatum	141	123	51	37	2.15	5.65
G	Bromus tectorum (a)	47	*11	17	4	.16	.19
G	Elymus cinereus	10	*-	3	-	.04	.15
G	Koeleria cristata	22	*10	11	5	.37	.39
G	Oryzopsis hymenoides	1	6	1	2	.03	.18
G	Poa fendleriana	97	*27	36	7	1.71	.76
G	Poa pratensis	-	*43	-	13	-	.81
G	Poa secunda	21	*123	8	48	.40	3.27
Total for Annual Grasses		47	11	17	4	0.15	0.18
Total for Perennial Grasses		432	518	158	168	5.61	14.51
Total for Grasses		479	529	175	172	5.76	14.70

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Achillea millefolium</i>	-	6	-	3	-	.06
F	<i>Agoseris glauca</i>	68	*5	25	4	.15	.02
F	<i>Arabis</i> spp.	5	-	3	-	.01	-
F	<i>Astragalus beckwithii</i>	4	3	1	2	.00	.06
F	<i>Astragalus newberryi</i>	6	-	3	-	.01	-
F	<i>Aster</i> spp.	17	*38	5	14	.10	.44
F	<i>Astragalus utahensis</i>	3	-	1	-	.03	-
F	<i>Castilleja linariaefolia</i>	4	-	2	-	.03	-
F	<i>Calochortus nuttallii</i>	3	-	1	-	.00	-
F	<i>Chaenactis douglasii</i>	22	*8	12	3	.06	.01
F	<i>Cirsium</i> spp.	8	10	4	4	.06	.22
F	<i>Collomia linearis</i> (a)	16	22	6	7	.03	.03
F	<i>Comandra pallida</i>	105	*57	49	26	.49	.61
F	<i>Collinsia parviflora</i> (a)	131	*59	42	22	.43	.38
F	<i>Crepis acuminata</i>	31	17	14	9	.12	.53
F	<i>Cryptantha</i> spp.	22	*5	11	2	.22	.01
F	<i>Delphinium nuttallianum</i>	9	2	3	1	.04	.00
F	<i>Descurainia pinnata</i> (a)	16	-	5	-	.05	-
F	<i>Erysimum asperum</i>	3	-	2	-	.01	-
F	<i>Eriogonum cernuum</i> (a)	10	-	4	-	.02	-
F	<i>Erigeron pumilus</i>	1	-	1	-	.00	-
F	<i>Eriogonum umbellatum</i>	46	27	21	13	1.25	.87
F	<i>Gilia</i> spp. (a)	21	*-	13	-	.09	-
F	<i>Haplopappus acaulis</i>	16	12	7	6	.37	.18
F	<i>Hackelia patens</i>	69	*15	29	10	.91	.17
F	<i>Lesquerella</i> spp.	5	-	3	-	.01	-
F	<i>Lithospermum ruderales</i>	25	20	12	8	.41	.69
F	<i>Lomatium</i> spp.	21	16	8	8	.41	.40
F	<i>Microsteris gracilis</i> (a)	-	26	-	10	-	.05
F	<i>Phlox austromontana</i>	44	33	20	14	.30	.61
F	<i>Phlox longifolia</i>	86	*31	33	13	.18	.07
F	<i>Polygonum douglasii</i> (a)	7	2	3	1	.01	.00
F	<i>Ranunculus testiculatus</i> (a)	-	1	-	1	-	.00
F	<i>Senecio integerrimus</i>	20	8	6	4	.40	.36
F	<i>Senecio multilobatus</i>	59	*19	27	7	.29	.22
F	<i>Taraxacum officinale</i>	5	4	1	2	.00	.03

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Unknown forb-annual (a)	8	*-	5	-	.02	-
F	Viola spp.	21	*6	10	4	.07	.02
F	Zigadenus paniculatus	-	2	-	1	-	.03
Total for Annual Forbs		209	110	78	41	0.65	0.47
Total for Perennial Forbs		728	344	314	158	6.00	5.67
Total for Forbs		937	454	392	199	6.65	6.14

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

BROWSE TRENDS --

Herd unit 01 , Study no: 16

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier utahensis	32	28	3.92	7.59
B	Artemisia nova	12	6	.01	.03
B	Artemisia tridentata vaseyana	41	45	4.09	6.84
B	Chrysothamnus nauseosus consimilis	5	3	.00	.38
B	Chrysothamnus viscidiflorus lanceolatus	45	36	1.56	1.24
B	Eriogonum microthecum	23	15	.32	.24
B	Gutierrezia sarothrae	11	4	.12	.15
B	Juniperus osteosperma	4	2	.71	.71
B	Mahonia repens	4	4	.04	.04
B	Opuntia spp.	3	1	.03	-
B	Prunus virginiana	2	0	-	-
B	Purshia tridentata	48	46	11.98	16.20
B	Rosa woodsii	2	3	-	.30
B	Symphoricarpos oreophilus	72	69	13.26	16.46
B	Tetradymia canescens	34	33	.67	.60
Total for Browse		338	295	36.76	50.82

CANOPY COVER --

Herd unit 01 , Study no: 16

Point-Quarter Data

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	1	3	-	49	-	6.3
Pinus monophylla	-	.40	-	78	-	8.5

BASIC COVER --

Herd unit 01 , Study no: 16

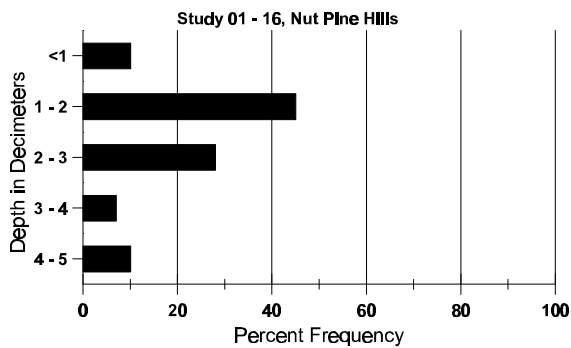
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	420	422	43.29	62.09
Rock	206	84	2.98	1.24
Pavement	249	205	3.84	6.13
Litter	487	461	45.58	47.65
Cryptogams	19	2	.13	.03
Bare Ground	276	194	12.81	13.35

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 16, Nut Pine Hills

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.1	51.4 (17.6)	8.1	50.9	25.1	24.0	2.1	8.5	544.0	1.1

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 16

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	2	3	365	N/A
Deer	22	9	496	38 (94)
Cattle	6	2	44	4 (9)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 16

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
Amelanchier utahensis																	
S	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	6	-	-	4	-	1	-	-	11	-	-	-	220		11	
	01	2	1	-	3	-	-	-	-	6	-	-	-	120		6	
M	96	5	7	4	4	7	1	-	-	28	-	-	-	560	36	42	28
	01	5	1	2	2	-	4	6	1	21	-	-	-	420	38	42	21
D	96	-	2	-	1	1	-	-	-	4	-	-	-	80		4	
	01	1	2	-	1	-	2	-	-	3	1	-	2	120		6	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'96		40%		14%		00%		-23%									
'01		12%		24%		06%											
Total Plants/Acre (excluding Dead & Seedlings)										'96	860	Dec:	9%				
										'01	660		18%				
Artemisia nova																	
Y	96	1	2	-	-	-	-	-	-	3	-	-	-	60		3	
	01	1	-	-	1	-	-	-	-	2	-	-	-	40		2	
M	96	-	2	3	-	-	1	-	-	6	-	-	-	120	7	13	6
	01	8	-	-	-	-	-	-	-	8	-	-	-	160	7	12	8
D	96	1	2	2	2	-	-	-	-	5	-	-	2	140		7	
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'96		38%		38%		13%		-31%									
'01		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'96	320	Dec:	44%				
										'01	220		9%				

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	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	3	-	-	3	-	1	-	-	-	7	-	-	-	140		7	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	21	11	-	15	-	1	-	-	-	47	1	-	-	960	19	29	48
	01	44	6	-	13	-	-	2	-	-	58	7	-	-	1300	24	29	65
D	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	4	-	-	1	-	-	-	-	-	4	-	1	-	100		5	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		19%			04%			00%			+23%							
'01		08%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1140	Dec:	4%				
											'01	1480		7%				
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	26	33	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	29	49	0
D	96	3	-	-	-	-	-	-	-	-	1	-	-	2	60		3	
	01	1	-	-	2	-	-	-	-	-	1	-	-	2	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			33%			-50%							
'01		00%			00%			67%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	120	Dec:	50%				
											'01	60		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 viscidiflorus lanceolatus																		
S	96	3	-	-	-	-	-	1	-	-	4	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	96	10	-	-	2	-	-	1	-	-	13	-	-	-	260		13	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	42	2	-	14	-	-	-	-	-	58	-	-	-	1160	16	20	58
	01	43	-	-	11	-	-	1	-	-	55	-	-	-	1100	14	18	55
D	96	3	-	-	-	-	-	-	-	-	2	-	-	1	60		3	
	01	2	-	-	-	-	-	-	-	-	-	-	-	2	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		03%			00%			01%			-22%							
'01		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1480	Dec:	4%				
											'01	1160		3%				
Eriogonum microthecum																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560	5	8	28
	01	17	-	-	-	-	-	-	-	-	17	-	-	-	340	5	9	17
D	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>							
'96		00%			00%			00%			-33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	660	Dec:	0%				
											'01	440		9%				

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	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	96	20	-	-	-	-	-	-	-	-	20	-	-	-	400		20	
	01	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	96	38	-	-	-	-	-	-	-	-	38	-	-	-	760	4	4	38
	01	10	-	-	1	-	-	-	-	-	11	-	-	-	220	3	5	11
D	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	60		3		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-68%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1180	Dec:	2%				
											'01	380		0%				
<i>Juniperus osteosperma</i>																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	2	-	-	-	-	-	-	1	-	3	-	-	-	60	-	-	3
	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%			-71%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	140	Dec:	-				
											'01	40		-				
<i>Mahonia repens</i>																		
Y	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	3	0
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100	2	2	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	360	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.																		
M	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	5	16	4
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20	4	10	1
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%			00%			-80%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	100	Dec:	20%				
											'01	20		0%				
Prunus virginiana																		
Y	96	1	-	-	-	-	-	1	-	-	2	-	-	-	40			2
	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	40	Dec:	-				
											'01	0		-				
Purshia tridentata																		
S	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	96	1	2	1	1	-	1	-	-	-	6	-	-	-	120			6
	01	4	1	-	-	-	-	-	-	-	5	-	-	-	100			5
M	96	-	11	35	1	15	4	-	-	-	66	-	-	-	1320	23	49	66
	01	24	7	19	-	7	3	2	-	1	63	-	-	-	1260	25	48	63
D	96	1	-	-	-	1	-	-	-	-	1	-	-	1	40			2
	01	1	-	2	1	-	-	-	-	-	1	-	1	2	80			4
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		39%			55%			01%			- 3%							
'01		21%			35%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1480	Dec:	3%				
											'01	1440		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				
Ribes cereum cereum																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	62	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		-			
Rosa woodsii																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	-	-	-	-	-	1	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	-	-	-	-	-	2	-	-	-	2	-	-	-	40	10	4	2
	01	-	-	-	-	-	-	3	-	-	3	-	-	-	60	17	18	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			100%			00%			+25%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
												'01	80		-			
Symphoricarpos oreophilus																		
S	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	31	-	-	24	-	-	-	-	-	55	-	-	-	1100			55
	01	12	-	-	7	-	-	13	-	-	32	-	-	-	640			32
M	96	106	14	-	62	2	-	3	-	-	187	-	-	-	3740	18	29	187
	01	82	-	-	73	-	-	9	-	-	164	-	-	-	3280	19	32	164
D	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		07%			00%			00%			-18%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	4840	Dec:	0%			
												'01	3980		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			
Tetradymia canescens																	
S	96	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	96	11	-	-	3	-	-	-	-	-	14	-	-	-	280		14
	01	1	-	-	3	-	-	-	-	-	4	-	-	-	80		4
M	96	30	-	-	5	-	-	-	-	-	35	-	-	-	700	8 11	35
	01	45	-	-	-	-	-	1	-	-	46	-	-	-	920	9 10	46
D	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
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%			- 2%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'96	1040	Dec:	6%			
											'01	1020		2%			

Trend Study 1-17-01

Study site name: Clark's Basin .

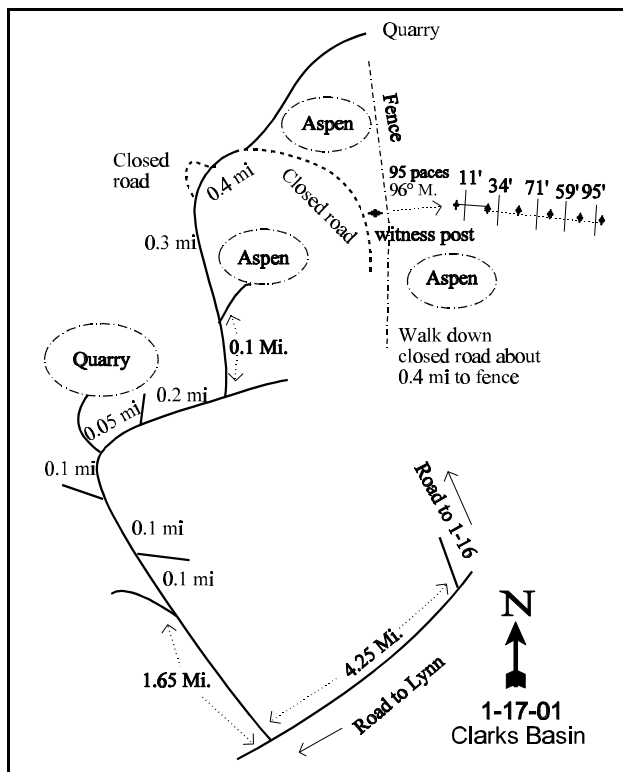
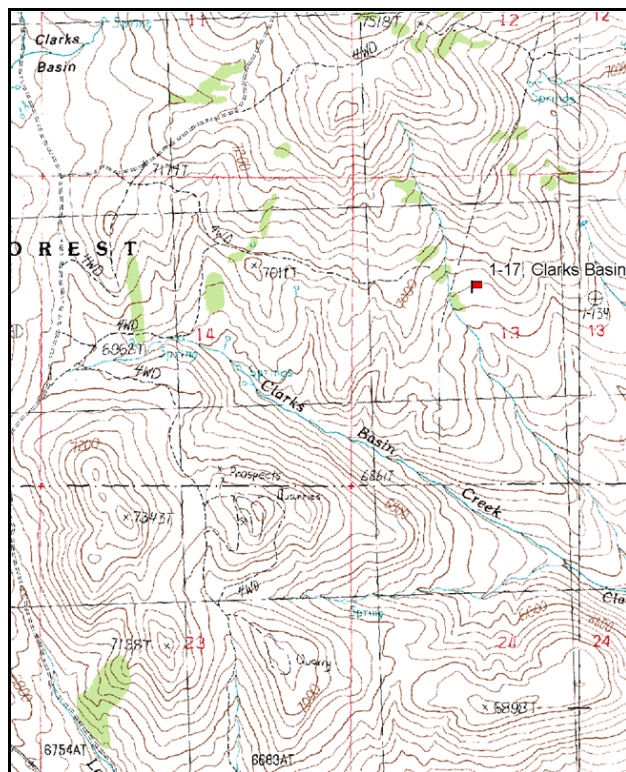
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 100 degrees magnetic.

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

LOCATION DESCRIPTION

From U-30, travel up the road towards Lynn to Clark's Basin for 13.05 miles.. Take a right and drive 1.65 miles to a fork in the road. Stay right and continue for another 0.35 on the main road to a quarry. Stay right and continue for 0.2 miles. Take a left, proceed 0.1 miles taking a left and proceed 0.3 miles to a wet meadow and a spring where the road has a been moved. Go through the stream and continue 0.4 miles to a spot where the road has been closed. From here walk down the hill on the old closed road about 0.4 miles to a witness post near the fence. From the witness post, walk 95 paces at a bearing of 96 degrees magnetic to the 0-foot baseline stake marked by browse tag #443. The baseline runs 100 degrees magnetic.



Map Name: Lynn Reservoir

Diagrammatic Sketch

Township 13N, Range 16W, Section 14

UTM 4636539 N, 281537 E

DISCUSSION

Trend Study No. 1-17

The Clark's Basin study is a new study established in 1996. It is placed to sample mixed mountain brush near one of the few aspen clones in the Clark's Basin area. It is considered important fawning habitat for deer. The site is on a bench with a ridge to the north and ravines to the south. The site is on a gentle 3% to 5% slope at an elevation of approximately 6,740 feet. This area is grazed by livestock as part of the Yost Pasture allotment. Season of use is May 1 to June 20 and November 1 to December 31 by 1,206 cattle. Water is readily available in nearby springs and livestock water developments. A pellet-group transect read on site in 2001 estimated 34 deer days use/acre (84 deer days use/ha) and 2 cows days use/acre (5 cow days use/ha).

The soil is relatively deep with some surface rock. Soil texture is a clay loam with a neutral reaction (6.8 pH). Effective rooting depth is a little over 20 inches. Erosion is not a problem due to the abundant herbaceous cover and little exposed bare soil. The erosion condition was classified as stable in 2001.

The site is a mixed mountain brush type with a good grass and forb understory which can provide important early summer forage for deer. Several preferred browse species occupy the site including: serviceberry, black sagebrush, basin big sagebrush, antelope bitterbrush, and woods rose. The dominant browse is mountain big sagebrush, which provides on average 54% of the browse cover. Serviceberry, black sagebrush, bitterbrush, and mountain snowberry are intermixed with the sagebrush. The mountain big sagebrush population is currently ('01) estimated at 3,180 plants/acre, 82% of which are mature. Utilization was light to moderate in 1996 and light in 2001. Percent decadency is low and vigor is good. There is a high number of dead sagebrush along the first 200 feet of the baseline which appear to have died several years ago, probably during the severe winter of 1983-84. Annual leader growth for the preferred shrubs was measured during the sampling period in 2001. Compared to the average for the management unit, both mountain big sagebrush and bitterbrush were well below their respective averages (about 3/4 of an inch for mountain big sagebrush and 1.1 inches for bitterbrush).

Serviceberry displays moderate to heavy use. Percent decadency was moderately high at 41% in 1996. It dropped to 7% in 2001. The serviceberry provides on average about 7% of the browse cover. Antelope bitterbrush also occur in relatively small numbers (440 plants/acre and 5% of the browse cover) but provides preferred forage. Utilization of these shrubs was moderate to heavy in 1996 and 2001. Percent decadency has decreased from 33% down to 18%. Only 5% of the population was classified with poor vigor in 2001.

Some black sagebrush occurs in patches along belts 3 and 4 with a current ('01) estimated density of 2,200 plants/acre. They provide 11% of the browse cover. Less preferred browse include: rubber rabbitbrush, mountain low rabbitbrush, creeping barberry, snowberry, and gray horsebrush.

The herbaceous understory is diverse and well developed. Eleven species of perennial grass currently produce over 20% cover. The dominant species include thickspike wheatgrass, Kentucky bluegrass, and Sandberg bluegrass. Forbs are extremely diverse with 41 species producing 15% cover. Several useful species occur including: paintbrush, silvery lupine, lambstongue groundsel, sulfur eriogonum, and Penstemon.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is excellent for soil protection. Vegetation and litter cover are abundant and well distributed and no significant erosion appears to be occurring. Trend for the key browse species (serviceberry, mountain big sagebrush, black sagebrush, and antelope bitterbrush) appears stable for the most

part. Extremely heavy use of serviceberry and bitterbrush are cause for concern. Percent decadency is 41% for serviceberry, but no dead plants were encountered. Some plants near the site have grown out of reach to browsing animals. Bitterbrush has a percent decadency of 33% and heavy use on 48% of the shrubs. Young plants are present for both species but no seedlings were encountered. The herbaceous understory is diverse and abundant. The sod forming thickspike wheatgrass and Kentucky bluegrass may increase in the future.

2001 TREND ASSESSMENT

The protective ground cover remains excellent. The ratio of bare soil to protective cover has improved since 1996. Trend for soil remains stable. The five preferred browse species for the site make up on average 92% of the total browse cover. Of the five species, only mountain big sagebrush showed a slight downward trend, while the others showed trends that were stable to slightly upward. The overall trend for browse is stable. The herbaceous understory continues to be diverse and abundant. The sum of nested frequency for perennial grasses show a slight increase, while the sum of nested frequency of perennial forbs indicates a decrease. The grasses make up over 60% of the herbaceous cover, therefor the overall trend for the herbaceous understory is stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 17

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron dasystachyum	279	299	72	82	6.03	7.03
G	Agropyron spicatum	46	*24	16	9	1.37	1.22
G	Bromus tectorum (a)	17	25	7	7	.06	.06
G	Carex spp.	52	*33	16	7	1.12	1.19
G	Elymus cinereus	-	4	-	1	-	.98
G	Koeleria cristata	4	9	2	4	.06	.21
G	Melica bulbosa	4	5	3	3	.04	.06
G	Poa bulbosa	-	2	-	1	-	.03
G	Poa fendleriana	6	14	4	5	.16	.35
G	Poa pratensis	49	*159	12	48	1.04	5.79
G	Poa secunda	216	*148	63	53	4.51	3.81
Total for Annual Grasses		17	25	7	7	0.06	0.06
Total for Perennial Grasses		656	697	188	213	14.36	20.69
Total for Grasses		673	722	195	220	14.42	20.75

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
		F	<i>Achillea millefolium</i>	62	53	21	21
F	<i>Agoseris glauca</i>	112	*48	41	21	.69	.40
F	<i>Allium</i> spp.	22	*92	13	37	.06	.42
F	<i>Antennaria rosea</i>	-	1	-	1	-	.03
F	<i>Arabis</i> spp.	8	-	4	-	.02	-
F	<i>Astragalus beckwithii</i>	1	3	1	2	.03	.04
F	<i>Astragalus cibarius</i>	8	18	5	7	.39	.08
F	<i>Astragalus convallarius</i>	-	2	-	1	-	.15
F	<i>Aster</i> spp.	178	192	57	56	2.19	5.29
F	<i>Astragalus</i> spp.	5	-	2	-	.06	-
F	<i>Castilleja linariaefolia</i>	1	6	1	2	.03	.30
F	<i>Calochortus nuttallii</i>	4	-	2	-	.01	-
F	<i>Cirsium</i> spp.	3	*11	2	8	.07	.31
F	<i>Collomia linearis</i> (a)	85	*24	30	12	.20	.06
F	<i>Comandra pallida</i>	15	*50	7	18	.06	.66
F	<i>Collinsia parviflora</i> (a)	287	*228	87	66	2.28	2.41
F	<i>Crepis acuminata</i>	3	*8	1	4	.00	.07
F	<i>Crepis intermedia</i>	10	*-	6	-	.05	-
F	<i>Cryptantha</i> spp.	7	-	2	-	.01	-
F	<i>Cymopterus</i> spp.	12	-	3	-	.04	-
F	<i>Cynoglossum officinale</i>	1	-	1	-	.03	-
F	<i>Delphinium nuttallianum</i>	7	17	4	8	.02	.06
F	<i>Delphinium occidentale</i>	2	1	1	1	.03	.00
F	<i>Equisetum</i> spp.	4	3	2	1	.01	.00
F	<i>Eriogonum umbellatum</i>	16	12	5	5	.12	.39
F	<i>Gayophytum ramosissimum</i> (a)	-	*23	-	9	-	.04
F	<i>Geranium</i> spp.	1	1	1	1	.01	.03
F	<i>Gilia</i> spp. (a)	-	1	-	1	-	.00
F	<i>Hackelia patens</i>	10	2	4	2	.04	.03
F	<i>Hymenoxys acaulis</i>	41	35	22	17	.39	.93
F	<i>Lomatium triternatum</i>	2	*16	2	7	.01	.30
F	<i>Lupinus argenteus</i>	4	6	4	4	.19	.40
F	<i>Machaeranthera</i> spp	53	*3	20	1	.10	.00
F	<i>Microsteris gracilis</i> (a)	-	*87	-	32	-	.18
F	<i>Penstemon humilis</i>	7	6	3	3	.01	.16
F	<i>Phlox longifolia</i>	68	75	26	29	.36	.27
F	<i>Polygonum douglasii</i> (a)	9	10	5	4	.02	.02

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Schoenocrambe linifolia	-	1	-	1	-	.03
F	Senecio integerrimus	77	*40	29	21	1.19	.62
F	Senecio multilobatus	-	2	-	1	-	.00
F	Taraxacum officinale	30	43	12	22	.16	.21
F	Tragopogon dubius	3	2	3	2	.01	.18
F	Trifolium spp.	-	4	-	1	-	.00
F	Unknown forb-annual (a)	3	-	1	-	.15	-
F	Unknown forb-perennial	32	-	12	-	.22	-
F	Veronica biloba (a)	3	*29	1	11	.03	.13
F	Viguiera multiflora	70	*3	29	1	.14	.03
F	Viola spp.	15	*6	7	2	.35	.01
F	Wyethia amplexicaulis	4	3	2	2	.18	.18
F	Zigadenus paniculatus	14	12	8	6	.12	.23
Total for Annual Forbs		387	402	124	135	2.69	2.85
Total for Perennial Forbs		912	777	365	316	8.04	12.67
Total for Forbs		1299	1179	489	451	10.73	15.53

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

BROWSE TRENDS --

Herd unit 01 , Study no: 17

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier utahensis	16	15	1.56	2.82
B	Artemisia nova	16	21	3.40	4.13
B	Artemisia tridentata vaseyana	76	73	17.25	20.02
B	Chrysothamnus nauseosus	2	3	-	.03
B	Chrysothamnus viscidiflorus lanceolatus	38	39	1.82	1.41
B	Mahonia repens	3	8	.01	.87
B	Purshia tridentata	18	19	1.07	1.78
B	Rosa woodsii	10	12	.51	.87
B	Symphoricarpos oreophilus	58	56	6.44	4.87
B	Tetradymia canescens	3	3	-	.38
Total for Browse		240	249	32.10	37.22

BASIC COVER --

Herd unit 01 , Study no: 17

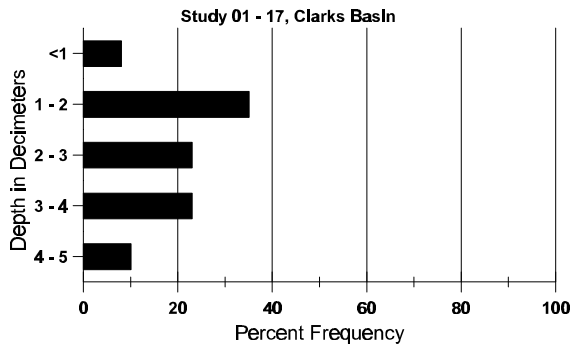
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	478	474	55.89	68.40
Rock	161	97	2.41	2.63
Pavement	187	154	2.48	2.58
Litter	495	466	52.18	51.50
Cryptogams	26	13	.31	.22
Bare Ground	263	190	9.58	7.31

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 17, Clarks Basin

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.5	50.0 (19.7)	6.8	31.7	35	33.3	3.3	24.2	553.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 17

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	2	1	44	N/A
Deer	4	10	444	34 (84)
Cattle	6	2	26	2 (5)
Sheep	-	-	17	N/A

BROWSE CHARACTERISTICS --

Herd unit 01 , 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				
Amelanchier utahensis																		
Y	96	1	3	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	3	-	-	-	-	-	1	-	-	4	-	-	-	80		4	
M	96	1	2	2	-	1	-	-	-	-	6	-	-	-	120	27	32	
	01	2	3	1	-	1	2	1	-	-	10	-	-	-	200	34	39	
D	96	-	-	1	1	5	-	-	-	-	4	-	-	3	140		7	
	01	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		65%			18%			18%			-12%							
'01		27%			27%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	340	Dec:	41%			
												'01	300		7%			
Artemisia nova																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12	
Y	96	-	4	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	96	8	51	11	2	-	-	-	-	-	72	-	-	-	1440	9	19	
	01	94	-	-	2	-	-	-	-	-	96	-	-	-	1920	8	18	
D	96	-	1	-	1	-	-	-	-	-	-	-	-	2	40		2	
	01	8	-	-	-	-	-	-	-	-	4	-	-	4	160		8	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		72%			14%			03%			+29%							
'01		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1560	Dec:	3%			
												'01	2200		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				
Artemisia tridentata vaseyana																		
S	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
Y	96	12	3	-	-	-	-	-	-	-	15	-	-	-	300		15	
	01	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
M	96	111	41	1	3	-	-	-	-	-	156	-	-	-	3120	20	30	156
	01	128	1	1	-	-	-	1	-	-	127	2	2	-	2620	22	33	131
D	96	1	-	-	2	1	-	-	-	-	3	-	-	1	80		4	
	01	12	-	-	1	-	-	-	-	-	10	1	1	1	260		13	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	640		32	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		26%			.57%			.57%			- 9%							
'01		.62%			.62%			03%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	3500	Dec:	2%				
											'01	3180		8%				
Chrysothamnus nauseosus																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	15	19	1
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	20	21	3
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		50%			50%			00%			+50%							
'01		00%			25%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	40	Dec:	50%				
											'01	80		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 lanceolatus</i>																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	96	51	10	-	6	1	-	-	-	-	68	-	-	-	1360	13	18	68
	01	55	-	-	5	-	-	3	-	-	63	-	-	-	1260	12	15	63
D	96	1	4	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	5	-	-	3	-	-	-	-	-	8	-	-	-	160		8	
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		19%			00%			00%			- 5%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1600	Dec:	6%				
											'01	1520		11%				
<i>Mahonia repens</i>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
M	96	-	-	-	5	-	-	-	-	-	5	-	-	-	100	3	4	5
	01	69	-	-	4	-	-	-	-	-	73	-	-	-	1460	6	7	73
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+95%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	100	Dec:	-				
											'01	1820		-				
<i>Purshia tridentata</i>																		
Y	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	4	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	-	4	1	1	1	5	-	-	1	13	-	-	-	260	17	28	13
	01	4	3	3	-	1	3	-	-	-	14	-	-	-	280	19	40	14
D	96	-	-	2	2	2	-	-	-	1	4	-	-	3	140		7	
	01	-	-	2	-	-	2	-	-	-	3	-	-	1	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		38%			48%			14%			+ 5%							
'01		36%			45%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	420	Dec:	33%				
											'01	440		18%				

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ribes spp.																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	26	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		-			
Rosa woodsii																		
Y	96	26	-	-	-	-	-	-	-	-	26	-	-	-	520			26
	01	22	-	-	-	-	-	2	-	-	24	-	-	-	480			24
M	96	10	-	-	3	-	-	-	-	-	13	-	-	-	260	19	17	13
	01	19	-	-	5	-	-	3	-	-	27	-	-	-	540	15	13	27
% 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	780	Dec:	-			
												'01	1020		-			
Symphoricarpos oreophilus																		
S	96	8	-	-	1	-	-	1	-	-	10	-	-	-	200			10
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	96	29	2	-	5	-	-	-	-	-	36	-	-	-	720			36
	01	12	-	-	3	-	-	-	-	-	15	-	-	-	300			15
M	96	71	22	2	10	-	-	-	-	-	105	-	-	-	2100	16	27	105
	01	55	1	-	16	-	-	6	-	-	77	1	-	-	1560	14	26	78
D	96	2	1	-	2	-	-	-	-	-	4	-	-	1	100			5
	01	9	-	-	1	-	-	-	-	-	4	-	-	6	200			10
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		17%			01%			.68%			-29%							
'01		.97%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	2920	Dec:	3%			
												'01	2060		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				
Tetradymia canescens																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	2	-	-	-	-	-	-	-	-	-	-	-	40			2	
M	96	2	3	-	-	-	-	-	-	-	-	-	-	100	15	18	5	
	01	3	-	-	-	-	-	-	-	-	-	-	-	60	10	12	3	
D	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	2	-	-	-	-	-	-	-	-	-	1	-	40			2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'96		60%			00%			00%				+29%						
'01		00%			00%			14%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	100	Dec:	0%			
												'01	140		29%			

Trend Study 1-18-01

Study site name: Bedke Spring.

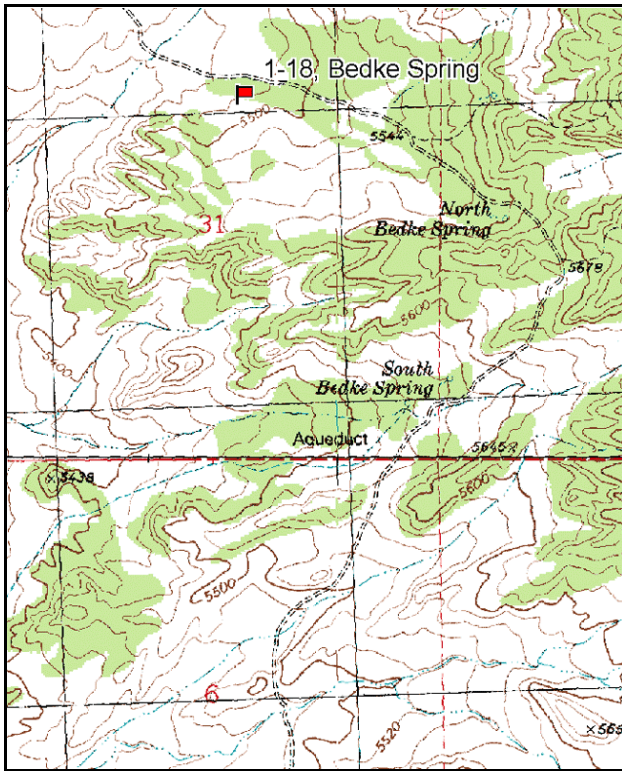
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline: 110 degrees magnetic.

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

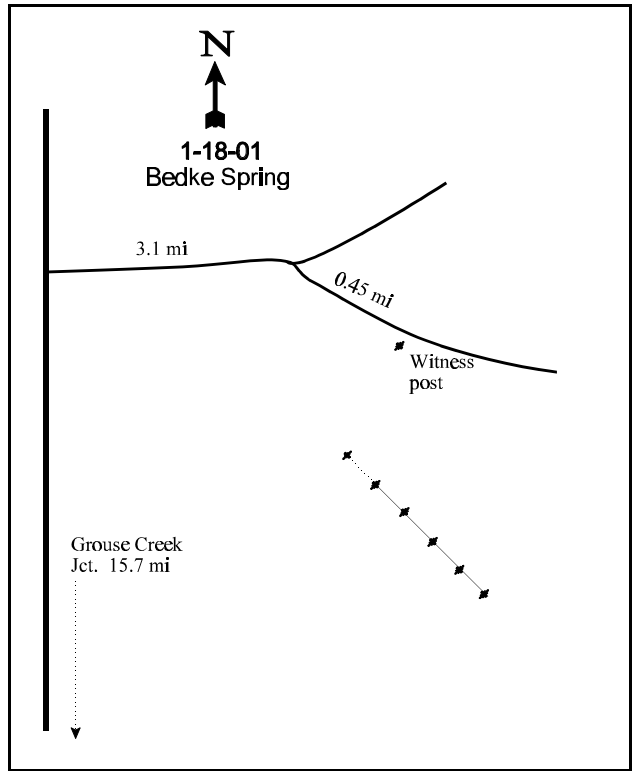
LOCATION DESCRIPTION

From the Grouse Creek Junction on U-30 travel north for 15.7 miles. Turn right and travel east for 3.1 miles. Stay right and continue 0.45 miles to a witness post on the right hand side of the road. The baseline is approximately 300 feet in a southerly direction on a small bench. The baseline runs 110 degrees magnetic.



Map Name: Ingham Canyon

Township 11N, Range 17W, Section 31



Diagrammatic Sketch

UTM 4613021 N, 263661 E

DISCUSSION

Trend Study No. 1-18

The Bedke Spring trend study is a new site established in 1996. It samples a Wyoming big sagebrush flat surrounded by juniper and pinyon located just west of North Bedke Spring. The site has a gentle 3% to 5% slope with a west, northwest exposure and an elevation of approximately 5,640 feet. Cattle use the area during the spring (April 1-April 30) as part of the combined Red Butte\Pine Creek allotment which is grazed by 1,148 cattle and 5 horses. When the site was initially setup, there were numerous elk pellet groups around some of the juniper trees just north of the 0 foot baseline stake, yet few were encountered on the site. A pellet-group transect read on site in 2001 estimated 2 deer days use/acre (5 deer days use/ha) and 11 cow days use/acre (27 cow days use/ha).

The soil is relatively deep but very compacted making it difficult to probe with the soil penetrometer. Effective rooting depth (see methods) was estimated at 18 inches. Soil texture is a clay loam with few rocks on the surface or within the profile. Soil reaction is mildly alkaline (7.7 pH) with a low amount of phosphorus. The soil is light colored in the interspaces with little organic matter buildup in the surface horizon. There are large areas of unprotected bare soil (28-31% bare ground). Under the sagebrush canopies there is considerable cryptogamic development (12% in 2001). Water movement is evident on the surface and soil is pedestalled underneath shrubs. There are no active gullies on the site and erosion is not severe due to the gentle slope. The erosion condition class was determined to be slight to moderate in 2001.

The site is dominated by a relatively dense stand of Wyoming big sagebrush. Narrowleaf low rabbitbrush is also abundant. Density of big sagebrush was estimated at 3,360 plants/acre in 1996, with 68% classified as mature. Currently ('01), the population has increased dramatically to 16,340 plants/acre with only 8% classified as mature. The increase is due to the explosion of young plants which now account for 87% of the population. Utilization is mostly light with percent decadency going from 26% down to only 5%. There were a considerable number of dead plants sampled (1,040 plants/acre) in 1996, indicating a past die off. The percent dead within the population has dropped from 24% to 6% due to the increase in density. In 1996, the age class structure indicated a stable population. Currently, it would indicate an increasing population where the percent young has risen from 6% to 87%. One would expect to see many of the very dense population of young to decrease in number with the extended drought. During the 2001 sampling period, average annual leader growth for Wyoming big sagebrush was 1.3 inches which was 10% more than the average for the management unit.

Other shrubs contributing additional forage include small numbers of black sagebrush, a slightly expanding population of shadscale, and a few scattered spiny hopsage. Utilization of these shrubs is light with the exception of a few heavily hedged spiny hopsage which occur in very low numbers.

Narrowleaf low rabbitbrush (an increaser) is a co-dominant with Wyoming big sagebrush. It accounted for 43% of the shrub cover in 1996 with an estimated density of 6,600 plants/acre. Currently ('01), it only makes up 27% of the shrub cover and its density has decreased to 3,820 plants/acre. Percent decadence has gone from 2% up to 43%. The percentage of plants classified as mature has also decreased, while the height and crown measurements for mature plants has decreased. Greasewood and threadleaf rubber rabbitbrush are increasers also found on the site in very small numbers.

The herbaceous understory is fairly well developed for a Wyoming big sagebrush site. Grasses are fairly diverse and on average produce about 8% cover. The most abundant perennial species consist of Sandberg bluegrass, bottlebrush squirreltail, and bluebunch wheatgrass. Annual cheatgrass is also present, but produced less than 1% total cover in 1996. Currently, it has increased to 3.5% cover. In 1996 it made up only 5% of

the grass cover, now it contributes to 33% of the grass cover and has significantly increased in nested frequency. The forb composition is also diverse with 19 perennial and 10 annual species sampled since 1996. Hoods phlox is the most abundant forb, producing nearly 70% of the forb cover in 2001.

1996 APPARENT TREND ASSESSMENT

Soil trend appears stable with no serious erosion occurring. Protective ground cover is average for a Wyoming big sagebrush type. The key browse species, Wyoming big sagebrush, appears to have a stable population. Utilization is light, vigor good, and percent decadency is low. The population of the increaser, narrowleaf low rabbitbrush, appears stable with the majority (94%) of the shrubs classified as mature. The herbaceous understory is diverse and fairly abundant for a Wyoming big sagebrush type. It will likely not increase without a significant reduction in sagebrush canopy cover.

2001 TREND ASSESSMENT

Soil trend continues to be stable with the ratio of bare soil to protective cover remaining almost unchanged with no significant erosion occurring. Protective ground cover is average for a Wyoming big sagebrush type. The key browse species, Wyoming big sagebrush, currently appears to have a improving trend. Utilization continues to be light, vigor good, and percent decadency is low at only 5%. The number of young within the population has increased from only 200 plants/acre to an astounding 14,220 plants/acre. The population of the increaser, narrowleaf low rabbitbrush, appears to be decreasing (down by 42%) with percent decadence increasing from 2% to 43%. The herbaceous understory is fairly diverse and abundant for a Wyoming big sagebrush type. The sum of nested frequency value for perennial grasses and perennial forbs have both declined slightly while sum of nested frequency of annuals have increased for both grasses and forbs. Trend for herbaceous understory is slightly down.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 18

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	<i>Agropyron cristatum</i>	7	11	3	4	.30	.10
G	<i>Agropyron smithii</i>	30	21	14	9	.19	.12
G	<i>Agropyron spicatum</i>	51	*89	18	31	.72	1.11
G	<i>Bromus tectorum</i> (a)	115	*310	36	84	.30	3.50
G	<i>Elymus</i> spp.	10	*-	4	-	.12	-
G	<i>Festuca</i> spp.	2	-	1	-	.03	-
G	<i>Poa fendleriana</i>	2	-	1	-	.03	-
G	<i>Poa secunda</i>	216	218	76	78	2.92	4.32
G	<i>Sitanion hystrix</i>	135	*71	60	34	1.19	.89
Total for Annual Grasses		115	310	36	84	0.30	3.50
Total for Perennial Grasses		453	410	177	156	5.51	6.55
Total for Grasses		568	720	213	240	5.82	10.05
F	<i>Allium acuminatum</i>	1	13	1	5	.00	.03
F	<i>Arabis</i> spp.	5	1	3	1	.04	.03
F	<i>Astragalus beckwithii</i>	21	*43	9	18	.12	.59
F	<i>Astragalus cibarius</i>	35	*7	15	5	.20	.05
F	<i>Astragalus utahensis</i>	13	*5	9	1	.14	.00
F	<i>Camelina microcarpa</i> (a)	-	3	-	3	-	.01
F	<i>Castilleja</i> spp.	2	-	1	-	.03	-
F	<i>Chaenactis douglasii</i>	23	*3	11	1	.05	.00
F	<i>Collomia linearis</i> (a)	4	-	2	-	.01	-
F	<i>Collinsia parviflora</i> (a)	32	*10	16	4	.10	.02
F	<i>Cordylanthus ramosus</i> (a)	2	-	1	-	.00	-
F	<i>Crepis acuminata</i>	-	1	-	1	-	.00
F	<i>Cryptantha</i> spp.	12	*-	8	-	.06	-
F	<i>Delphinium nuttallianum</i>	-	4	-	2	-	.01
F	<i>Descurainia pinnata</i> (a)	11	*122	3	55	.01	.42
F	<i>Erigeron</i> spp.	-	6	-	2	-	.18
F	<i>Eriogonum</i> spp.	-	1	-	1	-	.00
F	<i>Eriogonum ovalifolium</i>	1	3	1	1	.00	.00
F	<i>Erigeron pumilus</i>	50	*10	18	4	.34	.02
F	<i>Gilia</i> spp. (a)	2	*29	2	15	.01	.10
F	<i>Lathyrus brachycalyx</i>	-	1	-	1	-	.00
F	<i>Lappula occidentalis</i> (a)	22	*77	13	26	.06	.13

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Microsteris gracilis</i> (a)	-	*33	-	16	-	.08
F	<i>Penstemon cyananthus</i>	24	*-	10	-	.25	-
F	<i>Phlox hoodii</i>	240	240	82	80	6.65	8.27
F	<i>Phlox longifolia</i>	67	52	30	22	.32	.45
F	<i>Ranunculus testiculatus</i> (a)	11	*196	3	59	.01	1.57
F	Unknown forb-annual (a)	4	-	2	-	.03	-
F	Unknown forb-perennial	-	4	-	2	-	.01
Total for Annual Forbs		88	470	42	178	0.26	2.34
Total for Perennial Forbs		494	394	198	147	8.22	9.67
Total for Forbs		582	864	240	325	8.48	12.01

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

BROWSE TRENDS --

Herd unit 01 , Study no: 18

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Artemisia nova</i>	1	3	.76	.03
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	76	70	7.83	6.91
B	<i>Atriplex confertifolia</i>	23	33	.31	1.22
B	<i>Chrysothamnus nauseosus</i> <i>consimilis</i>	2	1	-	.03
B	<i>Chrysothamnus viscidiflorus</i> <i>stenophyllus</i>	86	70	7.31	3.35
B	<i>Grayia spinosa</i>	0	1	.30	-
B	<i>Opuntia</i> spp.	7	14	.15	.06
B	<i>Sarcobatus vermiculatus</i>	2	2	.38	.78
Total for Browse		197	194	17.04	12.40

BASIC COVER --

Herd unit 01 , Study no: 18

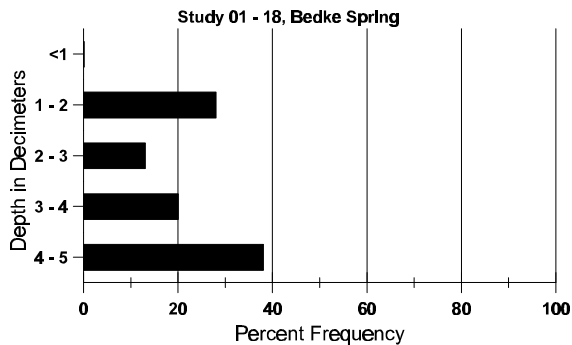
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	409	448	29.98	34.56
Rock	198	111	2.48	.67
Pavement	334	387	6.25	10.18
Litter	483	423	28.97	22.69
Cryptogams	189	204	7.75	12.10
Bare Ground	389	393	27.96	31.32

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 18, Bedke Spring

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.0	57.2 (16.6)	7.7	36.7	30.0	33.3	2.2	5.4	387.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 18

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	7	2	17	N/A
Elk	3	-	-	-
Deer	6	1	26	2 (5)
Cattle	1	3	130	11 (27)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 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				
Artemisia nova																		
M	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	10	26	1
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	13	24	2
D	96	-	1	-	-	-	-	-	-	1	-	-	-	20			1	
	01	1	-	-	-	-	-	-	-	1	-	-	-	20			1	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	80			4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	80			4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		100%			00%			00%			+33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	50%			
												'01	60		33%			
Artemisia tridentata wyomingensis																		
S	96	1	-	-	-	-	-	-	-	1	-	-	-	20			1	
	01	2	-	-	-	-	-	-	-	2	-	-	-	40			2	
Y	96	10	-	-	-	-	-	-	-	10	-	-	-	200			10	
	01	710	-	-	1	-	-	-	-	710	-	1	-	14220			711	
M	96	106	9	-	-	-	-	-	-	115	-	-	-	2300	22	31	115	
	01	58	4	-	-	-	-	-	-	60	2	-	-	1240	22	28	62	
D	96	26	11	-	4	2	-	-	-	34	-	2	7	860			43	
	01	39	2	-	3	-	-	-	-	27	-	-	17	880			44	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	1040			52	
	01	-	-	-	-	-	-	-	-	-	-	-	-	1100			55	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		13%			00%			05%			+79%							
'01		.73%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	3360	Dec:	26%			
												'01	16340		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>Atriplex confertifolia</i>																	
S	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	96	41	-	-	3	-	-	-	-	-	44	-	-	-	880		44
	01	39	-	-	-	-	-	-	-	-	39	-	-	-	780		39
M	96	9	-	-	4	1	-	-	-	-	14	-	-	-	280	8 10	14
	01	40	-	-	19	-	-	1	-	-	60	-	-	-	1200	8 15	60
D	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>						
'96		02%			00%			00%			+43%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'96	1160	Dec:	0%			
											'01	2020		2%			
<i>Chrysothamnus nauseosus consimilis</i>																	
Y	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	21 31	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	24 49	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'96		00%			00%			00%			-50%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'96	40	Dec:	-			
											'01	20		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																	
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	01	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17
Y	96	10	1	-	-	-	-	-	-	-	11	-	-	-	220		11
	01	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11
M	96	300	-	-	11	-	-	-	-	-	311	-	-	-	6220	11 15	311
	01	90	-	-	6	-	-	1	-	-	97	-	-	-	1940	9 13	97
D	96	7	1	-	-	-	-	-	-	-	7	-	1	-	160		8
	01	80	-	-	3	-	-	-	-	-	54	3	-	26	1660		83
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	320		16
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'96		.60%			00%			.30%			-42%						
'01		00%			00%			14%									
Total Plants/Acre (excluding Dead & Seedlings)											'96	6600	Dec:	2%			
											'01	3820		43%			

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>Grayia spinosa</i>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	40	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	25	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	20		-			
<i>Opuntia spp.</i>																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100	5	9	5
	01	7	-	-	1	-	-	5	-	-	13	-	-	-	260	4	7	13
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+53%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	140	Dec:	-			
												'01	300		-			
<i>Sarcobatus vermiculatus</i>																		
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	33	0
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20	38	57	1
% 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	80	Dec:	-			
												'01	60		-			

Trend Study 1-19-01

Study site name: Bally Mountain.

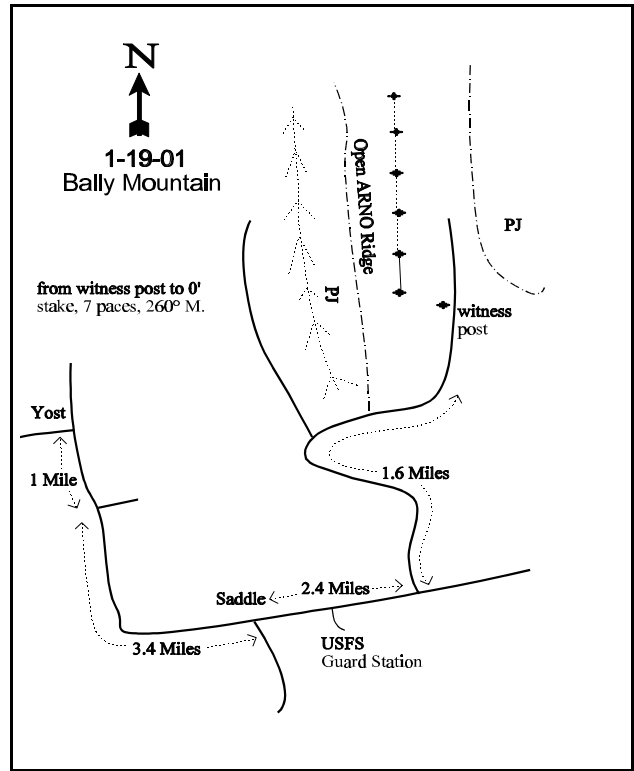
Vegetation type: Black Sagebrush.

Compass bearing: frequency baseline 0 degrees magnetic.

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

LOCATION DESCRIPTION

From the yield sign east of the town of Yost, travel south and then west towards Bally Mountain for 1.0 miles. Stay right and continue for 3.4 miles. Stay left and travel 2.4 miles. Take a left and continue 1.6 miles to a witness post. From the witness post to the 0 foot stake, walk 7 paces at 260 degrees magnetic. The baseline runs 0 degrees magnetic.



Map Name: Standrod

Diagrammatic Sketch

Township 15N, Range 25E, Section 4

UTM 4649407 N, 296607 E

DISCUSSION

Trend Study No. 1-19

The Bally Mountain trend study samples a open west facing ridge top surrounded by pinyon, juniper and curlleaf mountain mahogany. Slope of the ridge is 20% to 25% with an elevation of approximately 7,160 feet. Deer concentrate here during the winter because the slope remains open. Cattle also graze the area and a trail runs through the site. This area is within the Sawtooth National Forest. It is in the combined Raft River\Yost Pastures allotment which is grazed by 1,418 cattle in the spring and fall. A pellet-group transect read on the site in 2001 estimates 6 deer days use/acre (15 deer days use/ha) and 10 cow days use/acre (25 cow days use/ha).

Soil depth is limited to an effective rooting depth (see methods) of about 13 inches. The soil texture is a clay loam with a soil reaction that is mildly alkaline (7.7 pH). Percent organic matter is one of the highest found within the management unit (5%). The amount of phosphorus in the soil is low at only 6 ppm. Values less than 10 ppm can limit normal plant growth and development. The soil profile is rocky throughout with mostly gravel and some cobble size rocks. On average, rock and pavement has a cover value of a little over 15% with around 7% bare soil. Due to the abundant vegetation and litter cover, erosion is not a serious problem. The erosion condition class was determined to be stable in 2001.

This open ridge is dominated by a low growing population of black sagebrush. Density averages 25,710 plants/acre in 1996 and 2001 with 82% classified as mature. The average mature plant measures only 6 inches high with a 12 inch crown. Utilization was mostly moderate in 1996, but currently it is almost entirely classified as light use. Vigor is good on all plants except 16% of the decadent shrubs which were classified as dying. Seedlings and especially young are numerous, yet the population will likely not expand much further due to the very high density and increasing intraspecific competition. Annual leader growth averaged .7 inches in 2001. The average growth for black sagebrush on this site was 14% lower than the average for the management unit. Additional forage is provided by a few scattered mountain big sagebrush, curlleaf mountain mahogany, and rubber rabbitbrush.

The next most abundant shrub consist of broom snakeweed which numbered about 19,520 plants/acre in 1996. Density declined 43% in 2001. These are small plants, dwarfed by the harshness of the site and measure, on average, only 3 inches high by 5 inches across. Age class analysis indicated a dynamic reproductive potential in 1996. However, broom snakeweed did not increase and will likely not increase much in the future due to the harshness of the site and the relatively high density of black sagebrush.

The herbaceous understory is relatively well developed for a black sagebrush site. Five perennial grasses combined to produce 12% cover in 1996 increasing to 23% in 2001. Slender wheatgrass, Sandberg bluegrass, and prairie junegrass provide 99% of the total grass cover. Forbs are diverse and abundant. However, most of the common forbs are low value, low growing species which includes: stemless goldenweed, desert phlox, and dandelion.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is adequate to prevent most soil erosion on this site. Black sagebrush is abundant with adequate numbers of seedlings and young to maintain the population. Browse trend appears stable. The herbaceous understory is diverse and in good condition for this vegetation type. Some useful forbs are found, but the majority are low value forage species.

2001 TREND ASSESSMENT

Protective ground cover is good and prevents most soil erosion on this site. The ratio of bare soil to protective cover has remained almost unchanged since 1996, therefore the trend for soil is stable. Black sagebrush is abundant with adequate numbers of seedlings and young to maintain the population. Browse trend is stable. The herbaceous understory is diverse and in good condition for this vegetation type. Since 1996, the sum of nested frequency values for the grasses has remained almost the same, however the value for forbs has decreased somewhat. However, most of the forbs are small and of little forage value. Trend overall would be considered stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 19

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron trachycaulum	334	*367	97	98	6.34	16.36
G	Bromus tectorum (a)	3	8	1	2	.00	.01
G	Koeleria cristata	64	*100	24	31	1.12	2.23
G	Oryzopsis hymenoides	14	*-	6	-	.25	-
G	Poa secunda	301	*259	89	86	4.57	4.67
G	Sitanion hystrix	2	-	1	-	.00	-
Total for Annual Grasses		3	8	1	2	0.00	0.00
Total for Perennial Grasses		715	726	217	215	12.30	23.27
Total for Grasses		718	734	218	217	12.31	23.28
F	Achillea millefolium	4	4	2	2	.03	.15
F	Agoseris glauca	2	*8	1	4	.00	.04
F	Antennaria rosea	6	10	3	5	.06	.05
F	Arabis spp.	37	*10	16	7	.08	.03
F	Arenaria fendleri	160	*84	55	37	.97	.38
F	Astragalus calycosus	117	*51	51	23	1.52	.27
F	Aster spp.	24	*6	8	2	.06	.15
F	Castilleja angustifolia	11	*17	5	12	.02	.33
F	Castilleja linariaefolia	36	*55	19	28	.17	.51
F	Chenopodium fremontii (a)	-	3	-	1	-	.00
F	Cirsium spp.	3	4	2	2	.01	.01
F	Comandra pallida	2	6	1	2	.00	.01
F	Collinsia parviflora (a)	275	293	77	81	1.78	2.56

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
		F	<i>Cordylanthus ramosus</i> (a)	7	-	3	-
F	<i>Crepis intermedia</i>	2	-	1	-	.00	-
F	<i>Cryptantha</i> spp.	21	*-	11	-	.13	-
F	<i>Cymopterus</i> spp.	4	-	1	-	.00	-
F	<i>Erigeron pumilus</i>	54	*24	27	15	.26	.07
F	<i>Haplopappus acaulis</i>	88	*50	35	27	2.61	.75
F	<i>Lappula occidentalis</i> (a)	30	*1	11	1	.20	.00
F	<i>Lesquerella</i> spp.	4	11	1	5	.00	.02
F	<i>Linum lewisii</i>	55	*6	18	3	.26	.04
F	<i>Lomatium</i> spp.	5	7	2	4	.03	.02
F	<i>Machaeranthera</i> spp	4	-	1	-	.00	-
F	<i>Microsteris gracilis</i> (a)	-	4	-	1	-	.00
F	<i>Penstemon</i> spp.	2	-	1	-	.00	-
F	<i>Phlox austromontana</i>	238	*183	79	72	5.08	3.70
F	<i>Phlox longifolia</i>	-	6	-	3	-	.01
F	<i>Ranunculus testiculatus</i> (a)	13	*19	4	9	.16	.19
F	<i>Senecio multilobatus</i>	48	*25	25	13	.28	.14
F	<i>Taraxacum officinale</i>	92	69	44	35	.50	.64
F	<i>Tragopogon dubius</i>	18	*6	7	2	.06	.03
F	<i>Viola</i> spp.	-	3	-	1	-	.00
Total for Annual Forbs		325	320	95	93	2.16	2.77
Total for Perennial Forbs		1037	645	416	304	12.22	7.41
Total for Forbs		1362	965	511	397	14.39	10.18

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

BROWSE TRENDS --

Herd unit 01 , Study no: 19

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	100	100	14.38	17.74
B	Artemisia tridentata vaseyana	1	2	-	-
B	Cercocarpus ledifolius	1	1	-	-
B	Chrysothamnus nauseosus consimilis	24	24	.82	1.19
B	Chrysothamnus viscidiflorus stenophyllus	1	1	-	-
B	Eriogonum microthecum	15	21	.01	.04
B	Gutierrezia sarothrae	98	86	3.24	1.33
B	Pediocactus simpsonii	4	0	.01	-
B	Pinus monophylla	2	1	-	-
B	Tetradymia canescens	1	1	-	-
Total for Browse		247	237	18.48	20.31

BASIC COVER --

Herd unit 01 , Study no: 19

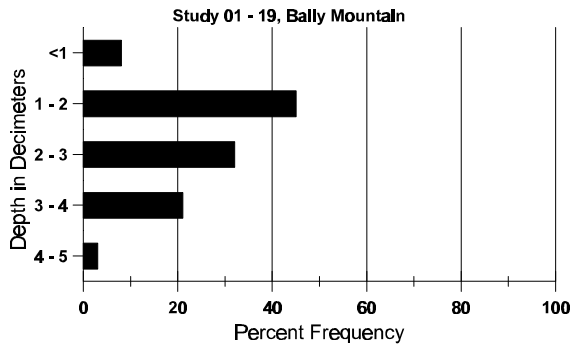
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	463	472	44.50	63.04
Rock	316	130	6.55	1.45
Pavement	391	362	11.31	11.48
Litter	483	417	29.17	23.38
Cryptogams	233	138	2.90	2.75
Bare Ground	281	287	5.23	9.27

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 19, Bally Mountain

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.4	52.6 (14.5)	7.8	26.7	42.0	31.3	5.0	6.0	297.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 19

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	2	1	9	N/A
Deer	13	2	78	6 (15)
Cattle	3	2	122	10 (25)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 19

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								
Artemisia frigida																						
M	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	10	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>Artemisia nova</i>																	
S	96	19	-	-	-	-	-	-	-	-	19	-	-	-	380		19
	01	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9
Y	96	204	44	-	7	-	-	-	-	-	255	-	-	-	5100		255
	01	85	-	-	-	-	-	-	-	-	85	-	-	-	1700		85
M	96	48	934	38	-	-	-	-	-	-	1020	-	-	-	20400	5 15	1020
	01	1036	35	-	-	-	-	-	-	-	1071	-	-	-	21420	6 12	1071
D	96	8	32	7	5	-	-	-	-	-	41	-	-	11	1040		52
	01	88	-	-	-	-	-	-	-	-	74	-	-	14	1760		88
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	380		19
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'96		76%			03%			.82%			- 6%						
'01		03%			00%			01%									
Total Plants/Acre (excluding Dead & Seedlings)											'96	26540	Dec:	4%			
											'01	24880		7%			
<i>Artemisia tridentata vaseyana</i>																	
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8 19	0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	9 19	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'96		00%			00%			00%			+50%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'96	20	Dec:	-			
											'01	40		-			
<i>Cercocarpus ledifolius</i>																	
Y	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		00%			100%			00%			+ 0%						
'01		100%			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				
Chrysothamnus nauseosus consimilis																		
Y	96	4	3	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12	
M	96	12	7	-	-	-	-	-	-	-	19	-	-	-	380	17	24	
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200	19	24	
D	96	1	-	4	-	-	-	-	-	-	3	-	-	2	100		5	
	01	14	-	-	-	-	-	-	-	-	7	-	1	6	280		14	
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		32%			13%			06%			+14%							
'01		00%			00%			19%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	620	Dec:	16%			
												'01	720		39%			
Chrysothamnus nauseosus hololeucus																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	7	
% 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		-			
Chrysothamnus viscidiflorus stenophyllus																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	10	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
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%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	0%			
												'01	20		100%			

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 microthecum</i>																		
Y	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	96	11	5	-	1	-	-	-	-	-	17	-	-	-	340	6	10	
	01	33	-	-	6	-	-	-	-	-	39	-	-	-	780	6	10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		20%			00%			00%			+49%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	500	Dec:	-			
												'01	980		-			
<i>Gutierrezia sarothrae</i>																		
S	96	57	-	-	1	-	-	-	-	-	58	-	-	-	1160		58	
	01	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
Y	96	258	-	-	19	-	-	-	-	-	277	-	-	-	5540		277	
	01	64	-	-	2	-	-	-	-	-	66	-	-	-	1320		66	
M	96	675	-	-	3	-	-	-	-	-	678	-	-	-	13560	3	4	
	01	470	-	-	-	-	-	-	-	-	470	-	-	-	9400	3	5	
D	96	21	-	-	-	-	-	-	-	-	16	-	-	5	420		21	
	01	17	-	-	1	-	-	-	-	-	8	-	1	9	360		18	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	340		17	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			.51%			-43%							
'01		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	19520	Dec:	2%			
												'01	11080		3%			
<i>Pediocactus simpsonii</i>																		
M	96	1	-	-	3	-	-	-	-	-	4	-	-	-	80	1	2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	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	80	Dec:	-			
												'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				
Pinus monophylla																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	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>							
'96		00%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			
												'01	20		-			
Tetradymia canescens																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	17	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	14	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	20	Dec:	-			
												'01	20		-			

Suspended

Trend Study 1-20-96

Study site name: Cotton Thomas.

Vegetation type: Aspen.

Compass bearing: frequency baseline 19 degrees magnetic.

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

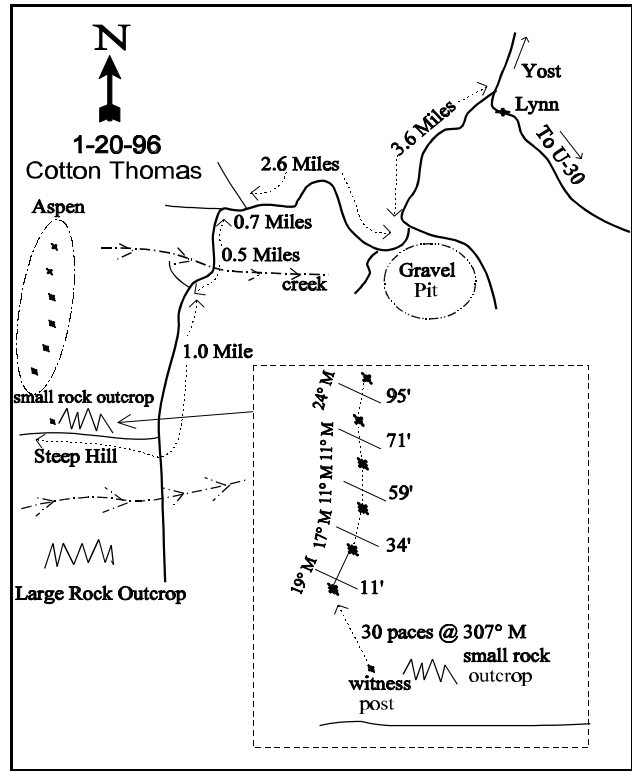
LOCATION DESCRIPTION

From Lynn, travel north approximately 1/4 a mile and take a left. Continue 3.6 miles and take a left just before the gravel pit. Continue 2.6 miles to a fork in the road, stay left and proceed 0.7 miles to another fork. Stay left again and proceed 0.5 miles (you will cross a creek and come to a fork). Stay left at the fork and proceed 1 mile going up a steep hill. The witness post will be on the right side of the road. From the witness post walk 30 paces at 307 degrees magnetic. The baseline doglegs down through the aspen. The 100-foot baseline runs 19 degrees magnetic, the 200-foot baseline runs 17 degrees magnetic, the 300-foot baseline runs 11 degrees magnetic, the 400-foot baseline runs 11 degrees magnetic, and the 500-hundred foot baseline runs 24 degrees magnetic.



Map Name: Kimball Creek

Township 13N, Range 17W, Section 6



Diagrammatic Sketch

UTM 4639651 N, 264733 E

DISCUSSION

Trend Study No. 1-20

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006.

The Cotton Thomas trend study was established in 1996 and occurs on private land, placed in one of the few aspen clones in the Grouse Creek Mountains. The area lies west of the town of Lynn near the Cotton Thomas Basin. Aspen is a critical vegetation type for deer summer range. This site contains many dead and decadent trees. Most of the vigorous trees are of the younger age class. The majority of the aspen in the vicinity appear to be stunted in growth and possibly declining, most likely this is a marginal site for aspen with periods of prolonged drought. This aspen clone is in the bottom of a drainage that runs south to north. Aspect is to the north with a slope of 5% and elevation of about 7,000 feet. Cattle graze this area in the summer, but since this is private land, no numbers or season of use is known. Water and a salt lick is less than a mile away.

The soil is relatively deep, dark colored and probably deeper than the estimated effective rooting depth of 37 inches (see methods). Surface rock cover is scarce (<1%) and nearly absent in the profile. Vegetation and litter cover are abundant leaving little bare soil exposed (5%). Erosion is not a problem.

The browse component is not a critical part of deer summer range, but many are useful for providing some forage for wildlife and cattle. These include mountain big sagebrush, serviceberry, aspen, wax current, woods rose, and snowberry. Most browse appears not to be utilized. Mountain big sagebrush is found around the fringes of the aspen clone along with a few scattered serviceberry. Most of the other shrubs occur within the aspen canopy. Aspen provides the most browse forage. Many young and mature trees are still available for browsing. Point-quarter data estimates a density of 4,486 plants/acre. Average diameter is just under 1 inch. Larger mature trees account for only 5% of the population. Population estimates using shrub density strip data estimates a density of 3,240 plants/acre, 81% of which are young trees. Overhead canopy cover is about 36%. Utilization on available trees is light and percent decadency low at 2%. The number of dead trees is approximately 300 per acre.

The herbaceous understory is diverse and very abundant. Thirteen grasses and one sedge were encountered. The most abundant species include: Kentucky bluegrass, sheep fescue, and bog bluegrass. The dominance of Kentucky bluegrass provides evidence of past heavy livestock grazing on this area as it increases with heavy livestock use.

The forb composition is diverse with 41 species inventoried. Dominant species include: arrowleaf balsamroot, violet, dandelion, sweetroot, alpinebog swertia, and a milkvetch. Few forbs appeared to have been utilized at the time of reading, June 12, 1996, but livestock will likely graze later this summer.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is abundant and well dispersed. Erosion is not a problem except on disturbed areas and cattle trails. The browse component is diverse and basically shows little use. Aspen is the key browse species. The stand is dense and mostly young with large mature trees comprising only about 5% of the population. The low rate of decadency and small number of dead trees would suggest that this stand is in good vigor. There are a number of other useful browse species present, but they all appear to show little use. Trend for browse appears stable for these species and improving for aspen. The herbaceous understory is diverse but the grass component is dominated by the increaser species, Kentucky bluegrass, which increases in response to heavy grazing. There was no sign of grazing yet this season, but livestock may graze here later in the summer. Forbs are represented by many common to the aspen type. Few appear to have been utilized.

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 20

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'96	'96	'96
G	Agropyron trachycaulum	66	23	.61
G	Bromus anomalus	32	9	.19
G	Bromus inermis	4	1	.03
G	Carex spp.	40	17	.55
G	Elymus cinereus	36	13	1.20
G	Festuca ovina	96	27	2.83
G	Koeleria cristata	2	1	.03
G	Poa spp.	14	4	.47
G	Poa leptocoma	102	30	1.58
G	Poa pratensis	92	22	4.89
G	Poa secunda	3	1	.00
G	Stipa columbiana	9	3	.06
G	Stipa lettermani	5	1	.00
Total for Annual Grasses		0	0	0
Total for Perennial Grasses		501	152	12.48
Total for Grasses		501	152	12.48
F	Achillea millefolium	12	7	.08
F	Agoseris glauca	52	24	.20
F	Antennaria rosea	10	3	.39
F	Arabis drummondi	14	6	.03
F	Artemisia ludoviciana	3	1	.03
F	Astragalus convallarius	20	7	.27
F	Aster spp.	43	19	.88
F	Astragalus spp.	69	20	1.00
F	Balsamorhiza sagittata	61	22	4.44
F	Borago officinalis	18	5	.07
F	Castilleja spp.	3	1	.00
F	Cirsium spp.	11	4	.19
F	Collomia linearis (a)	2	1	.00
F	Comandra pallida	8	5	.07
F	Collinsia parviflora (a)	96	26	.60
F	Crepis acuminata	16	6	.10
F	Cryptantha spp.	3	1	.00
F	Delphinium nuttallianum	17	6	.05

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'96	'96	'96
F	<i>Descurainia pinnata</i> (a)	14	5	.10
F	<i>Descurainia</i> spp. (a)	14	6	.10
F	<i>Galium</i> spp.	130	40	.60
F	<i>Geranium richardsonii</i>	43	18	.60
F	<i>Hackelia patens</i>	1	1	.00
F	<i>Helianthus</i> spp.	37	13	.48
F	<i>Hydrophyllum capitatum</i>	22	11	.56
F	Labiatae	20	8	.43
F	<i>Lupinus argenteus</i>	8	4	.07
F	<i>Mertensia oblongifolia</i>	51	27	.51
F	<i>Osmorhiza occidentalis</i>	77	24	1.84
F	<i>Penstemon</i> spp.	5	3	.01
F	<i>Phlox longifolia</i>	16	5	.02
F	<i>Polygonum douglasii</i> (a)	5	2	.01
F	<i>Senecio serra</i>	37	19	1.12
F	<i>Smilacina stellata</i>	8	3	.33
F	<i>Stellaria jamesiana</i>	83	32	.40
F	<i>Swertia perennis</i>	42	20	1.58
F	<i>Taraxacum officinale</i>	142	51	1.92
F	<i>Thalictrum fendleri</i>	100	37	5.16
F	Unknown forb-annual (a)	7	4	.19
F	<i>Veronica biloba</i> (a)	53	16	1.24
F	<i>Viguiera multiflora</i>	2	1	.03
F	<i>Viola</i> spp.	260	76	3.89
Total for Annual Forbs		191	60	2.25
Total for Perennial Forbs		1444	530	27.46
Total for Forbs		1635	590	29.71

BROWSE TRENDS --

Herd unit 01 , Study no: 20

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier alnifolia	2	.16
B	Artemisia tridentata vaseyana	32	2.90
B	Chrysothamnus viscidiflorus viscidiflorus	51	3.66
B	Eriogonum heracleoides	3	.06
B	Mahonia repens	10	.64
B	Populus tremuloides	66	10.64
B	Ribes cereum cereum	10	.21
B	Symphoricarpos oreophilus	96	17.82
Total for Browse		270	36.11

CANOPY COVER --

Herd unit 01 , Study no: 20

Point-Quarter Tree Data

Species	Percent Cover	Trees per Acre	Average diameter (in)
	'96	'96	'96
Populus tremuloides	36	4,486	0.8

BASIC COVER --

Herd unit 01 , Study no: 20

Cover Type	Nested Frequency	Average Cover %
	'96	'96
Vegetation	481	64.94
Rock	89	.53
Pavement	132	.88
Litter	491	64.61
Bare Ground	177	4.94

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 20, Cotton Thomas

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
36.6	45.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 20

Type	Quadrat Frequency '96
Rabbit	1
Deer	1
Cattle	3

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 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>Amelanchier alnifolia</i>																		
Y	96	-	-	-	5	-	-	-	-	-	5	-	-	-	100			5
% Plants Showing '96		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)															'96	100	Dec:	-
<i>Artemisia tridentata vaseyana</i>																		
S	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
Y	96	12	-	-	7	-	-	-	-	-	19	-	-	-	380			19
M	96	33	-	-	12	-	-	-	-	-	44	-	1	-	900	24	31	45
D	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing '96		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 02%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)															'96	1320	Dec:	3%
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	96	17	-	-	1	-	-	-	-	-	18	-	-	-	360			18
M	96	62	-	-	47	-	-	-	-	-	109	-	-	-	2180	17	23	109
D	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing '96		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)															'96	2560	Dec:	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>Eriogonum heracleoides</i>																		
M	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	8	11	6
% Plants Showing '96		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)													'96	120	Dec:	-		
<i>Mahonia repens</i>																		
Y	96	-	-	-	4	-	-	-	-	-	4	-	-	-	80			4
M	96	7	-	-	46	-	-	-	-	-	53	-	-	-	1060	6	7	53
% Plants Showing '96		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)													'96	1140	Dec:	-		
<i>Populus tremuloides</i>																		
S	96	13	1	-	4	-	-	-	-	-	18	-	-	-	360			18
Y	96	117	-	-	14	-	-	-	-	-	131	-	-	-	2620			131
M	96	19	-	-	-	-	-	1	7	-	26	-	-	1	540	-	-	27
D	96	1	-	-	-	-	-	-	3	-	3	-	-	1	80			4
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	300			15
% Plants Showing '96		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 01%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)													'96	3240	Dec:	2%		
<i>Ribes cereum cereum</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	60			3
M	96	6	-	-	3	-	-	-	-	-	9	-	-	-	200	55	121	10
% Plants Showing '96		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)													'96	260	Dec:	-		
<i>Rosa woodsii</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing '96		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)													'96	0	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				
Symphoricarpos oreophilus																		
S	96	40	-	-	10	-	-	3	-	-	53	-	-	-	1060		53	
Y	96	44	2	-	36	-	-	-	-	-	82	-	-	-	1640		82	
M	96	257	-	-	59	-	-	-	-	-	316	-	-	-	6320	27	45	316
D	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		.50%			00%			.25%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	8000	Dec:	1%			

Trend Study 1-21-01

Study site name: Keg Spring.

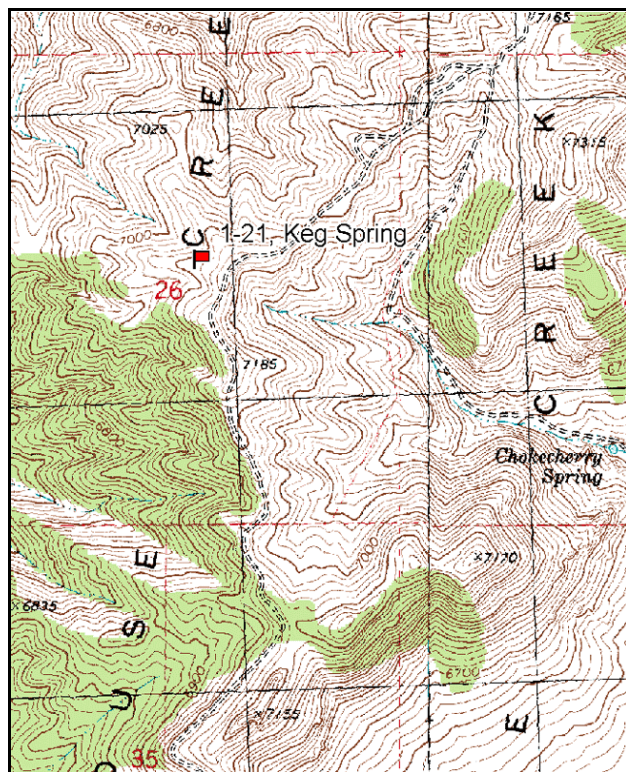
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 241 degrees magnetic.

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

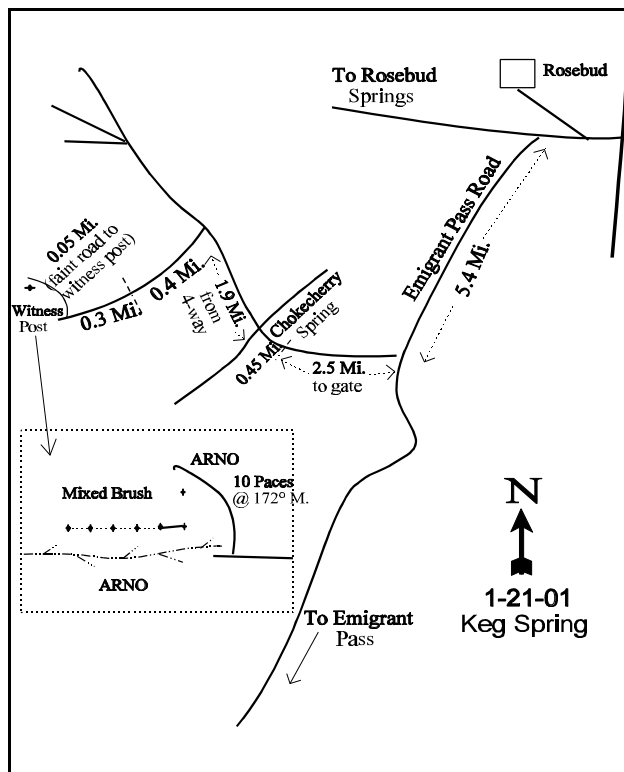
LOCATION DESCRIPTION

From the Rosebud Spring/Emigrant Pass Road intersection, travel up the Emigrant Pass Road for 5.4 miles. Turn right and travel 2.5 miles to a gate. Continue for 0.45 miles to a four way intersection (right goes to Chokecherry Springs). Continue straight through the intersection and drive 1.9 miles. Take a left and go 0.7 miles. Take a right at a faint road traveling down a ridge. Drive 0.05 to a witness post on the left hand side of the road. From the witness post, walk 10 paces at a bearing of 172 degrees magnetic. The baseline runs 241 degrees magnetic.



Map Name: Rocky Pass Peak

Township 10N, Range 17W, Section 26



Diagrammatic Sketch

UTM 4604448 N, 269872 E

DISCUSSION

Trend Study No. 1-21

The Keg Spring study samples critical summer range near the summit of the Grouse Creek Mountains. The vegetative type is mixed mountain brush. The site is on the south facing side of a long ridge which runs west. Slope is 20% to 25% and elevation is approximately 7,100 feet. There is no water nearby except from springs found further down the canyon at Keg and Willow Spring. Deer utilize this area most of the year except when snow forces them to lower elevations. A pellet-group transect read on the site in 2001 estimated a very low level of use at only 1 deer day use/acre (2 deer days use/acre) and 2 cows days use/acre (5 cow days use/ha).

The soil is relatively shallow on the top of the ridge top, but noticeably deeper down slope where the base line occurs. Effective rooting depth is estimated at >21 inches (see methods). The soil has a loam texture with a neutral soil reaction (6.8 pH). Protective cover from vegetation and litter was abundant and well dispersed in the past, leaving little bare soil exposed (<3%). A fire has burned through the site since then, probably about a year before the reading in 2001. Percent bare soil has now increased to 30%. Even with the fire, erosion does not appear to be a problem and the erosion condition class was determined to be stable in 2001.

The dominant browse species before the fire included basin big sagebrush, mountain big sagebrush, and snowberry. Basin big sagebrush, intermixed with the mountain big sagebrush, had a density of 1,560 plants/acre. Mature plants were large and vigorous measuring nearly 3 feet in height with a crown of just over 3½ feet. Utilization was mostly light yet percent decadency was moderately high at 26%. Dead plants numbered an estimated 600 plants/acre, about 28% of the population. No basin big sagebrush was left after the fire.

Mountain big sagebrush had a preburn density of approximately 2,500 plants/acre, 70% of which were classified as mature. Utilization was generally light with moderate use noticed on some plants in 1996. Percent decadency was fairly low at 23%. The number of dead plants was estimated at 280/acre, or about 10% of the population. After the burn, density is down to 320 plants/acre. All are young plants with good vigor.

Snowberry was and still is the most abundant shrub on the site with a density of 3,840 plants/acre before the fire. Now the population has decreased to 2,680 plants/acre. Initially it provided 37% of the browse cover. After the fire, it currently makes up 63% of the browse cover. With it being rhizomatous, the fire did not effected it as much as the other species. No plants appear to be utilized.

The herbaceous understory is diverse and abundant. However, the most abundant and dominant grass is cheatgrass. It accounted for 46% of the grass cover in 1996, increasing to 72% after the fire. Initially the common perennial species included: bluebunch wheatgrass, great basin wildrye, and Sandberg bluegrass. They continue to be the most common perennial grass species, however, since the fire they all have significantly decreased sum of nested frequency values. The forb component contains several useful species including: arrowleaf balsamroot, Indian paintbrush, northern sweetvetch, silvery lupine, and bluebell. Since the fire annuals have increased in their abundance from 53% of the herbaceous cover in 1996, to 88% in 2001.

1996 APPARENT TREND ASSESSMENT

Abundant protective vegetation and litter cover provide excellent soil protection on this site. Percent bare ground is estimated at less than 3% with no serious erosion occurring. The key browse species is mountain big sagebrush followed by basin big sagebrush. Sagebrush shows only light to moderate utilization. It is in good vigor and has adequate seedlings and young to maintain their populations. Trend appears stable. The herbaceous understory is diverse and abundant. The grass component, however, is dominated by annual cheatgrass which contributes 46% of the grass cover.

2001 TREND ASSESSMENT

A fire burned the area since the last reading in 1996. As a result, there is much less protective ground cover and percent bare soil has increased from less than 3% to more than 30%. Trend for soil at this time is down but erosion is not a serious problem at this time. The key browse species is mountain big sagebrush followed by basin big sagebrush. All of the basin big sagebrush has been lost to fire, while mountain big sagebrush has been reduced from 2,500 plant/acre to 320 plants/acre. These are all young plants. Snowberry is almost as abundant as it was before the fire, but it is not a preferred species. Trend for browse is down and it will take many years to recover from the fire. The herbaceous understory continues to be diverse and relatively abundant. The grass component remains dominated by annual cheatgrass which provides 72% of the grass cover. Annual forbs have also increased their dominance they now contribute 49% of the forb cover. Annual grasses and forbs have increased in abundance since the fire. Perennial grass sum of nested frequency values have significantly decreased since 1996. Trend for herbaceous understory is down.

TREND ASSESSMENT

soil - down since the fire (1)

browse - down due to fire (1)

herbaceous understory - down and dominated by annuals (1)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 21

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron dasystachyum	10	13	3	5	.06	.16
G	Agropyron spicatum	119	*20	41	6	3.86	.55
G	Agropyron trachycaulum	4	1	2	1	.03	.03
G	Bromus tectorum (a)	225	264	51	76	9.33	13.53
G	Elymus cinereus	80	*34	27	9	4.72	3.18
G	Koeleria cristata	10	3	3	1	.04	.15
G	Melica bulbosa	2	-	1	-	.03	-
G	Poa secunda	67	*50	23	16	1.14	.73
G	Sitanion hystrix	1	-	1	-	.03	-
G	Stipa columbiana	13	16	9	5	.82	.34
Total for Annual Grasses		225	264	51	76	9.33	13.53
Total for Perennial Grasses		306	137	110	43	10.77	5.17
Total for Grasses		531	401	161	119	20.11	18.70
F	Agoseris glauca	48	76	22	35	.13	1.10
F	Agastache urticifolia	13	*-	4	-	.59	.03
F	Allium spp.	15	*58	8	26	.04	.48
F	Arabis spp.	-	2	-	1	-	.06
F	Astragalus beckwithii	42	15	14	8	.49	.41
F	Aster spp.	1	-	1	-	.00	-

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Balsamorhiza sagittata	18	8	7	3	1.11	.97
F	Borago officinalis	55	*-	22	-	.86	-
F	Casella bursa-pastoris	-	6	-	3	-	.33
F	Castilleja linariaefolia	2	17	1	4	.00	.12
F	Chenopodium fremontii (a)	-	*41	-	15	-	.41
F	Collomia linearis (a)	88	77	33	31	.51	1.27
F	Comandra pallida	-	11	-	4	-	.19
F	Collinsia parviflora (a)	284	*218	76	61	2.66	6.38
F	Cordylanthus ramosus (a)	-	1	-	1	-	.01
F	Crepis acuminata	77	69	30	30	1.77	5.50
F	Cryptantha spp.	12	*-	4	-	.04	-
F	Delphinium nuttallianum	11	*62	6	28	.05	.53
F	Descurainia pinnata (a)	16	*173	4	49	.02	6.41
F	Galium aparine (a)	40	*20	12	5	.16	.75
F	Gayophytum ramosissimum (a)	-	*16	-	6	-	.20
F	Gilia spp. (a)	-	1	-	1	-	.03
F	Hackelia patens	35	*4	17	3	.43	.42
F	Hedysarum boreale	10	*-	5	-	.31	-
F	Lappula occidentalis (a)	7	*36	3	13	.01	.53
F	Lactuca serriola	-	2	-	1	-	.00
F	Lithospermum ruderales	27	*8	12	4	1.00	1.02
F	Lomatium spp.	-	1	-	1	-	.01
F	Lomatium triternatum	7	34	4	15	.02	.40
F	Lupinus argenteus	54	74	30	36	2.08	4.96
F	Mertensia oblongifolia	2	-	2	-	.03	-
F	Microsteris gracilis (a)	7	*41	4	15	.02	.44
F	Navarretia intertexta (a)	36	*-	14	-	.14	-
F	Phlox hoodii	-	6	-	2	-	.01
F	Phlox longifolia	55	71	21	27	.20	1.64
F	Polygonum douglasii (a)	62	*4	22	1	.16	.03
F	Ranunculus testiculatus (a)	-	4	-	2	-	.01
F	Sisymbrium altissimum (a)	-	6	-	3	-	.21
F	Unknown forb-perennial	-	2	-	1	-	.03
F	Veronica biloba (a)	21	*74	6	19	.08	1.74
F	Viola adunca	38	53	18	24	.09	.69

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
	Total for Annual Forbs	561	712	174	222	3.77	18.45
	Total for Perennial Forbs	522	579	228	256	9.30	18.93
	Total for Forbs	1083	1291	402	478	13.08	37.39

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

BROWSE TRENDS --

Herd unit 01 , Study no: 21

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier utahensis	2	1	.18	-
B	Artemisia tridentata tridentata	32	0	3.15	-
B	Artemisia tridentata vaseyana	46	14	7.64	.21
B	Chrysothamnus nauseosus consimilis	28	0	1.54	-
B	Chrysothamnus viscidiflorus viscidiflorus	55	34	5.84	2.61
B	Eriogonum microthecum	1	1	.15	-
B	Juniperus osteosperma	1	0	-	-
B	Symphoricarpos oreophilus	63	44	10.71	4.73
	Total for Browse	228	94	29.23	7.56

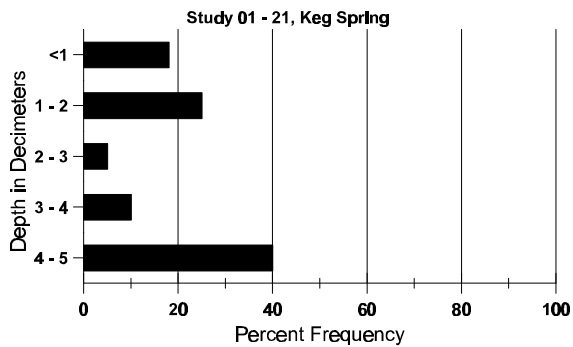
BASIC COVER --
Herd unit 01 , Study no: 21

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	475	454	59.40	55.68
Rock	120	131	1.69	1.76
Pavement	129	373	3.55	11.83
Litter	496	264	68.39	5.63
Cryptogams	13	1	.05	.03
Bare Ground	129	405	2.63	30.22

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 21, Keg Spring

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
21.8	49.5 (19.4)	6.8	29.9	43.4	26.6	4.9	29.5	486.4	.8

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 21

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	2	-	-	-
Deer	15	1	9	1 (2)
Cattle	-	3	26	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 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				
<i>Amelanchier utahensis</i>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	20		1		
M	96	1	1	-	-	-	-	-	-	-	2	-	-	40	33	42	2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		50%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			
												'01	20		-			
<i>Artemisia tridentata tridentata</i>																		
Y	96	15	-	-	3	-	-	-	-	-	18	-	-	360		18		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	96	31	5	-	4	-	-	-	-	-	40	-	-	800	35	43	40	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
D	96	12	8	-	-	-	-	-	-	-	19	-	-	400		20		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
X	96	-	-	-	-	-	-	-	-	-	-	-	-	600		30		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		17%			00%			01%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1560	Dec:	26%			
												'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				
<i>Artemisia tridentata vaseyana</i>																		
S	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	96	8	1	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320		16	
M	96	69	17	-	1	-	-	-	-	-	87	-	-	-	1740	23	28	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
D	96	23	5	-	1	-	-	-	-	-	20	-	1	8	580		29	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		18%			00%			07%			-87%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	2500	Dec:	23%				
											'01	320		0%				
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	42	-	-	6	-	-	-	-	-	48	-	-	-	960	29	34	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
D	96	4	-	-	-	-	-	-	-	-	3	1	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1080	Dec:	7%				
											'01	0		0%				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	96	5	-	-	2	-	-	-	-	-	7	-	-	-	140		7	
	01	26	-	-	-	-	-	-	-	-	26	-	-	-	520		26	
M	96	114	-	-	15	-	-	-	-	-	128	-	1	-	2580	15	20	
	01	41	-	-	-	-	-	-	-	-	41	-	-	-	820	9	13	
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%			01%			-51%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	2740	Dec:	1%				
											'01	1340		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				
Eriogonum microthecum																		
M	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	8	12	3
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	9	1
% 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	60	Dec:	-			
												'01	20		-			
Juniperus osteosperma																		
Y	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	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	57	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																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	35	-	-	26	-	-	-	-	-	46	-	8	7	1220			61
	01	48	-	-	-	-	-	-	-	-	48	-	-	-	960			48
M	96	90	-	-	13	-	-	-	-	-	59	7	37	-	2060	23	42	103
	01	86	-	-	-	-	-	-	-	-	86	-	-	-	1720	14	44	86
D	96	27	-	-	1	-	-	-	-	-	1	-	6	21	560			28
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
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%			41%			-30%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	3840	Dec:	15%			
												'01	2680		0%			

Trend Study 1-22-01

Study site name: Dake Pass.

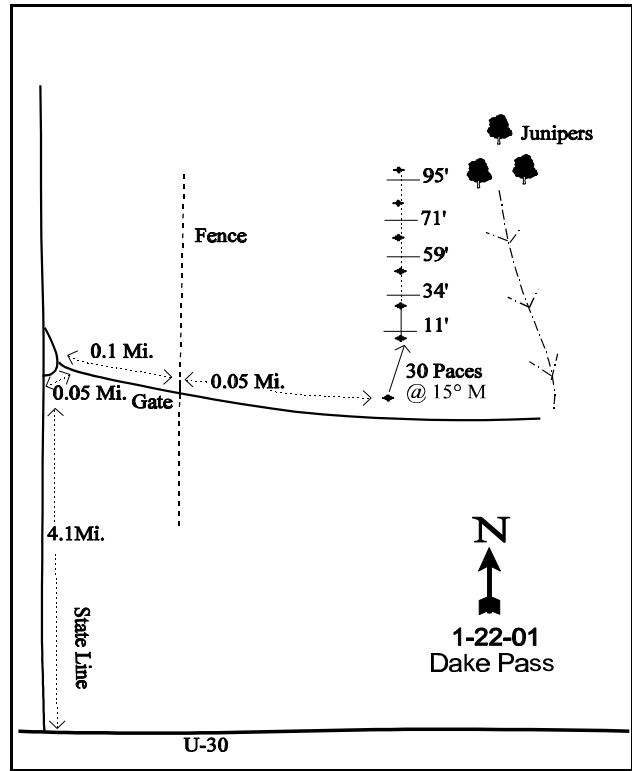
Vegetation type: Black Sagebrush.

Compass bearing: frequency baseline 0 degrees magnetic.

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

LOCATION DESCRIPTION

From U-30 at the Utah/Nevada state line, near mile marker 0, turn right and travel 4.1 miles to an intersection. Take a right at the intersection and travel 0.15 to a gate. From the gate drive 0.05 miles to a witness post on the left hand side of the road. From the witness post walk 30 paces at 15 degrees magnetic to the 0-foot baseline stake. The baseline runs 0 degrees magnetic.



Map Name: Jackson Spring

Diagrammatic Sketch

Township 8N, Range 19W, Section 9

UTM 4590307 N, 246104 E

DISCUSSION

Trend Study No. 1-22

The Dake Pass site samples a salt desert shrub community just west of the Nevada State line. The site is characterized by gentle low ridges dominated by black sagebrush and shallow drainage depressions with deeper soils and a relatively good association of grasses. Site aspect is to the south with a gentle 3% to 5% slope and an elevation of about 5,300 feet. This area is utilized by deer and elk as winter range. It is also reportedly an important sage grouse strutting area. A large number of sage grouse droppings were noted on the next ridge to the east in 2001. Deer and elk pellets were encountered when the transect was setup, but more appeared to be outside of the sampled area. Some coyote droppings were found along with sign of past livestock activity. This area is within the U & I allotment. It is grazed by 914 cattle from November 1 to March 31. A pellet-group transect read on site in 2001 estimated 19 elk days use/acre (46 elk days use/ha).

The soil is moderately shallow with an effective rooting depth of only 10 inches, light colored, with considerable surface rock and pavement cover. Soil texture is a clay loam with a moderately alkaline soil reaction (8.2 pH). Phosphorus could be a limiting factor at 9.3 ppm where values less than 10 ppm can limit normal plant growth and development. There are large open areas between individual shrubs, but little bare soil is exposed due to the abundance of pavement-rock cover (33%). The soil profile is rocky throughout, yet no hardpan was noted. Aside from the gradual movement of soil from the low ridges, there is no accelerated erosion occurring and the erosion condition class was determined as stable in 2001.

Black sagebrush dominates the site, but there are several associated and useful species that include: bud sagebrush, shadscale, winterfat, Nevada ephedra, and spiny hopsage. All provide additional forage for wintering big game. Black sagebrush provides more than half of the shrub cover with an estimated density of 7,580 plants/acre in 1996, and 8,360 plants/acre in 2001. Utilization was mostly moderate with 21% of the population displaying heavy use in 1996. Use was mostly light in 2001. Percent decadency has been moderate at 32% in 1996 and 27% in 2001. Currently, vigor is good on all but 45% of the decadent shrubs which were classified as dying. Recruitment is good with high numbers of young plants sampled in 2001. Annual leader growth was poor in 2001 averaging just over ½ of an inch (.63"). Annual leader growth for this site was 24% of the average for the unit which would suggest poor site potential of this site compared to the other black sagebrush sites within this unit.

Other preferred browse occur at much lower densities. The next most abundant shrub is Bud sagebrush which had an estimated density of 780 plants/acre in 2001. These plants measure, on average, only 6 inches in height with a 8 inch crown. This may be due to continued heavy use and competition with the dense population of black sagebrush. Currently, 18% of the population displays heavy use. Shadscale is relatively abundant with an estimated density of 3,480 plants/acre. The population appears to be stable with a proportion of only 1% seedlings and 23% young being inventoried. Utilization is light. Winterfat, Ephedra, and hopsage occur infrequently. Other, less desirable shrubs include narrowleaf low rabbitbrush, and two species of spiny horsebrush.

The herbaceous understory is not particularly abundant, yet is well developed for a salt desert shrub community. Grasses and forbs combined in 1996 to produce nearly 10% cover. In 2001, they combine again for nearly 10% cover, however forb cover decreased while grass cover compensated for these losses. Grasses initially made up 62% of the herbaceous cover, now they contribute to 91% of the herbaceous cover. Common grasses consist of Sandberg bluegrass, bottlebrush squirreltail, and Indian ricegrass. Forbs are diverse, however most have low forage value. Hoods phlox dominates the forb component by providing about 67% of the forb cover.

1996 APPARENT TREND ASSESSMENT

Some inevitable soil movement is occurring on the low ridges, but little bare soil is exposed due to the abundant pavement and rock cover (33%). No active gullies are present and accelerated erosion is not occurring. The key browse is black sagebrush. It appears to have a stable population with a moderate percent decadency of 33%, yet the majority of the plants have good vigor with more than adequate numbers of seedlings and young. The other preferred browse species also appear to have stable populations. The herbaceous understory is fairly well developed for a salt desert shrub community. Forbs are, however, dominated by low value species.

2001 TREND ASSESSMENT

Some inevitable soil movement continues to occur on the low ridges, but bare soil has increased due mostly to the losses in litter cover. Abundant pavement-rock cover remains almost unchanged (33%). No active gullies are present and accelerated erosion is not occurring. However, the ratio of bare soil to protective cover has decreased significantly. With these changes, trend for soil is slightly down at this time. The key browse is black sagebrush. It appears to have a stable population even with the 9% increase in its population. This is offset by moderately high decadence (27%) and with the increase in decadent classified as dying going from 520 plants/acre to 1,060 plants/acre. There are adequate numbers of young within the population to replace these individuals. The other preferred browse species, which are a minor component of the browse population, also appear to fairly stable populations. The herbaceous understory is relatively well developed for a salt desert shrub community. Forbs are, however, dominated by low value species. The herbaceous understory is considered stable.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 22

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Bromus tectorum (a)	27	*51	8	16	.04	.20
G	Oryzopsis hymenoides	49	63	18	25	.64	2.33
G	Poa secunda	136	118	49	45	2.87	2.54
G	Sitanion hystrix	129	126	55	46	2.46	3.64
Total for Annual Grasses		27	51	8	16	0.04	0.20
Total for Perennial Grasses		314	307	122	116	5.98	8.52
Total for Grasses		341	358	130	132	6.02	8.72
F	Agoseris glauca	3	-	1	-	.00	-
F	Arabis spp.	10	*-	5	-	.02	-
F	Astragalus utahensis	12	*-	6	-	.03	-
F	Collinsia parviflora (a)	14	-	4	-	.02	-

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Cruciferae	4	-	2	-	.38	-
F	Cryptantha spp.	33	*-	12	-	.42	-
F	Cymopterus spp.	-	1	-	1	-	.00
F	Descurainia pinnata (a)	2	*15	1	8	.00	.04
F	Eriogonum ovalifolium	1	-	1	-	.00	-
F	Erigeron pumilus	2	-	1	-	.00	-
F	Gilia spp. (a)	5	3	3	1	.01	.00
F	Halogeton glomeratus (a)	1	-	1	-	.00	-
F	Lappula occidentalis (a)	15	4	5	3	.05	.01
F	Melilotus alba	6	-	2	-	.03	-
F	Navarretia intertexta (a)	7	-	3	-	.01	-
F	Phlox hoodii	107	*50	36	20	2.47	.55
F	Phlox longifolia	27	*51	15	24	.15	.22
F	Sphaeralcea grossulariaefolia	1	1	1	1	.03	.00
F	Townsendia spp.	3	-	3	-	.01	-
Total for Annual Forbs		44	22	17	12	0.10	0.05
Total for Perennial Forbs		209	103	85	46	3.59	0.78
Total for Forbs		253	125	102	58	3.70	0.84

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

BROWSE TRENDS --
Herd unit 01 , Study no: 22

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	87	92	14.13	13.55
B	Artemisia spinescens	19	15	.55	.19
B	Atriplex confertifolia	56	53	4.50	2.28
B	Ceratoides lanata	3	13	.03	.27
B	Chrysothamnus viscidiflorus stenophyllus	35	39	1.76	1.27
B	Ephedra nevadensis	9	8	.21	.64
B	Grayia spinosa	10	9	2.70	2.33
B	Kochia americana	17	0	.75	-
B	Pediocactus simpsonii	3	2	.00	.00
B	Tetradymia nuttallii	4	2	.30	.06
B	Tetradymia spinosa	1	0	-	-
Total for Browse		244	233	24.95	20.63

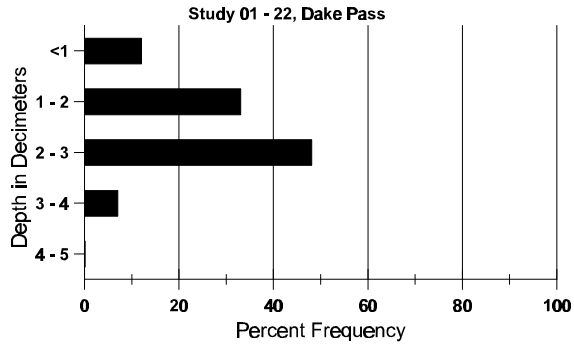
BASIC COVER --
Herd unit 01 , Study no: 22

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	385	338	33.97	32.38
Rock	278	198	5.53	2.96
Pavement	427	437	27.12	30.03
Litter	479	401	33.09	17.84
Cryptogams	223	255	2.29	3.89
Bare Ground	248	341	4.20	17.40

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 22, Dake Pass

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.2	60.8 (10.6)	8.2	42.7	28.0	29.3	1.8	9.3	380.8	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 22

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Elk	1	9	244	19 (46)
Deer	1	-	-	-

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 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		11	23	
Artemisia nova																		
S	96	276	-	-	7	-	-	-	-	-	283	-	-	-	5660		283	
	01	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
Y	96	27	13	-	-	-	-	-	-	40	-	-	-	800		40		
	01	63	-	-	-	-	-	1	-	64	-	-	-	1280		64		
M	96	46	139	28	2	-	-	-	-	215	-	-	-	4300	11	23	215	
	01	223	-	-	10	7	-	-	-	234	6	-	-	4800	9	18	240	
D	96	15	55	51	2	1	-	-	-	98	-	-	26	2480		124		
	01	86	-	4	17	3	-	4	-	63	-	-	51	2280		114		
X	96	-	-	-	-	-	-	-	-	-	-	-	-	1720		86		
	01	-	-	-	-	-	-	-	-	-	-	-	-	1620		81		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		55%			21%			07%			+ 9%							
'01		02%			.95%			12%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	7580	Dec:	33%			
												'01	8360		27%			

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 spinescens</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	96	12	-	1	-	-	-	-	-	-	13	-	-	-	260		13	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	96	17	6	4	-	-	-	-	-	-	26	-	1	-	540	5	13	
	01	17	2	-	3	2	-	-	-	-	24	-	-	-	480	6	8	
D	96	5	-	6	1	-	2	-	-	-	3	-	1	10	280		14	
	01	3	1	2	1	-	5	-	-	-	5	-	-	7	240		12	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		11%			24%			22%			-28%							
'01		13%			18%			18%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1080	Dec:	26%				
											'01	780		31%				
<i>Atriplex confertifolia</i>																		
S	96	82	-	-	1	-	-	-	-	-	83	-	-	-	1660		83	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	61	-	5	4	-	-	-	-	-	70	-	-	-	1400		70	
	01	25	-	-	14	-	-	1	-	-	40	-	-	-	800		40	
M	96	113	11	7	11	-	-	-	-	-	140	-	-	2	2840	9	15	
	01	33	-	-	70	-	-	2	-	-	105	-	-	-	2100	7	12	
D	96	17	5	6	-	-	-	-	-	-	23	1	-	4	560		28	
	01	16	-	-	13	-	-	-	-	-	21	-	-	8	580		29	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	320		16	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		07%			08%			03%			-28%							
'01		00%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	4800	Dec:	12%				
											'01	3480		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>Ceratoides lanata</i>																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	01	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	96	-	-	1	1	-	-	-	-	-	1	1	-	-	40	7	12	
	01	24	-	-	-	1	-	-	-	-	25	-	-	-	500	5	8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			67%			00%			+91%							
'01		03%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
												'01	680		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	96	12	-	-	8	-	-	-	-	-	20	-	-	-	400		20	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	7	-	-	1	-	-	-	-	-	8	-	-	-	160		8	
M	96	49	-	-	1	-	-	-	-	-	49	-	1	-	1000	10	16	
	01	36	-	-	8	-	-	1	-	-	45	-	-	-	900	9	16	
D	96	2	2	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	7	-	-	2	-	-	-	-	-	4	-	-	5	180		9	
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		07%			00%			02%			+10%							
'01		00%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1120	Dec:	7%			
												'01	1240		15%			
<i>Ephedra nevadensis</i>																		
Y	96	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	2	3	5	-	1	-	-	-	-	11	-	-	-	220	18	29	
	01	-	2	2	-	2	-	-	-	-	6	-	-	-	120	15	25	
D	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>							
'96		29%			36%			00%			-43%							
'01		50%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	280	Dec:	0%			
												'01	160		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>Grayia spinosa</i>																		
M	96	8	2	-	-	-	-	-	-	-	7	-	3	-	200	23	34	10
	01	4	-	-	9	-	-	1	-	-	14	-	-	-	280	16	25	14
D	96	2	-	1	-	-	-	-	-	2	-	-	1	60			3	
	01	-	-	-	2	-	-	3	-	5	-	-	-	100			5	
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		15%			08%			31%			+32%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	260	Dec:	23%			
												'01	380		26%			
<i>Kochia americana</i>																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	96	55	9	-	-	-	-	-	-	-	64	-	-	-	1280	6	11	64
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
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		13%			00%			01%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1360	Dec:	1%			
												'01	0		0%			
<i>Opuntia spp.</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	0	4	13	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	5	10	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				
Pediocactus simpsonii																		
M	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	0	2	3
	01	-	-	-	-	-	-	2	-	-	2	-	-	-	40	1	2	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
												'01	40		-			
Tetradymia nuttallii																		
M	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	15	19	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	12	0
D	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
	01	1	-	-	1	-	-	-	-	-	-	-	-	2	40			2
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			25%			-50%							
'01		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:	50%			
												'01	40		100%			
Tetradymia spinosa																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	11	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	60	Dec:	-			
												'01	0		-			

Trend Study 1-23-01

Study site name: Patterson Pass.

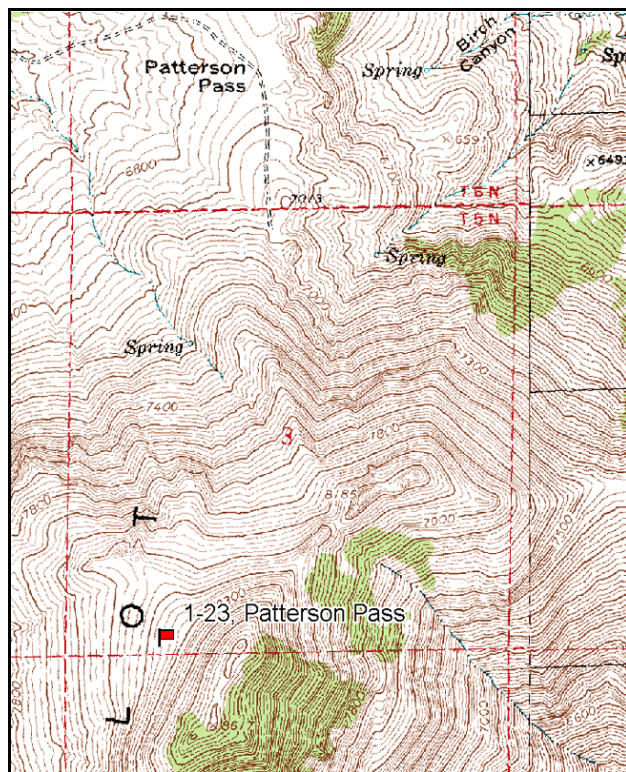
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 225 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar: belt 1 on 1 ft., belt 2 on 15 ft., belt 3 on 0 ft., belt 4 on 1 ft., belt 5 on 0 ft.

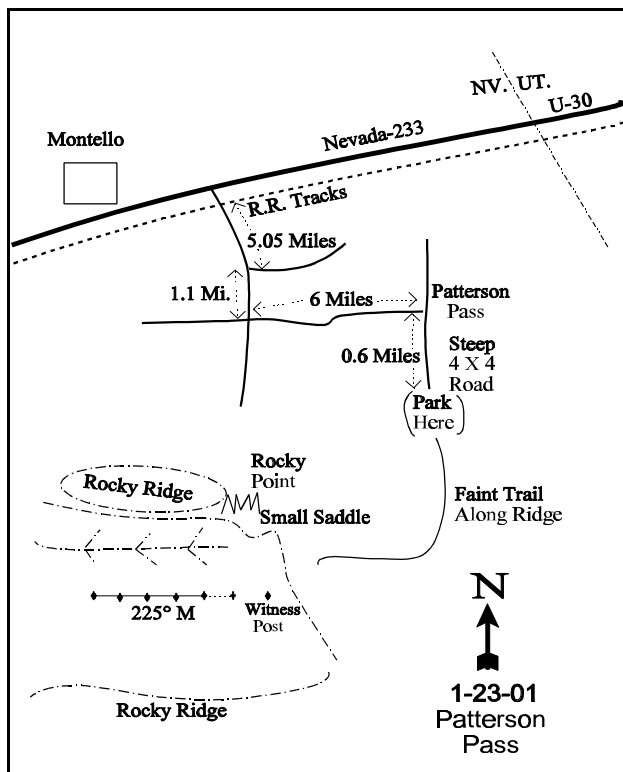
LOCATION DESCRIPTION

Drive 0.5 miles past mile marker 25 on Nevada State Road 233. Turn left and cross tracks and continue straight for 5.05 miles. At this point there will be a road going to the left. Stay right and continue 1.1 miles to a four way intersection. Take a left turn and drive 6 miles to Patterson Pass. Take a right turn and drive 0.6 miles up a steep four wheel drive road. Park here. Walk on a faint trail up the ridge to a saddle. Stay high on the slope. The witness post is in the saddle about 400 ft. from the rocky slope to the east. The 0-foot baseline stake is just a few paces west of the witness post. The baseline runs 225 degrees magnetic.



Map Name: Patterson Pass

Township 5N, Range 19W, Section 3



Diagrammatic Sketch

UTM 4562113 N, 246992 E

DISCUSSION

Trend Study No. 1-23

The Patterson Pass study was established in 1996 to monitor an increasing elk population on the Pilot Mountains along the Utah/Nevada border. The area is remote and accessible only by foot. The site has a southwest aspect with a moderate slope of 20% to 25% and an elevation of about 8,160 feet. This area receives concentrated use by elk as indicated by the high pellet group quadrat frequency. Some of the elk pellet groups appear recent, indicating that elk use this area during most of the year then move to lower elevations when the snow gets too deep. Small numbers of deer pellet groups were also encountered. Chuckers were heard on the nearby rocky slopes during study establishment in 1996. The area is within the Lucin/Pilot allotment which is grazed by cattle and sheep. Livestock do not appear to utilize the steeper slopes where the transect is located. A pellet-group transect read on site in 2001 estimated 47 elk days use/acre (116 elk days use/ha). Only 1 deer pellet group was encountered. Two cow elk were seen in the area when the site was read on June 6th of 2001. Most of the elk pellet groups appeared to be 2 to 3 months old. Some fresh pellet groups were also seen along with apparent bedding areas on site.

The soil is moderately shallow with an estimated effective rooting depth of almost 10 inches (see methods). The soil is a clay loam with a neutral soil reaction (6.7 pH). It is extremely rocky with numerous large rocks and boulders on the surface and throughout the profile. Rooting depth is limited in some areas where black sagebrush occurs in isolated pockets, but the deeper rooted mountain big sagebrush, which dominates the site, would indicate a deeper soil. Protective ground cover, in the form of vegetation and litter cover, is abundant and well dispersed. Accelerated erosion is not a problem on the site and the erosion condition class was determined to be in the stable range in 2001.

The site is dominated by a stand of moderately large, vigorous mountain big sagebrush. They accounted for 59% of the browse cover with an estimated population of 5,060 plants/acre in 1996. They now ('01) account for 69% of the browse cover and have a population of 6,000 plants/acre. The percentage of the population classified as mature plants has gone from 79% up to 93%. Utilization was light to moderate in 1996, and mostly light in 2001. Percent decadency has remained relatively low at 15%. There are more than adequate numbers of seedlings and young to maintain the population. On a more flat area, some of the sagebrush exhibit signs of winter injury. Annual leader growth averaged 1.3 inches in 2001, which was 28% below the average for this unit.

Additional forage is provided by black sagebrush, slenderbush eriogonum, and a few scattered wax current. Black sagebrush occurs in isolated patches where soil depth is obviously limited. The population is in good vigor with mostly light utilization and low percent decadency.

The increaser, mountain low rabbitbrush, is fairly abundant with an estimated density of 3,280 plants/acre in 2001, a 20% decrease from 1996. The majority of the population consist of mature plants. Most plants appear to not be utilized.

The herbaceous understory is abundant and on average makes up 53% of the total vegetative cover. Through the last two sampling periods, there have been 11 grasses and 25 forbs, and on average they produce 35% cover. Grasses are dominated by sheep fescue which accounted for 70% of the grass cover in 1996 and 62% of the grass cover in 2001. Other common grasses include spike fescue and Sandberg bluegrass. Several useful forb species are present including: silvery lupine, bluebell, lambstongue, and hooker balsamroot. Utilization was noted in 1996 on lambstongue and bluebell.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is more than adequate to prevent erosion from occurring. Vegetation and litter cover are abundant and well dispersed leaving little bare soil (3%). The key browse species, mountain big sagebrush appears to have a stable, vigorous population. Black sagebrush also appears stable. Mountain low rabbitbrush is also abundant but the population is mostly mature, indicating that it is not increasing. The herbaceous understory is abundant and provides good forage for elk and deer. Grasses and forbs will likely not increase significantly unless the shrub canopy cover (30%) is reduced.

2001 TREND ASSESSMENT

Protective ground cover is again more than adequate to prevent erosion from occurring. Percent bare soil has actually gone down slightly. The trend for soil would be stable. The key browse species, mountain big sagebrush continues to be a stable and vigorous population. Black sagebrush also appears stable. Mountain low rabbitbrush has actually decreased in abundance, with a population that continues to be mostly mature, indicating that it is not increasing. The herbaceous understory is abundant and provides good forage for elk and deer. The sum of nested frequency for perennial grasses has decreased somewhat, however, the value for perennial forbs increased offsetting this change. Therefore, the herbaceous understory would be considered stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 23

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron spicatum	43	24	15	10	.32	.78
G	Elymus cinereus	5	5	1	1	.63	.85
G	Festuca ovina	292	287	89	87	12.97	15.92
G	Koeleria cristata	-	2	-	2	-	.30
G	Leucopoa kingii	110	84	32	28	2.50	4.80
G	Poa fendleriana	47	63	22	23	.77	1.99
G	Poa pratensis	1	-	1	-	.03	-
G	Poa secunda	95	*35	37	14	1.07	.29
G	Sitanion hystrix	3	-	1	-	.00	-
G	Stipa columbiana	-	5	-	1	-	.03
G	Stipa lettermani	11	*28	6	12	.08	.63
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		607	533	204	178	18.40	25.61
Total for Grasses		607	533	204	178	18.40	25.61

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Agoseris glauca</i>	83	*106	31	43	.60	.93
F	<i>Arabis</i> spp.	-	7	-	3	-	.01
F	<i>Astragalus beckwithii</i>	-	2	-	2	-	.01
F	<i>Astragalus utahensis</i>	1	-	1	-	.00	-
F	<i>Balsamorhiza hookeri</i>	5	5	3	3	.01	.06
F	<i>Castilleja</i> spp.	-	-	-	-	-	.00
F	<i>Comandra pallida</i>	7	13	4	6	.07	.18
F	<i>Collinsia parviflora</i> (a)	198	*106	62	37	.86	.75
F	<i>Crepis acuminata</i>	7	*4	4	2	.02	.06
F	<i>Haplopappus acaulis</i>	2	2	1	1	.15	.03
F	<i>Hackelia patens</i>	33	11	11	4	.44	.39
F	<i>Lomatium</i> spp.	-	4	-	2	-	.03
F	<i>Lupinus argenteus</i>	150	153	66	57	4.57	5.04
F	<i>Lygodesmia spinosa</i>	2	-	1	-	.03	-
F	<i>Mertensia oblongifolia</i>	71	70	32	34	.77	.72
F	<i>Microsteris gracilis</i> (a)	-	1	-	1	-	.00
F	<i>Penstemon</i> spp.	3	-	1	-	.00	-
F	<i>Phlox longifolia</i>	188	155	68	60	.81	1.10
F	<i>Polygonum douglasii</i> (a)	6	2	3	1	.04	.00
F	<i>Potentilla pennsylvanica</i>	50	57	27	30	.61	.90
F	<i>Ranunculus</i> spp.	-	*134	-	53	-	1.41
F	<i>Senecio integerrimus</i>	77	60	34	23	1.22	2.09
F	<i>Senecio multilobatus</i>	-	0	-	10	-	.76
F	<i>Sisymbrium altissimum</i> (a)	4	-	2	-	.03	-
F	<i>Taraxacum officinale</i>	31	34	13	16	.35	.28
Total for Annual Forbs		208	109	67	39	0.93	0.76
Total for Perennial Forbs		710	834	297	349	9.69	14.07
Total for Forbs		918	943	364	388	10.63	14.84

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

BROWSE TRENDS --
Herd unit 01 , Study no: 23

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	34	27	6.58	3.99
B	Artemisia tridentata vaseyana	85	87	17.79	21.00
B	Chrysothamnus viscidiflorus lanceolatus	74	64	4.60	4.03
B	Eriogonum microthecum	38	29	1.36	.90
B	Pediocactus simpsonii	3	1	-	-
B	Ribes cereum cereum	0	0	-	.38
Total for Browse		234	208	30.35	30.31

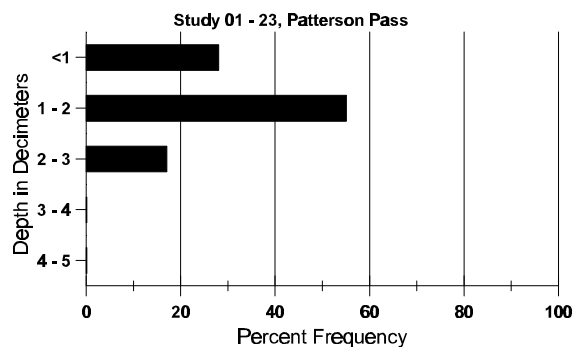
BASIC COVER --
Herd unit 01 , Study no: 23

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	443	439	55.85	64.50
Rock	236	185	12.85	9.43
Pavement	94	47	.60	.32
Litter	486	461	61.70	52.75
Cryptogams	3	6	.00	.04
Bare Ground	155	86	3.30	2.31

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 23, Patterson Pass

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.8	53.0 (8.8)	6.7	40.6	33.4	26.0	5.4	36.2	444.8	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 23

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Grouse	-	1	-	-
Elk	58	25	609	47 (116)
Deer	4	1	9	1 (2)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 23

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total		
		1	2	3	4					
Artemisia nova										
S	96 01	9 -	- -	- -	- -	- -	- -	9 0	9 0	
Y	96 01	9 3	4 -	- -	- -	- -	- -	13 3	13 3	
M	96 01	49 88	33 -	1 -	- -	- -	- -	83 88	11 25 11 20	83 88
D	96 01	5 3	4 -	- 1	- -	- -	- -	9 3	- 1	9 4
X	96 01	- -	- -	- -	- -	- -	- -	- -	120 20	6 1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'96		39%		.95%		00%		-10%		
'01		00%		00%		01%				
Total Plants/Acre (excluding Dead & Seedlings)						'96	2100	Dec:	9%	
						'01	1900		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				
<i>Artemisia tridentata vaseyana</i>																		
S	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	96	40	3	-	-	-	-	-	-	-	43	-	-	-	860		43	
	01	28	1	-	-	-	-	-	-	-	29	-	-	-	580		29	
M	96	95	48	26	-	2	-	-	-	-	170	-	1	-	3420	19	33	
	01	207	20	-	-	-	-	-	-	-	210	-	5	12	4540	19	32	
D	96	21	16	2	-	-	-	-	-	-	30	-	1	8	780		39	
	01	41	2	-	1	-	-	-	-	-	35	-	-	9	880		44	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	400		20	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	420		21	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		27%			11%			04%			+16%							
'01		08%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	5060	Dec:	15%				
											'01	6000		15%				
<i>Chrysothamnus viscidiflorus lanceolatus</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	96	21	-	-	2	-	-	-	-	-	22	-	1	-	460		23	
	01	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
M	96	141	-	-	19	-	-	-	-	-	157	-	3	-	3200	11	16	
	01	118	-	-	6	-	-	-	-	-	125	-	-	-	2500	9	16	
D	96	12	8	-	2	-	-	-	-	-	11	-	5	6	440		22	
	01	21	1	-	2	-	-	-	-	-	15	-	-	9	480		24	
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		04%			00%			07%			-20%							
'01		.60%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	4100	Dec:	11%				
											'01	3280		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				
Eriogonum microthecum																		
Y	96	9	-	-	1	-	-	-	-	-	10	-	-	-	200		10	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	40	8	-	7	-	-	1	-	-	56	-	-	-	1120	6	12	56
	01	49	-	-	4	-	-	3	-	-	54	2	-	-	1120	6	13	56
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		12%			00%			00%			-15%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1320	Dec:	-			
												'01	1120		-			
Pediocactus simpsonii																		
M	96	1	2	-	1	-	-	-	-	-	4	-	-	-	80	7	6	4
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	3	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		50%			00%			00%			-75%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:	-			
												'01	20		-			
Ribes cereum cereum																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	94	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	103	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		-			

Trend Study 1-24-01

Study site name: Sheep Range Spring.

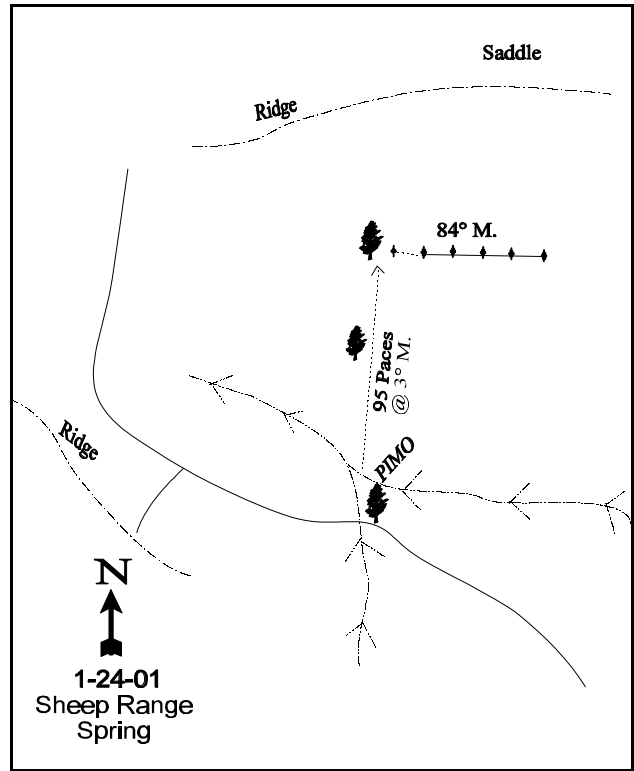
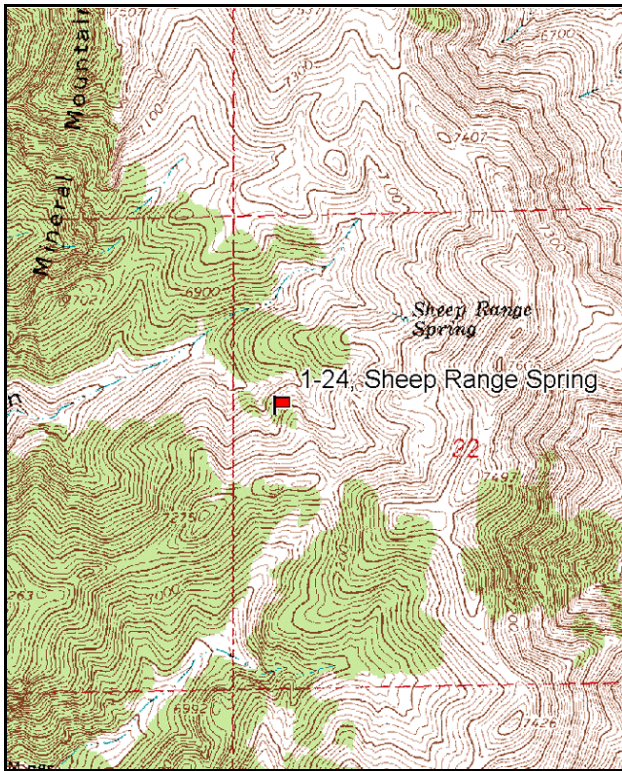
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 84 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar: belt 4 on 21 ft.

LOCATION DESCRIPTION

From Grouse Creek Junction, travel south for 5.4 miles to the railroad tracks. Continue straight for 0.6 miles to the TL Bar Beefmaster Ranch. Take the left fork and travel 5 miles to a fork in the road. Take a right turn and travel 2.1 miles to a four way intersection. Continue straight (stay right) for 2.7 miles to Governors Spring. Take a left at Governors Spring and drive 1.0 mile. Take a right and travel down hill for 1.0 mile. Take the left fork and continue for 1.6 miles to an intersection. From the intersection take the left and continue 1.1 miles where there will be a road going up a steep hill to the right. Stay left and travel 0.1 miles to the witness post on the left hand side of the road. From the witness post walk 120 paces at 3 degrees magnetic to the 0-foot baseline stake (near a PIMO). The baseline runs 84 degrees magnetic.



Map Name: Patterson Pass

Diagrammatic Sketch

Township 6N, Range 19W, Section 22

UTM 4567893 N, 247428 E

DISCUSSION

Trend Study No. 1-24

The Sheep Range Spring study was set up in 1996 to monitor preferred habitat used by an increasing elk population in the Pilot Mountains. The study samples a sagebrush-grass range type at an elevation of about 7,260 feet. The site was placed on the south, south-west facing side of a east, west running ridge. Slope on the site is 20% to 30%. Elk pellet groups were abundant in 1996 with some groups being recent. Two cow elk were also seen in the area during study establishment. Deer pellet groups were also encountered in relatively small numbers. Two large sage grouse were seen near the site in 1996. Deer and elk likely utilize this area during the summer as well as normal winters. A pellet-group transect read on site in 2001 estimated 5 deer days use/acre (13 deer days use/ha) and 22 elk days use/acre (56 elk days use/ha). Cattle grazing occurs in the lower canyons but no cattle were seen in the immediate area and no cattle pats were encountered on the site. This area is within the Lucin/Pilot allotment which is assigned for summer cattle use and spring sheep use. There are many mining claims in the area, but most do not appear active.

The soil is moderately shallow and extremely rocky under the first few inches of soil. There is a noticeable buildup of rock and pavement on the surface with an average of 13.5% cover. Effective soil depth is estimated at about 10 inches along the first 300 feet of the baseline, but is noticeably deeper (22 inches) along the last 200 feet. The overall average effective rooting depth is almost 15 inches. Soil texture is a loam to clay loam with a neutral soil reaction (7.2 pH). The soil erosion condition class was determined to be slight in 2001. The soil appears to have adequate protective cover of vegetation and litter.

The site is surrounded by ridges dominated by black sagebrush. The base line was placed on a ridge with deeper soils and more grass and forb cover. The browse component is dominated by mountain big sagebrush and is intermixed with black sagebrush in some of the areas with the more shallow soils. Mountain big sagebrush density was initially estimated at 2,200 plants/acre, 66% of which were classified as mature. Utilization was mostly light with a few heavily hedged individual plants. Vigor was good on most plants and percent decadency was low at 15%. Some of the decadent and dead sagebrush were found in areas with the more shallow soils where black sagebrush is more prevalent. Currently, mountain big sagebrush has a similar density, with 79% classified as mature plants. Utilization continues to be light. Vigor continues to be good with percent decadency remaining almost unchanged. Black sagebrush has decreased in density, however it only contributes, on average, about 12% of the browse cover. Utilization is light, vigor good and percent decadency relatively low at 12%.

The most numerous shrub on the site is the increaser, mountain low rabbitbrush. However, it contributes only about 1/3 of the browse cover. Density was estimated at 3,600 plants/acre in 1996 and 3,340 in 2001. The majority of the population consists of mature plants. These shrubs show no utilization. Other shrubs which are found on the site include rubber rabbitbrush and slenderbush eriogonum.

The herbaceous understory is abundant with grasses combining to produce on average just over 21% cover. Cheatgrass is common and accounted for 33% of the total grass cover in 1996, but only 16% in 2001. Common perennial species include: Sandberg bluegrass, bluebunch, and thickspike wheatgrass. Forbs produce about 1/3 of the vegetation cover. The dominant perennial species consist of arrowleaf balsamroot, silvery lupine, longleaf phlox, stickseed, and two milkvetch species. Some of the arrowleaf balsamroot was infested with bugs which caused yellow spots on the leaves in 1996.

1996 APPARENT TREND ASSESSMENT

Soil conditions are stable with abundant vegetation and litter cover. No accelerated erosion is occurring on the site. Mountain big sagebrush appears to be stable. Utilization is light, vigor good, and percent decadency low. The herbaceous understory is dominated by perennial grasses and forbs. The only negative aspect to the grass composition is the abundance of annual cheatgrass. Any decline in perennial grasses will likely allow an increase in cheatgrass. Forbs are also abundant with several preferred summer forage species for deer and elk.

2001 TREND ASSESSMENT

Soil conditions are considered stable with abundant vegetation and litter cover. No discernable erosion is occurring on the site. Mountain big sagebrush continues to be stable. Utilization is light, vigor good, and percent decadency low. The herbaceous understory is dominated by perennial grasses and forbs. The sum of nested frequency values for both perennial grasses and forbs increased slightly in 2001. Nested frequency of the annual, cheatgrass, declined significantly since 1996. Forbs are still abundant with several preferred summer forage species for deer and elk.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 24

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron dasystachyum	122	*42	36	12	2.07	.93
G	Agropyron spicatum	106	*192	37	60	2.09	8.69
G	Bromus tectorum (a)	307	*263	77	70	5.48	4.08
G	Poa fendleriana	1	3	1	1	.00	.00
G	Poa secunda	195	237	52	66	7.08	12.14
G	Stipa lettermani	3	-	1	-	.03	-
Total for Annual Grasses		307	263	77	70	5.48	4.08
Total for Perennial Grasses		427	474	127	139	11.30	21.78
Total for Grasses		734	737	204	209	16.78	25.87
F	Agoseris glauca	50	94	24	32	.17	.36
F	Allium spp.	1	*50	1	25	.00	.23
F	Arabis spp.	-	-	-	-	-	.00
F	Astragalus beckwithii	27	*3	10	1	.25	.03
F	Astragalus cibarius	62	60	32	26	.46	1.21
F	Balsamorhiza hookeri	21	16	9	8	.23	1.02
F	Balsamorhiza sagittata	130	114	57	47	12.23	9.21

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Camelina microcarpa</i> (a)	19	*1	7	1	.03	.03
F	<i>Collomia linearis</i> (a)	3	*57	2	21	.01	.14
F	<i>Comandra pallida</i>	18	32	10	12	.10	.45
F	<i>Collinsia parviflora</i> (a)	160	*295	64	87	.62	1.75
F	<i>Crepis acuminata</i>	9	14	5	9	.05	.17
F	<i>Erigeron pumilus</i>	-	*14	-	5	-	.10
F	<i>Eriogonum villiflorum</i>	-	*16	-	6	-	.42
F	<i>Haplopappus acaulis</i>	2	-	1	-	.03	-
F	<i>Hackelia patens</i>	38	*14	24	6	.71	.11
F	<i>Hydrophyllum capitatum</i>	25	49	12	19	.20	.53
F	<i>Lappula occidentalis</i> (a)	6	-	2	-	.01	-
F	<i>Lithospermum ruderales</i>	1	1	1	1	.00	.15
F	<i>Lomatium</i> spp.	-	11	-	4	-	.16
F	<i>Lupinus argenteus</i>	33	34	19	17	.92	.86
F	<i>Machaeranthera grindelioides</i>	2	3	1	1	.03	.00
F	<i>Microsteris gracilis</i> (a)	-	217	-	72	-	1.17
F	<i>Navarretia intertexta</i> (a)	2	-	1	-	.00	-
F	<i>Phlox longifolia</i>	162	*125	56	47	.82	1.00
F	<i>Polygonum douglasii</i> (a)	3	-	1	-	.00	-
F	<i>Ranunculus testiculatus</i> (a)	-	1	-	1	-	.00
F	<i>Senecio integerrimus</i>	4	*16	2	10	.03	.17
F	<i>Viola</i> spp.	-	3	-	1	-	.00
Total for Annual Forbs		193	571	77	182	0.68	3.10
Total for Perennial Forbs		585	669	264	277	16.28	16.23
Total for Forbs		778	1240	341	459	16.97	19.34

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

BROWSE TRENDS --

Herd unit 01 , Study no: 24

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	24	15	2.42	1.89
B	Artemisia tridentata vaseyana	64	62	7.43	11.06
B	Chrysothamnus nauseosus consimilis	1	1	-	-
B	Chrysothamnus viscidiflorus lanceolatus	63	62	6.23	6.55
B	Eriogonum microthecum	3	1	.03	.00
Total for Browse		155	141	16.13	19.52

BASIC COVER --

Herd unit 01 , Study no: 24

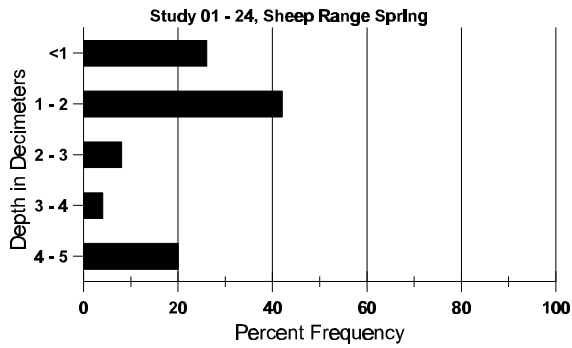
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	466	474	49.35	61.50
Rock	245	142	6.65	4.62
Pavement	275	275	7.63	8.09
Litter	495	460	53.22	50.44
Cryptogams	20	4	.04	.04
Bare Ground	221	203	6.47	7.08

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 24, Sheep Range Spring

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.8	53.6 (13.3)	7.2	40.4	34.1	27.4	2.9	21.1	425.6	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 24

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Elk	40	11	287	22 (55)
Deer	9	1	70	5 (13)

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 24

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		1	2	
Artemisia nova																		
Y	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	33	5	-	2	-	-	-	-	-	40	-	-	-	800	10	26	40
	01	21	-	-	-	-	-	-	-	-	21	-	-	-	420	10	25	21
D	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	3	-	-	-	-	-	-	-	-	1	-	1	1	60		3	
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		12%			00%			00%				-51%						
'01		00%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1020	Dec:	14%			
												'01	500		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	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	96	19	1	-	-	-	-	-	-	-	20	-	-	-	400		20	
	01	5	-	-	-	-	-	-	-	-	2	3	-	-	100		5	
M	96	65	8	-	-	-	-	-	-	-	72	-	1	-	1460	20	31	
	01	79	1	-	2	-	-	-	-	-	66	16	-	-	1640	24	37	
D	96	14	2	1	-	-	-	-	-	-	12	-	-	5	340		17	
	01	14	2	-	1	-	-	-	-	-	11	1	-	5	340		17	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	840		42	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	300		15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		10%			.90%			05%			- 5%							
'01		03%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	2200	Dec:	15%				
											'01	2080		16%				
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	29	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	27	58	
% 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		-				

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 lanceolatus																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	96	31	-	-	4	-	-	-	-	-	33	-	2	-	700		35	
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	96	127	-	-	4	-	-	-	-	-	129	-	2	-	2620	15 25	131	
	01	141	-	-	6	-	-	-	-	-	125	22	-	-	2940	13 20	147	
D	96	13	1	-	-	-	-	-	-	-	10	-	3	1	280		14	
	01	11	-	-	4	-	-	-	-	-	15	-	-	-	300		15	
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		.55%			00%			04%			- 7%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	3600	Dec:	8%				
											'01	3340		9%				
Eriogonum microthecum																		
M	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160	3 10	8	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3 6	1	
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		11%			00%			00%			-89%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	180	Dec:	11%				
											'01	20		0%				

SUMMARY

WILDLIFE MANAGEMENT UNIT 1 - BOX ELDER

Twenty-three trend study sites were read on unit 1 in 2001, sampling various vegetation types including: mountain brush, pinyon-juniper, big sagebrush, and black sagebrush. Fourteen of the sites were established in 1984 and reread in 1990 and 1996. The site at Cedar Hills (#1-15) was established in 1990. Nine additional sites were added in 1996 to monitor key habitat not previously covered. Two of the new sites were placed on the Pilot mountain range to monitor important elk habitat.

Study areas monitoring black sagebrush types include: Rosebud Hills (#1-3), South Side Emigrant Pass (#1-7), Kilgore Basin (#1-10), Kimber Ranch (#1-11), Bally Mountain (#1-19) and Dake Pass (#1-22). These sites, with the exception of the higher elevation Bally Mountain, monitor critical winter range for deer. Most of these sites have poor soil conditions due to a lack of herbaceous ground cover. The bare interspaces between shrub crowns are mostly covered by rock and erosion pavement. Browse trends appear to be stable to improving for all sites except for Kimber Ranch which has a slightly downward trend.

Basin and Wyoming big sagebrush sites are sampled by 8 studies which include: Kelton (#1-1), Rosette (#1-2), Bovine Exclosure (#1-6), Mud Springs Basin (#1-8), Southwest Rosette (#1-9), Red Butte Exclosure (#1-12), Raft River Narrows (#1-13) and Bedke Spring (#1-18). Soil trends currently appear stable for all sites. Herbaceous understory trends are stable on 5 sites and slightly downward on the other 3. The slightly downward sites include: 1-1, 1-13, and 1-18. Browse trends were stable to improving on all sites except sites 1-1, 1-6, and 1-8.

Two sites sample pinyon and juniper woodlands. Devils Playground (#1-5) samples a more open woodland which is an important wintering area for deer. The soil is in poor condition but stable with minimal erosion. The browse trend is up slightly for the key black sagebrush. The herbaceous trend is stable. The site at Cedar Hills (#1-15) was established in 1990 to get baseline data for a proposed chaining treatment. By 1996, the site had still not been treated. Juniper and pinyon were relatively dense. A fire burned the entire area during the summer of 2000 which eliminated all of the trees and shrubs. All trends are down as a result.

Three sites, Chokecherry Springs (#1-4), Patterson Pass (#1-23) and Sheep Range Spring (#1-24) sample higher elevation mountain big sagebrush communities. Chokecherry Springs displays a stable soil trend and an improving herbaceous trend. The browse trend is down slightly for sagebrush and stable for bitterbrush. Patterson Pass and Sheep Range Spring are two sites placed on the Pilot Range to monitor important elk habitat. These sites are high enough to be utilized during the spring and summer months. Both sites have at least stable soil, browse, and herbaceous understory trends.

Four sites, Broad Hollow (#1-14), Nut Pine Hills (#1-16), Clark's Basin (#1-17) and Keg Spring (#1-21), sample the limited transitional and summer range on the Raft River and Grouse Creek Mountains. Broad Hollow is a site which was established in 1984. The other three sites were added in 1996. Key Spring burned prior to 2001 with cheatgrass now making up 72% of the grass cover.

The Cotton Thomas (#1-20) study was established in 1996 and placed within an aspen stand. The aspen type is limited on the Grouse Creek Mountains. It is considered important fawning and summer range for deer. The herbaceous understory is abundant and diverse but dominated by Kentucky bluegrass. With very little use observed on this site, it was not read this last time, but will be reevaluated in 2006.

Climate data from Grouse Creek show below normal precipitation for 13 out of the past 25 years (1975 to 2000). Four consecutive dry years occurred between 1976 and 1979, with another 2 consecutive dry years in

1981 and 1982, and 3 consecutive dry years from 1988-90. Conditions were also dry in 1999 when 78% of the normal 11.24 inches of precipitation fell at Grouse Creek. Nine years during the past 25 showed above normal precipitation including 2 consecutive wet years in 1983-84 and 4 consecutive wet years from 1995 through 1998. Annual precipitation was normal in 2000, but spring precipitation was below normal. April precipitation in 2000 was 70% of normal, May was normal but June, July and August were extremely dry with only 24% of the normal precipitation received. Spring precipitation was also below normal in 2001. May and June precipitation totaled just over 1/4 of an inch (0.26") when over 2 ½ inches (2.66") normally occurs. These two consecutive dry springs have had a significant impact on the herbaceous understories of some trend studies in unit 1.

When interpreting the data, it should be recalled that the 1984 studies were read in a period of above average precipitation. In fact, both 1983 and 1984 were well above normal. The 1990 readings were conducted after several successive years of drought (1988-1990). The 1996 readings occurred in a year of above normal precipitation and the 2001 readings occurred after 2 consecutive dry springs (2000 and 2001). These conditions must be considered when evaluating long-term trend data, especially pertaining to herbaceous vegetation.

A trend summary for each trend study follows.

TREND SUMMARY

Location	Category	1984	1990	1996	2001
1-1 Kelton	soil	est	3	4	3
	browse	est	1	4	2
	herbaceous understory	est	1	3	3
1-2 Rosette	soil	est	3	5	3
	browse	est	1	5	3
	herbaceous understory	est	4	3	3
1-3 Rosebud Hills	soil	est	3	3	3
	browse	est	3	4	3
	herbaceous understory	est	2	4	3
1-4 Chokecherry Springs	soil	est	3	5	3
	browse	est	2	3	2
	herbaceous understory	est	4	4	4
1-5 Devil's Playground	soil	est	3	3	3
	browse	est	2	4	4
	herbaceous understory	est	4	3	3

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

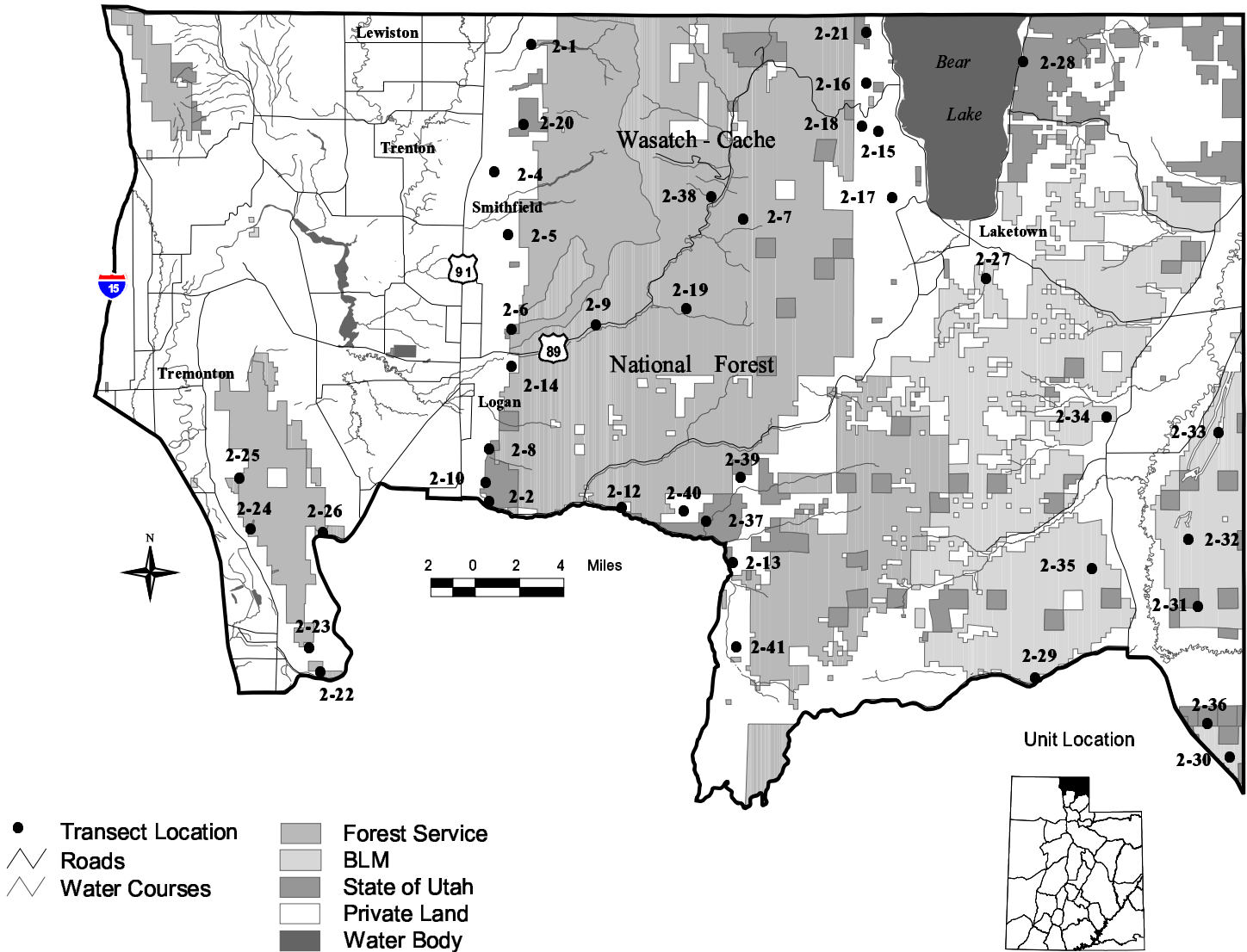
Location	Category	1984	1990	1996	2001
1-6 Bovine Exclosure	soil	est	3	3	3
	browse	est	5	3	2
	herbaceous understory	est	5	2	2
1-7 South Side Emigrant Pass	soil	est	3	3	3
	browse	est	3	4	3
	herbaceous understory	est	4	4	3
1-8 Mud Springs Basin	soil	est	1	4	3
	browse	est	1	3	2
	herbaceous understory	est	5	3	3
1-9 Southwest Rosette	soil	est	4	5	3
	browse	est	2	4	3
	herbaceous understory	est	3	4	3
1-10 Kilgore Basin	soil	est	3	4	2
	browse	est	3	4	3
	herbaceous understory	est	2	4	2
1-11 Kimber Ranch	soil	est	3	2	2
	browse	est	3	4	2
	herbaceous understory	est	3	2	2
1-12 Red Butte Exclosure	soil	est	3	5	3
	browse	est	3	3	3
	herbaceous understory	est	4	2	3
1-13 Raft River Narrows	soil	est	4	3	3
	browse	est	3	5	3
	herbaceous understory	est	4	4	2
1-14 Broad Hollow	soil	est	3	4	3
	browse	est	2	5	2
	herbaceous understory	est	4	3	3

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

Location	Category	1990	1996	2001
1-15 Cedar Hills	soil	est	4	1
	browse	est	1	1
	herbaceous understory	est	5	1
1-16 Nut Pine Hills	soil		est	3
	browse		est	3
	herbaceous understory		est	3
1-17 Clark's Basin	soil		est	3
	browse		est	3
	herbaceous understory		est	3
1-18 Bedke Spring	soil		est	3
	browse		est	5
	herbaceous understory		est	2
1-19 Bally Mountain	soil		est	3
	browse		est	3
	herbaceous understory		est	3
1-20 Cotton Thomas	soil		est	susp
	browse		est	susp
	herbaceous understory		est	susp
1-21 Keg Spring	soil		est	1
	browse		est	1
	herbaceous understory		est	1
1-22 Dake Pass	soil		est	2
	browse		est	3
	herbaceous understory		est	3
1-23 Patterson Pass	soil		est	3
	browse		est	3
	herbaceous understory		est	3
1-24 Sheep Range Spring	soil		est	3
	browse		est	3
	herbaceous understory		est	4

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

Management Unit 2



WILDLIFE MANAGEMENT UNIT 2 - CACHE

Boundary Description

Cache, Rich, Weber, and Box Elder counties - Boundary begins at the Utah-Idaho state line and I-15; east on this state line to the Utah-Wyoming state line; south on this state line to Highway SR-16; north on SR-16 to Highway SR-39; west on SR-39 to Ant Flat Road; north on the Ant Flat Road to Highway SR-101 (at Hardware Ranch); west on SR-101 to Highway US89-91; south on US 89-91 to I-15; north on I-15 to the Utah-Idaho state line

The Wellsville Mountains, on the west side of the unit, is subunit 2a - Cache, Wellsville Mountains. Prior to 1993, the area was designated as Deer herd unit #4. A boundary description of subunit 2a follows.

WILDLIFE MANAGEMENT SUBUNIT 2A

Boundary Description

Cache and Box Elder counties - Boundary begins at Interstate 15 and Highway US-89 in Brigham City; north on I-15 to the Utah-Idaho state line; east on this state line to Highway SR-23; south on SR-23 to Highway US 89/91; west on US 89/91 to I-15.

Subunit 2a Description

Deer habitat on subunit 2a is concentrated on the Wellsville Mountains and their northern extension, Clarkston Mountain. The eastern half of the unit, mostly agricultural land in Cache Valley, is not used much by wintering deer. Most deer cross over to the west side of the mountains where winter range was estimated at 23,906 acres (King and Muir 1971). King and Muir (1971) also stated that the winter range was all in good condition. The acreage and condition of available winter range has undoubtedly declined in the past 25 years. The summer range, due to its inaccessibility and low livestock grazing pressure, is in good condition.

The Wellsville Mountains have remained relatively inaccessible because of the steep topography. Rising abruptly from the valley floor, the ridge of the Wellsville Mountains reaches over 9,300 feet in elevation. The rise of almost 5,000 feet in just 2½ miles, plus the presence of sheer rocky outcrops, produces very steep and rugged terrain. The high point on the unit is Box Elder Peak at an elevation of 9,372 feet. Clarkston Mountain is shorter in elevation and not quite as steep. Both mountain ranges are dissected by numerous canyons, although none support year-round flows. All of the intermittent streams eventually drain into the Bear River, some via the Logan and Malad Rivers. The Bear River flows between the two ranges through a rather narrow and now dammed gorge. Towns located in closest proximity to the winter range are Brigham City, Honeyville, Madsen, Deweyville, and Collinston. Approximately 58% of the winter range is private land (King and Muir 1971). The Forest Service controls the higher areas of the normal winter range and the State owns two small sections (8%). In severe winters, the acreage of available range is reduced to 9,414 acres, 61% less than is available during a normal winter. Almost all of the severe winter range is under private ownership. A majority of this is used for grazing and agriculture, but much more is being developed with roads and houses, especially in the extremely critical Coldwater Canyon area. The continuing loss of winter range results in increased depredation problems on adjacent agricultural lands. Complaints of deer damage now come from all along the western portion of the unit.

The upper limit for normal winter range is generally the 7,000 foot level. It drops to 6,000 feet in some canyons to exclude the north slopes, and reaches as low as 5,400 feet in Box Elder Canyon. The lower limit follows the 4,400-foot contour. In severe winters, the upper limits are usually between 6,000 and 6,500 feet.

Most deer which summer on the east side of the Wellsville Mountains, migrate to winter range on the west side each fall. Coldwater Canyon is the most notable concentration area. There is some migration from the Mantua-Willard herd unit. Most deer that winter on Clarkston Mountain, summer on the Caribou National Forest in Idaho.

Other big game species found on the Wellsville mountains include introduced Rocky Mountain bighorn sheep and a few elk. Neither species are very numerous, but they should be considered in management decisions, especially concerning grazing. Land development and associated habitat loss is still the most critical problem facing Wildlife Management Unit 2a.

Unit 2 Description

Overall, unit 2 can be divided into three main areas which are isolated to some extent from one another. The first part, described above, is the Wellsville subunit. The second is the Cache Valley area with its summer range on the Cache National Forest to the east. Big game summer on the forest and use the winter ranges in the canyons and upper benches of the valley. The third area is Rich County, which includes a vast area of private and public range land on the east side of the Cache National Forest, extending to the Wyoming state line. Prior to 1993, these three areas were managed as separate deer herd units. In 1993, these areas were combined into Wildlife Management Unit 2.

The majority of the deer range, along with the largest deer herd, are within the Cache County portion of the unit. Most of this herd summers at higher elevations on the Cache National Forest, west of the Wasatch range summit. The majority of the winter range is also on Forest Service land.

Most winter range in the Cache County portion is located from the base of the mountain to 7,000 feet. However, the south-facing slopes of Blacksmith Fork, Logan, Dry, Providence, and Millville canyons are also important. The lower winter range limits are restricted by the upper limits of the towns and cities of Cove, Richmond, Smithfield, Hyde Park, North Logan, Logan, Providence, Millville, Nibley, and Hyrum. These limits to the winter range also include the deer-proof fence above agricultural land between Hyrum and Logan. Between Hyde Park and the Idaho border, the lower third of the winter range is located on private land and is endangered by increased cultivation and subdivision developments. The DWR owns 16,139 acres in Blacksmith Fork Canyon and needs to acquire and manage an additional 13,361 acres in order to maintain the herd at acceptable levels (Mann 1985).

The Rich County portion of the Cache deer herd unit, located on the east face of the Wasatch Range, is topographically similar to the west face. However, the drainages of Swan Creek, Garden City Canyon, Jebo Canyon, Cottonwood Canyon, and Temple Canyon are not as deep as those on the west face. Elevation ranges between 5,900 feet at Bear Lake and 9,114 feet on Swan Peak. The southern two thirds of Rich County was part of Unit 5 prior to 1993. This area has now been added to unit 2. Randolph and Woodruff are the principle municipalities located in Rich County. These towns are located on a strip of private land along the Bear River. Much of the lower country is privately owned and is grazed or farmed. Estimates are that 74,560 acres (33%) of the winter range is private land (Jense et al. 1985). A much higher percentage of the severe winter range is private. The BLM owns a majority of the winter range, controlling much of the land in the central part of the unit and the Crawford Mountains to the east.

The upper limits of the winter range begin at about 8,000 feet at the Idaho border and gradually descend to 6,000 feet at Cottonwood Canyon. The lower limits generally follow the 6,000-foot contour. For a more complete description of the winter range limits see King and Muir (1971).

Big Game Trends

The current management objective is to maintain a target winter herd of 25,000 wintering deer and maintain a buck/doe ratio of 15 bucks to 100 does and a fawn/doe ratio of 86 fawns to 100 does. To meet this objective, a projected yearly harvest of about 3,300 bucks will be required. Antlerless deer harvest will be adjusted yearly to meet population objectives.

Current management objectives for elk are to maintain a target population of 2,300 wintering elk with a bull-to-cow ratio of 8 bulls to 100 cows. Fifty percent of the bulls are to be 2½ years of age or older.

Trend Study Description

A total of 29 study sites were established in the unit in 1984 and read again in 1990 and 1996. During the 1990 season, 5 new sites were added. All of these were reread in 1996 along with 5 additional new sites. Six study sites occur in subunit 2a, Wellsville Mountains. In 2001, 31 trend studies were reread, while 8 studies were suspended and will be reevaluated during the next rotation. All of the sites monitored in 2001 sample big game winter range.

Trend Study 2-1-01

Study site name: High Creek.

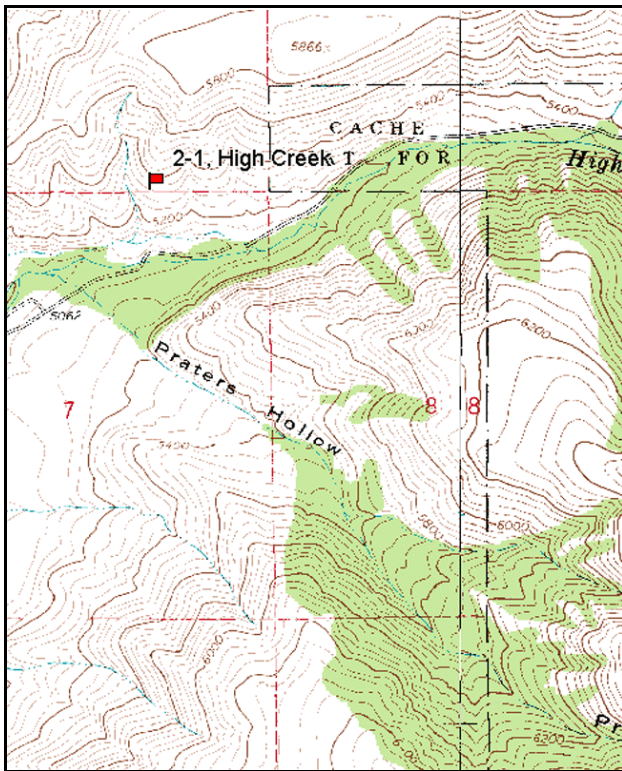
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

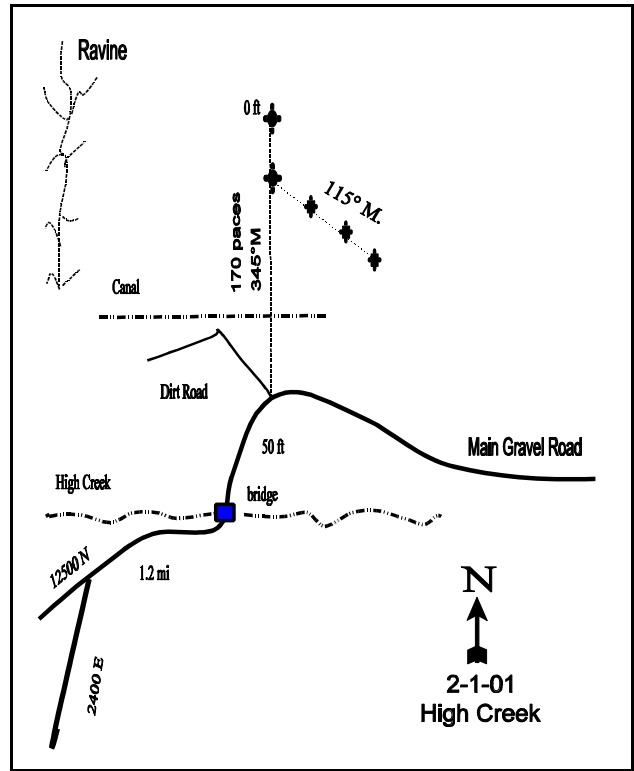
LOCATION DESCRIPTION

From 12500 North and 2400 East in Richmond, proceed northeast for 1.2 miles and cross High Creek. Just beyond this crossing (north) a dirt road heads off to the northeast. From this intersection, walk 170 paces at a bearing of 345 degrees magnetic to the 100-foot stake of the frequency baseline. Walk 100 feet beyond this stake to the 0-foot stake, marked with browse-tag #7929. The baseline runs at 165 degrees magnetic. The baseline doglegs after 100 feet and runs in a direction of 115 degrees magnetic.



Map Name: Richmond

Township 14N, Range 2E, Section 6



Diagrammatic Sketch

UTM 4647239 N, 436682 E

DISCUSSION

Trend Study No. 2-1

The High Creek study, located on the north side of High Creek, samples critical winter range on the northernmost part of the herd unit near the Idaho border. Unlike most of the Cache County "face" where sagebrush and other shrubs have been largely eliminated, this area retains a moderately dense mountain big sagebrush population. The site is on a fairly steep (35% to 40%), south-facing slope at 5,380 feet in elevation. The site lies about 700 ft above High Creek. The hillside on which the study is located contains many open areas dominated by annual and perennial weeds. Deer and elk pellet groups were infrequent in the past, entirely absent in 1996, and in low numbers in 2001. A pellet group transect read along the study site baseline in 2001 estimated 10 deer and 2 cow days use/acre (25 ddu/ha, 5 cdu/ha). Utilization appears to be from the fall and winter.

Soil is moderately shallow with a clay loam texture. Parent material is limestone. Rocks are common on the surface (>20%) and in the profile. They consist of both large limestone cobble and smaller gravel sized rock. Water infiltration rates should be rapid. Effective rooting depth (see methods) was estimated at nearly 10 inches in 1996, but the high amount of rock in the profile restricted accurate penetrometer readings. Rooting depth is obviously not overly restrictive since the site contains a moderately dense stand of mountain big sagebrush. The high amount of rock on the surface and upper soil profile does contribute to moderately high soil surface temperatures however. Soil temperature was estimated at nearly 70° F at a depth of about 10 inches. Protective ground cover is abundant, but comes largely from weedy plant cover and litter. The erosion condition class was determined to be stable in 2001, and no active erosion is evident at this time.

Browse composition consists of a fairly dense stand of mountain big sagebrush with a few remnant antelope bitterbrush. The mountain big sagebrush population tends to be clumped or aggregated on this site. Because of this and the relatively small sample size, density was overestimated to some extent at 4,132 plants/acre in 1984. Utilization was extremely heavy that year when 76% of the population displayed heavy use. Density remained somewhat similar in 1990 with an estimated 3,666 plants/acre. A larger proportion of the population (35% vs 19%) were classified as young. This may have been a classification problem between readers. Utilization in 1990 was light, percent decadency increased to 13%, and 41% of the mature and decadent shrubs displayed poor vigor. In 1996, density declined slightly due to a reduction in the amount of young plants in the population. Some of the change is due to the much larger, more representative sample used in 1996 which tripled the original sample size. Utilization was light to moderate, percent decadency was moderately low at 18%, and vigor good on all but a few mature and decadent plants. Seed production appeared good in 1996. Some of the decadent shrubs appear to have partial crown death due to some kind of winter injury or some other natural event (prolonged drought), not heavy browsing. Density declined slightly in 2001, but use was mostly light and vigor normal. Leader growth averaged only 1.5 inches in 2001. Percent decadence increased slightly to 22%, but this is still relatively low. Recruitment is currently ('01) poor with low numbers of seedlings and young encountered.

Antelope bitterbrush occurs as scattered mature plants. Apart from vegetative reproduction (i.e., layering), relatively few seedling or young bitterbrush can be found, and none occurred within the shrub density strips during any reading. Although bitterbrush was not encountered on the density plots in 1984 or 1990, it was picked up in the much larger sample of 1996 and 2001. Density was estimated at only 140 mature plants/acre in 2001. Utilization was reported to be heavy in 1984 and 1990, but more moderate in 1996. Use was again heavy in 2001, which is not surprising considering bitterbrush's small numbers. Vigor was normal. However, leader growth was estimated at only just over 1 inch in 2001.

The herbaceous understory is abundant, yet dominated by annual grasses and weedy forbs. Annual grasses made up 89% of the grass cover in 1996 and 81% in 2001. Only three perennial grasses, bluebunch wheatgrass, Sandberg bluegrass, and bulbous bluegrass were encountered on the site. The more preferred Sandberg bluegrass and bluebunch wheatgrass combined to produce only 9% of the grass cover in 1996 and 5% in 2001. Cheatgrass brome is the most abundant species on the site.

The forb composition is diverse and abundant, but dominated by weedy species that typically act as invaders or increasers on disturbed sites. Dominant species include ragweed, willowweed, storksbill, and yellow salsify. Most of the remaining species (see data summary) are generally low value increaser forbs.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable to declining at a low condition level. Erosion is apparent but not of large magnitude. Vegetative cover, especially from perennial herbaceous plants, is rather poor. Vegetative trend indicators suggest a thickening stand of mountain big sagebrush and a stable or declining bitterbrush population. It also indicates a herbaceous composition dominated by biennial and perennial weeds and other poor value species. No evidence suggests an improving perennial grass or forb composition.

1990 TREND ASSESSMENT

Although assessed as increasing in 1984, the population of big sagebrush declined by 11% in 1990. However, the proportion of young plants in the population increased from 19% in 1984 to 35%. Sagebrush canopy cover averages 17%. Percent decadency increased to 13%, although utilization was light. Vigor is poor on 44% of the mature and 36% of the decadent sagebrush. The remnant bitterbrush occurs in small numbers which has been heavily utilized. This shrub is considered a very minor component of the community. Trend for browse is considered stable. The only perennial grass has increased in nested and quadrat frequency. However, it is still a minor component within the weedy understory. There are many forbs, but only 9 out of the 20 had increased nested and quadrat frequency values with 6 out the 9 classified as weedy increasers. The understory remains dominated by undesirable weedy and annual species.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down slightly and still in poor condition (2)

1996 TREND ASSESSMENT

Protective ground cover is abundant on this site leaving little bare ground unprotected. Trend for soil is up due to an increase in litter cover from 21% to 57% and a decline in percent bare ground from 12% to <1%. The browse trend appears stable. Density remains similar to 1990 estimates with the exception of a decline in the number of young plants. Utilization is mostly light with vigor improved from 1990 observations. Percent decadency increased slightly (13% to 18%). One cause for concern on this site is the apparent lack of seedlings and young combined with the abundant herbaceous understory which is dominated by annual grasses and weedy forbs. These winter annuals and weeds provide considerable competition to the establishment of sagebrush seedlings. These weedy species also provide a high amount of fine fuels which increases the hazard of wild fire which would eliminate sagebrush from the site. The herbaceous understory trend is down. The site is still dominated by annuals and weedy forbs. Bluebunch wheatgrass and Sandberg bluegrass increased in nested frequency since 1990, but sum of nested frequency for forbs declined with 10 of the 15 species sampled in 1990 declining significantly.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - down with poor composition (1)

2001 TREND ASSESSMENT

Trend for soil is stable due to abundant herbaceous vegetation and litter cover. There is no sign of accelerated erosion. Trend for the key browse species, mountain big sagebrush is slightly down. The population density has declined by 29%. Utilization is mostly light, vigor good, and percent decadence moderately low at 22%. Recruitment in the form of seedlings and young is still poor due to the herbaceous understory that is dominated by cheatgrass and weedy biennial forbs. Decadent sagebrush classified as dying are currently more numerous than the young plants that are needed to replace them. This was also the case in 1996, and it appears that the population is in a state of decline due to lack of young recruitment. Trend for the herbaceous understory is stable but still in poor condition. Sum of nested frequency for perennial grasses increased due to a significant increase in bulbous bluegrass, a low value species. Cheatgrass still dominates the site by providing 71% of the grass cover and 54% of the total herbaceous cover. The forb composition continues to be poor, dominated by weedy annual and biennial species.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - stable but still dominated by annuals (3)

HERBACEOUS TRENDS --

Herd unit 02 , 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 spicatum	a ⁹	ab ²⁵	b ³¹	b ³⁴	5	12	16	18	2.02	1.15
G	Bromus brizaeformis (a)	-	-	b ⁸⁵	a ³⁸	-	-	31	18	.77	.12
G	Bromus japonicus (a)	-	-	b ¹⁵⁸	a ⁶⁸	-	-	56	29	4.85	.72
G	Bromus tectorum (a)	-	-	306	371	-	-	79	98	23.27	24.90
G	Poa bulbosa	a ⁻	ab ³	b ²⁶	c ⁸⁸	-	1	11	31	.83	4.37
G	Poa secunda	a ⁻	a ⁻	b ¹³	b ¹⁶	-	-	5	8	.84	.43
Total for Annual Grasses		0	0	549	477	0	0	166	145	28.90	25.74
Total for Perennial Grasses		9	28	70	138	5	13	32	57	3.69	5.96
Total for Grasses		9	28	619	615	5	13	198	202	32.60	31.70
F	Agoseris glauca	b ¹⁷	b ¹⁶	a ⁻	a ⁻	10	7	-	-	-	-
F	Allium acuminatum	6	-	-	-	2	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	a ⁹⁵	b ¹⁹⁴	-	-	40	71	.22	1.63
F	Ambrosia psilostachya	b ²⁸⁴	a ¹⁵	a ¹⁶	a ³⁵	92	9	6	16	.69	.64
F	Artemisia ludoviciana	7	6	4	14	2	2	1	6	.15	.74
F	Astragalus spp.	-	4	-	-	-	2	-	-	-	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Balsamorhiza sagittata	-	-	-	-	-	-	-	-	-	.15
F	Calochortus nuttallii	_b 24	_a -	_a -	_b 30	12	-	-	13	-	.19
F	Cirsium undulatum	-	4	-	-	-	1	-	-	-	-
F	Collinsia parviflora (a)	-	-	-	1	-	-	-	1	-	.00
F	Crepis acuminata	_a -	_{ab} 5	_b 7	_{ab} 3	-	2	5	2	.27	.04
F	Cymopterus spp.	-	-	-	6	-	-	-	2	-	.03
F	Epilobium brachycarpum (a)	_a -	_c 127	_c 119	_b 63	-	54	50	31	1.78	.25
F	Erodium cicutarium (a)	-	-	_a 30	_b 193	-	-	12	63	.35	6.77
F	Galium aparine (a)	-	-	6	7	-	-	3	3	.18	.04
F	Grindelia squarrosa	_a -	_a -	_a 5	_b 17	-	-	3	8	.21	.87
F	Hackelia patens	_a 2	_b 12	_a 1	_a -	1	5	1	-	.03	-
F	Helianthus annuus (a)	_a -	_b 30	_a -	_a 6	-	17	-	3	.00	.06
F	Lappula occidentalis (a)	-	-	10	-	-	-	4	-	.02	-
F	Lactuca serriola	_a -	_b 47	_b 28	_a 4	-	23	13	2	.72	.02
F	Lomatium grayi	_{bc} 27	_c 30	_{ab} 4	_a -	10	12	3	-	.04	-
F	Lupinus argenteus	_a 2	_a -	_a -	_b 12	1	-	-	6	-	.43
F	Machaeranthera spp	_b 92	_a -	_a -	_a -	47	-	-	-	-	-
F	Microsteris gracilis (a)	-	-	-	4	-	-	-	2	-	.01
F	Oenothera caespitosa	_b 15	_b 16	_a -	_a -	8	8	-	-	.00	-
F	Phacelia hastata	_a 7	_b 24	_a -	_a -	3	11	-	-	-	-
F	Phlox longifolia	3	-	-	9	1	-	-	3	-	.01
F	Polygonum douglasii (a)	-	-	8	20	-	-	4	7	.02	.06
F	Ranunculus testiculatus (a)	-	-	-	5	-	-	-	2	-	.01
F	Tragopogon dubius	_a 16	_b 58	_{ab} 37	_a 31	7	29	18	13	.76	.41
F	Veronica biloba (a)	-	-	_a 12	_b 169	-	-	4	63	.04	1.68
F	Zigadenus paniculatus	_a 1	_a -	_a 1	_b 20	1	-	1	12	.03	.26
Total for Annual Forbs		0	157	280	662	0	71	117	246	2.64	10.53
Total for Perennial Forbs		503	237	103	181	197	111	51	83	2.92	3.82
Total for Forbs		503	394	383	843	197	182	168	329	5.56	14.36

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

BROWSE TRENDS --
Herd unit 02 , Study no: 1

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	62	54	12.29	13.07
B	Purshia tridentata	8	6	1.85	1.24
Total for Browse		70	60	14.14	14.32

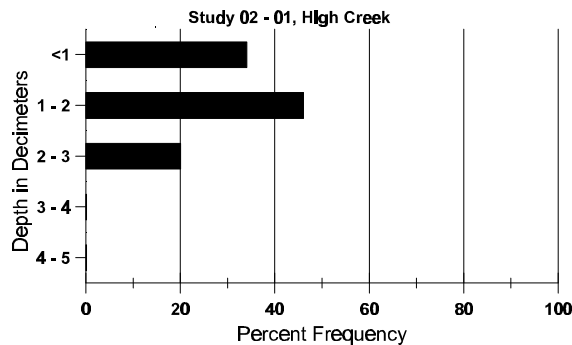
BASIC COVER --
Herd unit 02 , Study no: 1

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	387	390	2.25	6.50	56.92	57.89
Rock	237	242	37.00	49.25	19.50	19.99
Pavement	124	154	21.00	11.50	6.28	3.97
Litter	393	365	30.25	21.00	56.94	34.85
Cryptogams	9	7	1.50	0	.07	.04
Bare Ground	53	88	8.00	11.75	.72	3.32

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 01, High Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.7	69.6 (10.5)	7.2	42.9	29.1	28.0	2.2	16.3	150.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 1

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Deer	-	2	131	10 (25)
Cattle	-	2	26	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 02 , 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.		
<i>Artemisia tridentata vaseyana</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	10	14	-	-	-	-	-	-	21	2	1	-	800			24
	90	36	2	-	1	-	-	-	-	-	39	-	-	-	1300			39
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	2	17	76	-	-	-	-	-	-	94	1	-	-	3166	25	30	95
	90	56	1	-	-	-	-	-	-	-	32	1	24	-	1900	24	36	57
	96	73	22	-	1	-	-	-	-	-	95	-	1	-	1920	26	38	96
	01	50	11	4	-	-	-	-	-	-	65	-	-	-	1300	29	44	65
D	84	-	1	4	-	-	-	-	-	-	4	-	1	-	166			5
	90	13	1	-	-	-	-	-	-	-	9	-	2	3	466			14
	96	15	2	5	-	-	-	-	-	-	12	-	3	7	440			22
	01	18	1	-	-	-	-	-	-	-	15	-	-	4	380			19
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	860			43
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	620			31
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		23%			76%			02%			-11%							
'90		04%			00%			26%			-35%							
'96		21%			04%			09%			-29%							
'01		15%			05%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	4132	Dec:	4%				
											'90	3666		13%				
											'96	2400		18%				
											'01	1700		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				
<i>Gutierrezia sarothrae</i>																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	19	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>Purshia tridentata</i>																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	3	8	-	-	-	-	-	-	-	11	-	-	-	220	31	72	11
	'01	-	2	5	-	-	-	-	-	-	7	-	-	-	140	26	66	7
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	120			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		73%			00%			00%			-36%							
'01		29%			71%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	220		-			
												'01	140		-			

Trend Study 2-2-01

Study site name: Mouth of Blacksmith Fork.

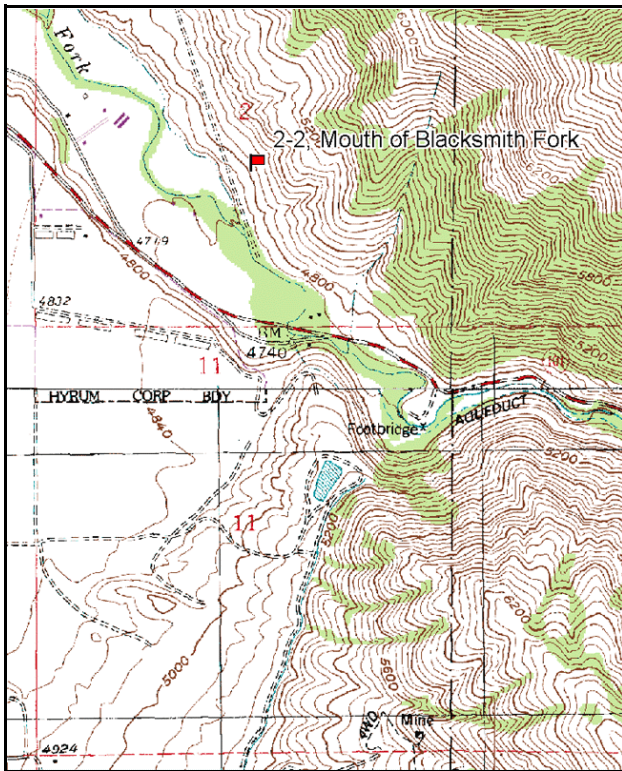
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 159 degrees magnetic.

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

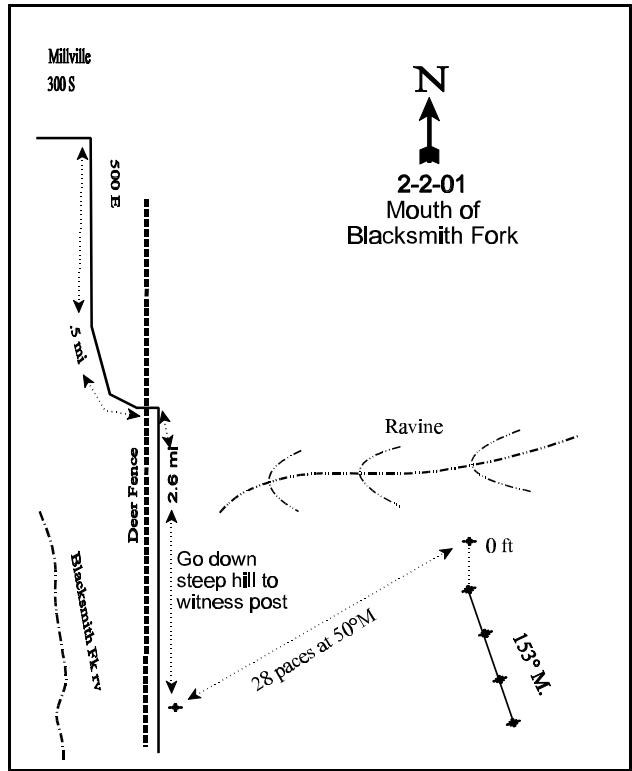
LOCATION DESCRIPTION

Proceed south 0.5 miles from the intersection of 300 South and 500 East in Millville. At the intersection just east of the deer fence, proceed south for 2.6 miles and stop at a witness post, which is at the top of the hill. From the witness post, walk 100 feet at 50 degrees magnetic to the 0-foot stake of the baseline marked by browse tag #90. The baseline runs at a bearing of 159 degrees magnetic. The baseline doglegs after 100 feet and runs 151 degrees magnetic.



Map Name: Logan

Township 10N, Range 1E, Section 2



Diagrammatic Sketch

UTM 4609060 N, 433136 E

DISCUSSION

Trend Study No. 2-2

The Mouth of Blacksmith Fork study is located slightly north of where the Blacksmith Fork river enters the Cache Valley. The site is located on a moderately steep (30%), west to southwest facing slope. Elevation is approximately 4,880 feet. The transect sits on a narrow bench about 200 feet above a big game fence which runs along the east edge of the valley. The vegetation type is basin big sagebrush with a remnant stand of perennial grass and an overabundance of annual grasses, annual forbs, and perennial weeds. The area has been heavily utilized in the past. Currently ('01), deer and elk pellet groups occur infrequently. A pellet group transect read at the site in 2001 estimated only 2 deer days use/acre (5 ddu/ha). Most of this critical winter range area has been almost totally depleted of browse within the last 30 to 40 years. A majority of this depletion is due to poor seedling establishment caused by competition with a very thick "carpet" of winter annuals. This is especially difficult for seedling establishment with extended periods of drought.

Soil is classified as "Sterling gravelly loam," a category with moderately rapid permeability. Rooting depth can reach 60 inches, but more often is restricted to the upper 16 inches of the soil profile. The soil is moderately alkaline and calcareous in the upper horizons, but becomes strongly so in the subsoil. Erosion potential is medium to high (Erickson and Mortensen, 1974). Soils at the site have a loam texture and a moderately alkaline pH (7.9). Effective rooting depth (see methods) is estimated at 16 inches. Rocks are common on the surface and throughout the profile. Phosphorus is limiting in the soil at only 7.3 ppm. Values less than 10 ppm may be limiting to plant growth and development. Soil temperature is extremely high averaging nearly 76° F at a depth of almost 17 inches. Currently ('01), erosion is not a problem due to the abundance of herbaceous vegetation and litter cover. The composition of the herbaceous understory is poor, with cheatgrass, Japanese brome, and rattlesnake brome contributing 66% of the grass cover. The abundance of these grasses leaves the area susceptible to a devastating fire which would eliminate the sagebrush.

Big sagebrush and broom snakeweed are the only browse species remaining on the site. Some mountain big sagebrush grows on the nearby slopes, but the majority of the sagebrush along the bench is the more deeply rooted basin big sagebrush. The population was extremely decadent (92%), heavily browsed (100%), and generally in poor vigor during the 1984 reading. Dead and dying plants resulting from heavy browsing and rodent activity were abundant. In 1990, the population increased slightly to 966 plants/acre. Use was more moderate and percent decadency went down to 31%. Vigor was still poor on 24% of the population. In 1996, a much larger sample size estimated a population of 1,680 plants/acre. Because the population is characteristically clumped and discontinuous in its distribution, the larger sample gives a better estimate of its true density. Utilization was light, vigor good, and percent decadency decreased to only 8%. Recruitment also improved in 1996 with good numbers of seedlings and young plants (13% and 26% of the population respectively). Density remained stable in 2001. Use is still mostly light, vigor good, and percent decadence low. However, recruitment is poor due in part to the abundant herbaceous understory dominated by annuals.

Shrubs such as antelope bitterbrush and Utah juniper occur occasionally, but were not sampled even with the larger sample. Broom snakeweed appears to have a stable population. It contributes <1% of the browse cover.

Herbaceous composition is dominated by annual grasses and biennial and perennial weeds. Among the grasses, the annuals cheatgrass and jointed goatgrass (*Aegilops cylindrica*) are especially prevalent. Annual grasses produced 94% of the grass cover in 1996 and 78% in 2001. Less abundant are bluebunch wheatgrass, Sandberg bluegrass, prairie Junegrass, and red three-awn, a warm season increaser. The poor value bulbous bluegrass is also abundant and has increased significantly in 2001.

The forb component consists largely of annual mustards, ragweed, storksbill, and yellow salsify. Ragweed alone made up 58% of the forb cover in 1996. Apart from the small amounts of white sweet clover and alfalfa, the forb composition is nearly valueless and indicative of very poor range condition.

1984 APPARENT TREND ASSESSMENT

This site appears to be in a state of decline. Virtually every indicator suggests a continuing decline in range condition. This is especially evident with respect to vegetative parameters. The soil trend will likely continue to remain stable as long as abundant vegetation cover continues. Perhaps the most serious downward trend is the possible loss or serious depletion of the big sagebrush resource due to extremely heavy use combined with poor recruitment.

1990 TREND ASSESSMENT

Basin big sagebrush has shown a slight increase in its density (17%) since 1984. Percent decadency has gone from 92% down to 31%, while the young class currently makes up 31% of the population. This population remains a moderately hedged, low density sagebrush community. The herbaceous trend is down. Undesirable species are prominent and continue to increase. Dyers woad increased significantly in nested frequency. Other species that have increased in abundance include jointed goatgrass and cheatgrass. Actually, only 6 out of 20 forbs increased in nested and quadrat frequency value, with 4 of these being weedy increasers. There is some evidence of soil movement, but ground cover percentages indicate no meaningful changes in the soil condition.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - downward and dominated by annuals (1)

1996 TREND ASSESSMENT

Soil trend is up due to an increase in litter cover and a decline in percent bare ground from 13% to <1%. The abundant herbaceous vegetation and its associated litter adequately protect the soil from erosion. Trend for browse is up with a 43% increase in density of basin big sagebrush. Some of the increase is due to the much larger sample size used in 1996. However, utilization is light, vigor good, and percent decadency low at 8%. Much of the dead sagebrush within the population appear to be the result of the harsh winters of the early 1980's (heavy use and winter injury) combined with extended drought. Sum of nested frequency for perennial grasses has decreased, while that for forbs has slightly increased. However, forbs only make up 17% of the total herbaceous cover. Trend for the perennial species within the herbaceous understory is down. The herbaceous composition is extremely poor, with >88% of the herbaceous cover made up of annual weeds. The grass composition is totally dominated by undesirable species which include joint goatgrass, rattlesnake brome, Japanese brome, cheatgrass, annual rye, and bulbous bluegrass. Preferred perennial grasses make up only 4% of the grass cover. The forb composition is also poor and dominated by weedy annual, biannual, and perennial species. Common ragweed is the most abundant species. It accounts for 58% of the forb cover, and showed a notable increase in its nested frequency since 1990. Conversely, dyers woad declined significantly in nested frequency, while that of white sweetclover increased. With the high amounts of fine fuel (weedy species), one wildfire could remove all of the critical winter browse (basin big sagebrush) from the site.

TREND ASSESSMENT

soil - up (5)

browse - up (5)

herbaceous understory - down with poor composition (1)

2001 TREND ASSESSMENT

The soil trend remains stable with abundant herbaceous vegetation and litter cover. Trend for basin big sagebrush is also stable with a similar population density. Use is mostly light, vigor normal, and percent decadence low at 13%. The only downward trend parameter is the decline in young and seedling sagebrush. Trend for the herbaceous understory is down slightly. Sum of nested frequency of perennial grasses has increased since 1996; however, the rise is the result of the significant increase in the poor value bulbous bluegrass. Jointed goatgrass and cheatgrass also increased significantly. These 3 species account for 89% of the grass cover and 74% of the total herbaceous cover. Sum of nested frequency of perennial forbs declined in frequency. The most abundant forbs consist of pale alyssum, ragweed, and storksbill. The only positive aspect of the forb composition is the significant decline in the nested frequency of dyers woad and the stable frequency of alfalfa.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down slightly, dominated by annual grasses and weedy forbs (2)

HERBACEOUS TRENDS --

Herd unit 02 , 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	<i>Aegilops cylindrica</i> (a)	a3	b81	c148	d229	1	26	54	75	7.88	15.26
G	<i>Agropyron spicatum</i>	b46	a15	a21	a17	19	7	9	7	.73	.28
G	<i>Aristida purpurea</i>	3	-	-	-	1	-	-	-	-	-
G	<i>Bromus brizaeformis</i> (a)	-	-	48	45	-	-	19	19	.19	.18
G	<i>Bromus japonicus</i> (a)	-	-	b338	a73	-	-	95	29	16.71	.32
G	<i>Bromus tectorum</i> (a)	-	-	a262	b313	-	-	74	94	8.07	14.82
G	<i>Carex</i> spp.	-	-	-	4	-	-	-	1	-	.38
G	<i>Elymus cinereus</i>	a-	a-	a-	b8	-	-	-	5	-	.27
G	<i>Koeleria cristata</i>	5	-	-	-	4	-	-	-	-	-
G	<i>Poa bulbosa</i>	a-	a-	b58	c171	-	-	22	58	1.49	7.62
G	<i>Poa pratensis</i>	-	-	-	3	-	-	-	1	-	.03
G	<i>Poa secunda</i>	a12	ab34	a14	b62	6	16	7	24	.03	.78
G	<i>Secale cereale</i> (a)	a-	a8	c114	b89	-	3	44	36	2.77	2.48
Total for Annual Grasses		3	89	910	749	1	29	286	253	35.64	33.08
Total for Perennial Grasses		66	49	93	265	30	23	38	96	2.25	9.36
Total for Grasses		69	138	1003	1014	31	52	324	349	37.90	42.44
F	<i>Agoseris glauca</i>	1	5	3	-	1	2	1	-	.00	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Allium acuminatum</i>	_b 22	_a -	_a -	_a -	12	-	-	-	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	_a 47	_b 106	-	-	18	42	.21	.33
F	<i>Ambrosia psilostachya</i>	_c 261	_{ab} 94	_b 114	_a 57	85	41	49	27	3.92	2.25
F	<i>Artemisia ludoviciana</i>	1	3	-	-	1	1	-	-	-	-
F	<i>Asclepias asperula</i>	_a -	_b 8	_{ab} 5	_b 11	-	5	4	6	.54	.23
F	<i>Astragalus utahensis</i>	_{ab} 6	_b 8	_a -	_a -	4	5	-	-	-	-
F	<i>Balsamorhiza sagittata</i>	1	-	-	-	1	-	-	-	-	-
F	<i>Calochortus nuttallii</i>	1	-	3	3	1	-	2	2	.01	.03
F	<i>Cirsium undulatum</i>	_b 22	_a 1	_a 1	_a 2	9	1	1	1	.00	.15
F	<i>Comandra pallida</i>	3	-	-	-	2	-	-	-	-	-
F	<i>Crepis acuminata</i>	5	7	-	2	3	3	-	1	-	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	_b 70	_a 6	-	-	33	2	.29	.01
F	<i>Erodium cicutarium</i> (a)	-	-	_a 8	_b 141	-	-	4	46	.07	4.19
F	<i>Gilia</i> spp. (a)	-	-	3	8	-	-	1	3	.00	.01
F	<i>Grindelia squarrosa</i>	-	-	3	-	-	-	1	-	.03	-
F	<i>Holosteum umbellatum</i> (a)	-	-	_a -	_b 101	-	-	-	39	-	.29
F	<i>Isatis tinctoria</i>	_a 1	_c 46	_b 27	_{ab} 6	1	24	12	3	.19	.01
F	<i>Lactuca serriola</i>	-	6	2	6	-	4	1	4	.00	.02
F	<i>Linum lewisii</i>	1	-	-	-	1	-	-	-	-	-
F	<i>Lithospermum ruderales</i>	_a -	_b 6	_a -	_a -	-	5	-	-	.03	-
F	<i>Lomatium grayi</i>	5	-	-	-	3	-	-	-	-	-
F	<i>Melilotus alba</i>	_a 9	_a 1	_b 28	_a -	4	1	11	-	.30	-
F	<i>Medicago sativa</i>	15	19	16	22	6	9	7	11	.45	.74
F	<i>Petrorhiza pumila</i>	2	-	-	-	1	-	-	-	-	-
F	<i>Phlox longifolia</i>	-	-	5	-	-	-	2	-	.01	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	6	-	-	-	3	-	.01
F	<i>Tragopogon dubius</i>	_c 191	_{ab} 35	_b 60	_a 8	86	15	28	4	.71	.16
F	<i>Zigadenus paniculatus</i>	-	-	-	4	-	-	-	1	-	.00
Total for Annual Forbs		0	0	128	368	0	0	56	135	0.57	4.86
Total for Perennial Forbs		547	239	267	121	221	116	119	60	6.22	3.63
Total for Forbs		547	239	395	489	221	116	175	195	6.80	8.50

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

BROWSE TRENDS --
Herd unit 02 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata tridentata	50	52	9.85	10.98
B	Gutierrezia sarothrae	7	9	.03	.69
Total for Browse		57	61	9.89	11.67

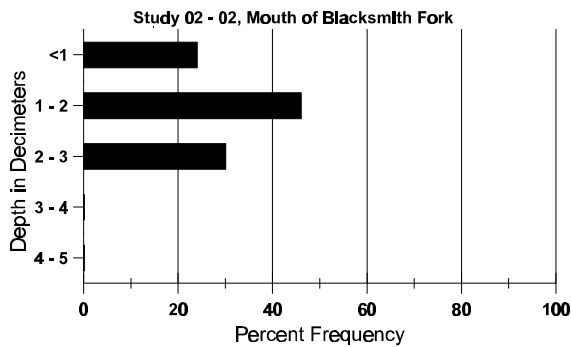
BASIC COVER --
Herd unit 02 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	398	390	2.00	11.00	59.50	69.97
Rock	195	101	16.00	20.75	6.88	3.52
Pavement	119	163	14.00	3.50	2.87	4.34
Litter	400	387	58.00	51.75	71.15	55.77
Cryptogams	-	-	1.00	0	0	0
Bare Ground	62	27	9.00	13.00	.41	.26

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 02, Mouth of Blacksmith Fork

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.9	75.6 (16.5)	7.9	33.3	40.7	26.0	2.7	7.3	188.8	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 2

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Elk	1	-	-	-
Deer	1	2	26	2 (5)
Cattle	1	1	17	1 (3)

BROWSE CHARACTERISTICS --

Herd unit 02 , 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 tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	10	-	-	1	-	-	-	-	-	-	-	-	11	220	32	40	11
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	8	1	-	-	-	-	-	-	-	-	-	-	9	300	25	27	9
	96	22	-	-	-	-	-	-	-	-	-	-	-	22	440	32	52	22
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20	31	41	1
M	84	-	-	2	-	-	-	-	-	-	-	-	-	2	66	32	40	2
	90	9	1	-	1	-	-	-	-	-	-	-	-	8	366	25	27	11
	96	52	3	-	-	-	-	-	-	-	-	-	-	55	1100	32	52	55
	01	67	13	-	-	-	-	-	-	-	-	-	-	80	1600	31	41	80
D	84	-	-	22	-	-	-	-	-	-	-	-	-	16	733			22
	90	3	5	1	-	-	-	-	-	-	-	-	-	5	300			9
	96	5	2	-	-	-	-	-	-	-	-	-	-	6	140			7
	01	10	2	-	-	-	-	-	-	-	-	-	-	7	240			12
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	520			26	
	01	-	-	-	-	-	-	-	-	-	-	-	-	280			14	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			13%			+17%							
'90		24%			03%			24%			+43%							
'96		06%			00%			01%			+10%							
'01		16%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	799	Dec:	92%			
												'90	966		31%			
												'96	1680		8%			
												'01	1860		13%			

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>Gutierrezia sarothrae</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	1	-	-	-	-	-	-	-	2	-	-	-	66	19	22	2
	90	24	-	-	1	-	-	-	-	-	25	-	-	-	833	18	16	25
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	14	19	17
	01	27	1	-	-	-	-	-	-	-	27	1	-	-	560	12	18	28
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		67%			00%			00%			+89%							
'90		00%			00%			00%			-31%							
'96		00%			00%			00%			-10%							
'01		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	99	Dec:	33%			
												'90	899		0%			
												'96	620		0%			
												'01	560		0%			
<i>Opuntia spp.</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33	6	8	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	33		-			
												'96	0		-			
												'01	0		-			

Trend Study 2-4-01

Study site name: Crow Mountain.

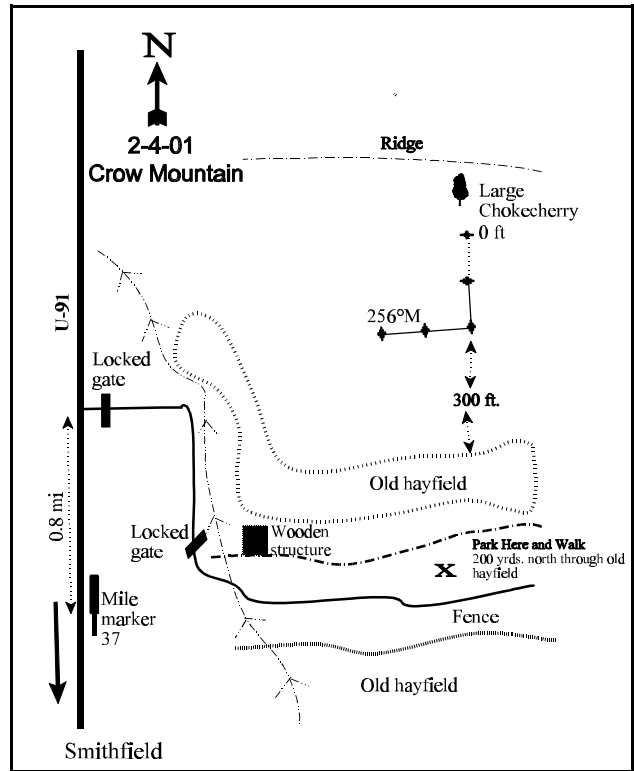
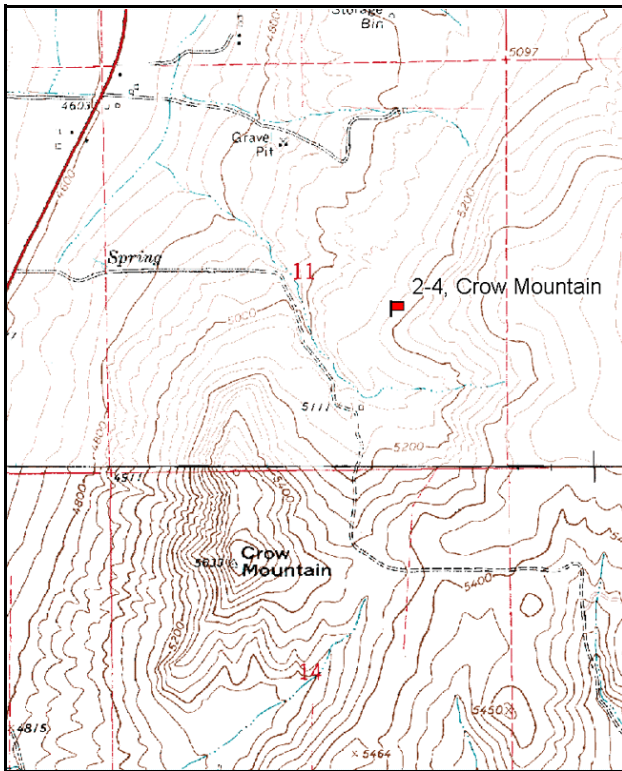
Vegetation type: Bitterbrush.

Compass bearing: frequency baseline 160 degrees magnetic.

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

LOCATION DESCRIPTION

Proceed north on U-91 through Smithfield to mile marker 37. Travel 0.8 miles north of the mile marker and turn east (right). At the fork, veer left (right fork goes to residence) and proceed through the gate. From the gate travel 0.4 miles passing through two gates. Stop at the third gate noting an old wooden structure on the left. From the gate walk approximately 275 paces at a bearing of 13 degrees true to the 0-foot stake of the baseline. The baseline runs at a bearing of 160 degrees magnetic. The 0-foot stake is marked by browse tag #7927. The baseline doglegs after 200 feet and runs in a direction of 256 degrees magnetic. You will need to call the land owner in Richmond to get the key for the locked gates.



Map Name: Richmond

Diagrammatic Sketch

Township 13N, Range 1E, Section 11

UTM 4636583 N, 433501 E

DISCUSSION

Trend Study No. 2-4

The Crow Mountain study, one of several that samples critical winter range along the Cache County "face", is located between Smithfield and Richmond. Like much of the critical winter range north of Smithfield, the study area is surrounded by cultivated hay-meadows and pastures. The site is within a dispersed stand of bitterbrush on a 35% south slope at approximately 5,140 feet in elevation. Utilization of the browse was observed as heavy in 1984, after the heavy winters of 1982-84. Utilization was light in 1996, with only a few deer and elk pellet groups found on the site. The area has been grazed by cattle in the past, but no grazing occurred between 1991-1996. A pellet group transect read on the site in 2001 estimated only 2 deer days use/acre and 1 cow day use/acre (5ddu/ha and 3 cdu/ha). Deer pellet groups appear to be primarily from late spring and early summer. These may be from resident deer which feed in nearby fields.

Soil is classified as "Leathan Silt Loam", a classification that has only moderate water permeability and a high erosion potential. Leathan soil is quite deep with an A horizon up to 12" in depth, depending upon erosion. Chemically, the soil is strongly calcareous but only mildly alkaline in reaction (Erickson and Mortensen, 1974). Soils at the study site are deep with an effective rooting depth (see methods) estimated at 20 inches in 1996. Texture is a clay loam with a moderately alkaline pH (7.8). Organic matter is relatively high at 4.5%, but phosphorus could be a limiting factor at only 7 ppm. Values less than 10 ppm may be limiting to plant growth and development. Vegetative and litter cover from herbaceous plants provide adequate soil protection to prevent most erosion. The erosion condition class was determined to be slight in 2001.

Because of an almost complete loss of mountain big sagebrush, browse composition and overall density has been seriously depleted. Current composition consists of a sparse stand of mostly older age class antelope bitterbrush and a number of smaller increaser shrubs including broom snakeweed, woods rose, and stickyleaf low rabbitbrush. Big sagebrush is nearly absent within the immediate area except on or near drainage channels. Antelope bitterbrush was heavily browsed in 1984, but protected somewhat by a semi-erect, layering growth form. Use was light to moderate in 1990 and 1996. Vigor was generally good. However, relatively little sexual reproduction was apparent. The major decline in population density in 1996 is more a reflection of the greatly increased sample size used in 1996 and not a major drop in density. Evidence of this is found in the relatively small number of dead plants sampled (140 plants/acre). During the 2001 reading, utilization was moderate to heavy. Poor vigor increased slightly and percent decadence rose from 12% in 1996 to 39% in 2001. The number of dead plants also rose slightly. Bitterbrush on the site displayed relatively long annual leader growth in 2001, averaging 4.5 inches. It appears that bitterbrush has received consistent heavy use for the past few years. The only other shrubs providing significant forage are a few large scattered serviceberry. These show heavy use where available, but most are growing out of reach.

The principal forage component is a vigorous stand of perennial grasses and forbs. The perennial grass composition has been dominated by Kentucky bluegrass with smaller amounts of bluebunch wheatgrass in 1984. Bluebunch wheatgrass is currently the most abundant perennial grass. However, annual brome grasses dominate the site by providing 81% of the grass cover in 1996 and 73% in 2001. Annual grasses and forbs were not included in the 1984 and 1990 surveys, so no comparisons can be made. Photo point comparisons suggest that these annual grasses were also numerous in 1990.

Forbs are very diverse and abundant, containing several useful species that include the following: yellow salsify, arrowleaf balsamroot, western yarrow, blue flax, and low penstemon. Unfortunately, weedy forbs are also abundant and contain some invasive species. Curly cup gumweed, thistle, and dyers woad are abundant. The abundant understory cover of annual grasses and weedy forbs provides significant competition to shrub establishment.

1984 APPARENT TREND ASSESSMENT

Soil is protected by an adequate vegetative cover of grass and forbs. Trend appears stable. However, the same factors that produce a stable soil trend also appear to be inhibiting reproduction of the more desirable shrub species. From a big game winter forage point of view, condition is declining because of a lack of browse and the fact that only the undesirable shrubs appear to be increasing.

1990 TREND ASSESSMENT

Bitterbrush is the key browse species on this privately-owned winter range. There is limited browse in this agricultural area. The large old plants have been heavily utilized in the past, but currently support light to moderate hedging. Density plots appeared to show the bitterbrush population increasing by 15%, while percent decadency also increased from 21% to 29%. On this slope, there is heavy competition from an understory of a sod-forming grass, rhizomatous forbs, and numerous annuals. There are 27 forbs with 17 of them increasing in nested and quadrat frequency values. Three of the 4 grasses also have increasing nested and quadrat frequency values. It should be noted that the competitive sod-forming Kentucky bluegrass has greatly decreased in nested and quadrat frequency values, while the more desired bluebunch wheatgrass has increased.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - improving (4)

1996 TREND ASSESSMENT

The soil trend is up slightly due to an increase in litter cover and a decline in bare ground from 36% to 8%. Abundant vegetation and litter cover adequately protect the soil from erosion. Trend for the key browse species, antelope bitterbrush, is up slightly. Estimated density declined since 1990 from 2,266 plants/acre to 860. However, due to the lack of significant numbers of dead plants, this decline is mostly due to the much larger sample size utilized. The new sample better estimates shrub densities which often have aggregated and/or discontinuous populations which characterizes this bitterbrush population. Utilization is currently light to moderate with no heavy use reported. Percent decadency declined from 29% to 12%, with most plants displaying good vigor. Broom snakeweed also showed an increase in population, apparently a result of the increased sample. Snakeweed and wood's rose appear to have stable populations with their current age distributions. The herbaceous understory is abundant, but dominated by annual brome grasses which combine to cover nearly one-third of the ground surface. Kentucky bluegrass has continued to decline significantly leaving bluebunch wheatgrass as the only abundant perennial grass. Sum of nested frequency for perennial grasses declined by 57%. Forbs are abundant and contain some important species. However, nearly all perennial forb species sampled in 1990 declined in nested frequency by 1996. The only species that increased include curly cup gumweed, dyers woad, pacific aster, tapertip hawksbeard, prickly lettuce, and low penstemon. Gumweed and dyers woad are abundant and account for 25% of the forb cover. Overall, sum of nested frequency for forbs declined by 30%. This, combined with the decline in sum of nested frequency for perennial grasses, indicates a downward trend for the herbaceous understory.

TREND ASSESSMENT

soil - up slightly (4)

browse - up slightly (4)

herbaceous understory - down, dominated by weedy species (1)

2001 TREND ASSESSMENT

Trend for soil is down. Percent cover of bare ground rose from 8% in 1996 to 34% in 2001. Litter cover also declined substantially. This trend is due to the past several dry years ('00 and '01). However, there is little erosion occurring. The erosion condition class was determined to be slight. Trend for the key browse species, antelope bitterbrush, is down slightly due to heavier use, increased poor vigor, increased decadence, and a decline in recruitment. Thirty-three percent of the decadent plants (80 plants/acre) were classified as dying and currently there are no young or seedlings to replace these. Except for the decadent, dying individuals in the population, all of the other plants sampled displayed normal vigor. Even with the heavy use, average annual leader growth of bitterbrush was 4.5 inches. Another positive aspect is the decline in the densities of broom snakeweed and woods rose, both increasers. Trend for the herbaceous understory is stable but composition is still poor. The grass composition is still dominated by Japanese brome which provides 71% of the grass cover and 44% of the total herbaceous cover. Bluebunch wheatgrass and Kentucky bluegrass are the only common perennial grasses. They combine to produce 26% of the grass cover. Forbs are abundant and diverse. The most abundant perennial species include arrowleaf balsam root, prickly lettuce, Lewis flax, and yellow salsify. Several undesirable species are also present including Pacific aster, thistle, curlycup gum weed, and dyer's woad.

TREND ASSESSMENT

soil - down (1)

browse - down slightly (2)

herbaceous understory - stable but composition is poor (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 4

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	a7	b98	b89	b80	3	32	30	28	6.23	4.86
G	Bromus brizaeformis (a)	-	-	a84	b105	-	-	36	48	.84	.47
G	Bromus japonicus (a)	-	-	b351	a341	-	-	95	97	22.86	16.85
G	Bromus tectorum (a)	-	-	b74	a9	-	-	25	5	3.95	.05
G	Festuca ovina	-	1	-	-	-	1	-	-	-	-
G	Koeleria cristata	-	-	-	1	-	-	-	1	-	.03
G	Poa fendleriana	-	1	5	-	-	1	3	-	.01	-
G	Poa pratensis	d310	c178	a25	b85	98	66	11	37	.28	1.36
G	Poa secunda	a-	a-	a-	b12	-	-	-	5	-	.06
Total for Annual Grasses		0	0	509	455	0	0	156	150	27.66	17.37
Total for Perennial Grasses		317	278	119	178	101	100	44	71	6.52	6.33
Total for Grasses		317	278	628	633	101	100	200	221	34.18	23.70

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Achillea millefolium</i>	15	13	11	22	9	6	6	10	.28	.17
F	<i>Agoseris glauca</i>	-	-	-	4	-	-	-	2	-	.01
F	<i>Alyssum alyssoides</i> (a)	-	-	_a 46	_b 94	-	-	17	38	.16	.24
F	<i>Artemisia ludoviciana</i>	-	-	1	1	-	-	1	1	.00	.03
F	<i>Aster chilensis</i>	_a 4	_b 40	_{ab} 22	_b 32	2	15	10	12	.36	1.13
F	<i>Astragalus convallarius</i>	_a -	_b 21	_{ab} 7	_a 4	-	9	3	2	.04	.18
F	<i>Astragalus</i> spp.	-	5	-	-	-	3	-	-	-	-
F	<i>Balsamorhiza sagittata</i>	_{bc} 126	_c 132	_b 95	_a 61	58	65	47	33	8.32	3.51
F	<i>Camelina microcarpa</i> (a)	-	-	_a -	_b 30	-	-	-	15	-	.08
F	<i>Calochortus nuttallii</i>	-	5	-	-	-	2	-	-	-	-
F	<i>Cirsium undulatum</i>	_c 78	_{ab} 37	_b 33	_a 8	37	17	17	4	1.40	.31
F	<i>Comandra pallida</i>	_b 21	_c 49	_b 14	_a -	9	25	8	-	.04	-
F	<i>Collinsia parviflora</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Crepis acuminata</i>	-	1	7	-	-	1	4	-	.12	-
F	<i>Draba</i> spp. (a)	-	-	-	2	-	-	-	1	-	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	10	9	-	-	5	5	.05	.02
F	<i>Eriogonum cernuum</i> (a)	-	-	1	-	-	-	1	-	.03	-
F	<i>Galium aparine</i> (a)	-	-	_b 16	_a 2	-	-	6	1	.03	.00
F	<i>Gilia</i> spp. (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Grindelia squarrosa</i>	_a 11	_{ab} 12	_b 32	_a 9	5	8	13	5	2.51	.54
F	<i>Hackelia patens</i>	_a 1	_b 23	_a -	_a -	1	14	-	-	-	-
F	<i>Helianthus annuus</i> (a)	_a -	_a -	_b 7	_b 15	-	-	5	8	.07	.58
F	<i>Helianthella uniflora</i>	_a -	_b 12	_a 3	_a -	-	6	1	-	.38	-
F	<i>Ipomopsis aggregata</i>	-	2	-	-	-	2	-	-	-	-
F	<i>Isatis tinctoria</i>	_a -	_a 6	_c 96	_b 51	-	2	45	25	2.20	2.02
F	<i>Lappula occidentalis</i> (a)	-	-	-	2	-	-	-	1	-	.00
F	<i>Lactuca serriola</i>	_a 7	_a 16	_a 27	_b 117	5	7	13	53	.38	2.79
F	<i>Leucelene ericoides</i>	-	-	-	1	-	-	-	1	-	.03
F	<i>Linum lewisii</i>	_a 38	_b 67	_{ab} 62	_{ab} 46	17	29	24	21	1.06	.98
F	<i>Lithospermum ruderales</i>	_c 50	_b 12	_{ab} 5	_a -	24	6	4	-	.19	-
F	<i>Medicago sativa</i>	-	1	-	-	-	1	-	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Oenothera caespitosa</i>	-	4	-	-	-	1	-	-	-	-
F	<i>Penstemon humilis</i>	_a -	_b 16	_b 49	_a 3	-	8	18	1	.82	.00
F	<i>Petrorhiza pumila</i>	-	3	-	-	-	1	-	-	-	-
F	<i>Phlox longifolia</i>	_a -	_c 127	_b 25	_b 15	-	54	12	6	.16	.03

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Senecio spp.	11	-	-	-	6	-	-	-	-	-
F	Taraxacum officinale	-	7	-	-	-	3	-	-	-	-
F	Tragopogon dubius	_c 176	_b 122	_a 27	_a 52	76	56	13	26	.24	1.05
F	Veronica biloba (a)	-	-	_a 6	_b 79	-	-	3	29	.01	.66
F	Viola spp.	_a -	_b 22	_a 1	_a -	-	15	1	-	.00	-
F	Zigadenus paniculatus	-	-	-	1	-	-	-	1	-	.03
Total for Annual Forbs		0	0	86	240	0	0	37	101	0.35	1.62
Total for Perennial Forbs		538	755	517	427	249	356	240	203	18.58	12.87
Total for Forbs		538	755	603	667	249	356	277	304	18.94	14.50

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

BROWSE TRENDS --

Herd unit 02 , Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Acer grandidentatum	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	2	0	.38	-
B	Gutierrezia sarothrae	43	25	3.32	1.24
B	Purshia tridentata	32	26	5.66	4.51
B	Rosa woodsii	29	11	.72	.21
Total for Browse		106	63	10.10	5.98

BASIC COVER --

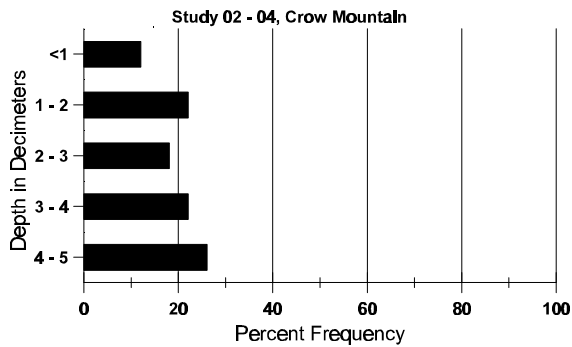
Herd unit 02 , Study no: 4

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	389	377	3.00	15.00	56.76	48.80
Rock	61	69	3.50	3.50	.71	1.58
Pavement	100	127	2.25	3.50	.48	1.18
Litter	398	381	70.00	41.75	58.16	39.72
Cryptogams	2	-	0	0	.00	0
Bare Ground	216	300	21.25	36.25	8.03	33.92

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 04, Crow Mountain

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.0	64.2 (18.1)	7.8	31.7	29.0	39.3	4.5	7.0	230.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 4

Type	Quadrat Frequency	
	'96	'01
Rabbit	1	-
Elk	1	-
Deer	-	1
Cattle	-	1

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
-	-
26	2 (5)
9	1 (3)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 4

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				
Acer grandidentatum																		
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		-			
Amelanchier alnifolia																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	98	56	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	70	61	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%			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>Artemisia tridentata vaseyana</i>																		
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%										
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	19	25	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	0	Dec:	-			
												'90	0		-			
												'96	40		-			
												'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				
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	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	16	18	1
	96	118	-	-	1	-	-	-	-	-	119	-	-	-	2380	12	18	119
	01	72	-	-	-	-	-	-	-	-	70	2	-	-	1440	10	15	72
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	7	-	-	-	-	-	-	-	-	1	-	1	5	140		7	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	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%			+97%							
'96		00%			00%			00%			-35%							
'01		00%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	66		0%			
												'96	2440		0%			
												'01	1580		9%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	84	3	2	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	18	-	-	-	-	-	-	18	-	-	-	1200	21	41	18
	90	16	2	-	6	-	-	-	-	-	24	-	-	-	1600	22	34	24
	96	12	19	-	-	1	-	-	-	-	30	2	-	-	640	25	49	32
	01	1	12	5	-	-	1	-	-	-	19	-	-	-	380	22	40	19
D	84	-	-	6	-	-	-	-	-	-	6	-	-	-	400			6
	90	4	6	-	-	-	-	-	-	-	9	-	-	1	666			10
	96	1	4	-	-	-	-	-	-	-	2	-	1	2	100			5
	01	2	7	2	-	-	1	-	-	-	8	-	-	4	240			12
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		07%			83%			00%			+15%							
'90		24%			00%			03%			-62%							
'96		56%			00%			07%			-28%							
'01		61%			29%			13%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1933	Dec:	21%			
												'90	2266		29%			
												'96	860		12%			
												'01	620		39%			

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				
Ribes aureum																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	55	56	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		-			
Rosa woodsii																		
S	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	6	-	-	11	-	-	-	-	-	17	-	-	-	1133			17
	96	31	-	-	-	-	-	-	-	-	28	-	3	-	620			31
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	84	18	-	-	-	-	-	-	-	-	18	-	-	-	1200	15	5	18
	90	3	-	-	1	-	-	-	-	-	4	-	-	-	266	12	8	4
	96	36	-	-	-	-	-	-	-	-	33	-	3	-	720	43	45	36
	01	8	-	-	-	-	-	-	-	-	7	-	-	1	160	12	10	8
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	2	-	3	-	100			5
	01	6	-	-	-	-	-	-	-	-	-	-	-	6	120			6
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%			- 9%							
	'90	00%			00%			00%			+ 3%							
	'96	00%			00%			13%			-71%							
	'01	00%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1533	Dec:	0%			
												'90	1399		0%			
												'96	1440		7%			
												'01	420		29%			

*****Suspended*****

Trend Study 2-5-96

Study site name: Smithfield Dry Canyon.

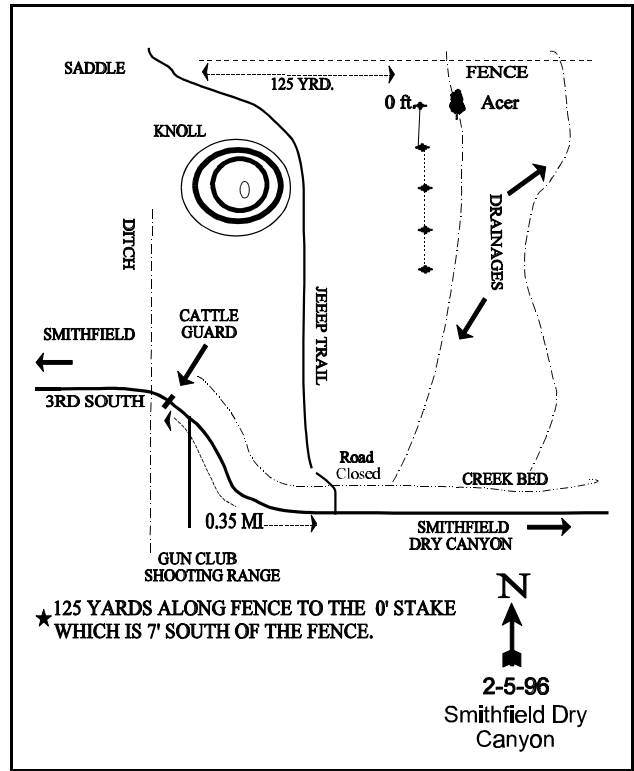
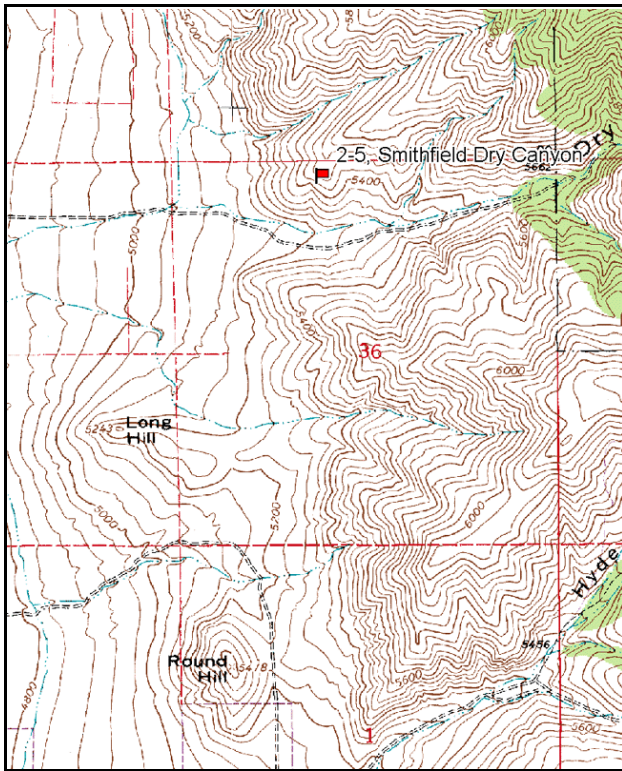
Vegetation type: Perennial Grass.

Compass bearing: frequency baseline 151 degrees magnetic

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

LOCATION DESCRIPTION

In Smithfield turn east (right) onto 3rd South and proceed up Smithfield Dry Canyon. The road eventually turns to gravel. Begin to note mileage at the cattleguard (old and filled in with dirt) outside of the canyon mouth. Proceed 0.35 miles up the canyon from the cattle guard to a point where a faint road takes off to the left, crosses the creek bed, and runs up the slope to the north. Four-wheel drive is advisable from this point. Proceed across creek and up the slope to the fence. Walk east along the fence approximately 125 yards and look for the 0-foot stake of the frequency baseline seven feet south of the fence. If one comes to a juniper by a drainage, backtrack 55 feet to the 0-foot stake. A red browse tag is wired to the 0-foot stake; #7952.



Map Name: Smithfield

Diagrammatic Sketch

Township 13N, Range 1E, Section 36

UTM 4631306 N, 434721 E

DISCUSSION

Trend Study No. 2-5

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006.

The Smithfield Dry Canyon study is located on the north side of Smithfield Canyon near an old bitterbrush "browse" transect. The study site is on a 35% south-facing slope at an elevation of 5,360 feet. Utilized as critical deer winter range, the area also is grazed by cattle during the summer. Once dominated by a good mix of antelope bitterbrush and mountain big sagebrush, the current community trend appears to be going toward annual grasses and forbs. Utilization of the remaining browse plants was extremely heavy in 1984, with many deer pellet groups and cattle pats present. During the 1996 reading, no pellet groups of any kind were encountered, but the site was utilized by a large number of grasshoppers.

The soil is relatively deep (>30") with very little rock on the surface or in the profile. The soil has a clay texture which resulted in large cracks 1 to 2 inches wide, reported in 1996, one day after a rain storm. The soil reaction is neutral (7.1 pH). Soil temperature was high however, with an average of nearly 72° F at a depth of 18 inches. Protective vegetation and litter cover are abundant and prohibit accelerated erosion.

Browse composition consists of a widely dispersed stand of antelope bitterbrush with some remnant mountain big sagebrush. Both species have been heavily browsed in the past, but currently display good vigor. Bitterbrush density was estimated at 300 plants/acre in 1996, 80% of which are mature. The decline in density from 799 plants/acre reported in 1990, to current levels is a result of the greatly increased sample used in 1996, which gives a much better estimate because of its widely dispersed nature. Only 60 dead plants/acre were estimated in 1996, indicating that no large die-off occurred since 1990. Utilization of the bitterbrush was considered moderate with heavy use reported on 33% of the population in 1996. Percent decadency declined from a high of 58% in 1990 to 13% by 1996. All plants displayed good vigor and many were producing seed. However, a long term decline in density is obvious. For example in 1984, nearly half of the bitterbrush plants with browse tags from the old browse transect were dead.

Mountain big sagebrush number only 40 plants/acre, all classified as mature. The population displays light use and good vigor, but no reproduction is evident. This is likely due to the abundant herbaceous understory which is dominated by annuals and weedy forbs.

In response to the decline in browse density and cover, there has been a concurrent increase in herbaceous density. The principal beneficiary prior to 1990 was Kentucky bluegrass, a naturalized turf grass. Kentucky bluegrass is a good quality forage species. However, it also is one that forms a dense sod that offers strong competition to developing shrub seedlings. With extended drought, Kentucky bluegrass has been replaced by bulbous bluegrass by 1990. Currently (1996), Kentucky bluegrass has essentially disappeared. The only common perennial grasses include bluebunch wheatgrass and bulbous bluegrass.

Forb composition is moderately diverse but includes few desirable species. The most uniformly distributed forb is arrowleaf balsamroot. Weedy forbs dominate the composition. These include curlycup gumweed, ragweed, aster, sunflower, tumble mustard, prickly lettuce, and yellow salsify. They currently account for 86% of the forb cover. Many forbs tend to occur in dense but irregularly distributed patches. Species such as pacific aster, ragweed, and mountain sage are also in this category.

1984 APPARENT TREND ASSESSMENT

For deer winter range, the overall trend must be judged as declining. Vegetative composition is becoming increasingly dominated by perennial grass and to a lesser extent, forbs. Valuable forage shrubs are rapidly disappearing. However, this same vegetative trend is resulting in a stable or even improving soil trend. Although some soil erosion is apparent, the increasing stand densities of Kentucky bluegrass appears to be stabilizing the site.

1990 TREND ASSESSMENT

This foothill slope retains remnants of bitterbrush and big sagebrush. The data indicates no substantial changes in density. Hedging appears light to moderate, compared to the heavy browsing noted in 1984. Vigor is fair. However, both populations are a little more than 50% decadent, an increase from 1984 when it was a little over 30%. There are few seedling and young shrubs because of the competition with the very dense weedy understory accompanied with extended drought. These weedy species also cause a high fire hazard, especially with the high numbers of annual brome grasses and bulbous bluegrass. Bluebunch wheatgrass has increased slightly since 1984. Bulbous bluegrass has greatly increased in nested and quadrat frequencies while Kentucky bluegrass has greatly reduced values. This would appear to be caused by the drought conditions we are now experiencing and that this is a marginal site for Kentucky bluegrass. Twelve of 19 forbs have increased, but many of them are weedy increasers. The soil is fairly well protected with percent bare ground decreasing.

TREND ASSESSMENT

soil - stable (3)

browse - stable but at very low densities (3)

herbaceous understory - downward trend because of increased prominence of weedy species (1)

1996 TREND ASSESSMENT

Soil trend is up due to a 50% increase in litter cover and a nearly 7-fold decline in percent bare ground. However, this improvement comes largely from an increase in annual grasses and their associated litter. Trend for the key browse species, bitterbrush, is up slightly. Density declined but most of the change is the result of the larger, more representative sample used in 1996 giving better estimates for populations that are widely dispersed and clumped. There are only 60 dead plants/acre of bitterbrush. Utilization is higher, but percent decadency has declined from 58% to 13% and vigor is good on all plants sampled. The herbaceous understory is shifting dramatically toward annual grasses and aggressive weedy forbs. Kentucky bluegrass was abundant in 1984 with a quadrat frequency of 97%. Quadrat frequency declined to 22% in 1990 and 0% in 1996. The only perennial grasses left are small quantities of bluebunch wheatgrass and bulbous bluegrass. Currently, annual brome grasses include rattlesnake brome, Japanese brome, and cheatgrass. They comprise 91% of the grass cover. These grasses were not included in the 1984 or 1990 samples, so no direct comparisons can be made. The forb component is dominated by low value aggressive forbs that mostly include ragweed, aster, curlycup gumweed, prickly lettuce, tumble mustard, and yellow salsify. Prickly lettuce and yellow salsify can provide some forage for big game. Since 1990, gumweed and prickly lettuce have increased significantly in nested frequency values and now represent the most abundant forbs on the site. Overall, sum of nested frequency for perennial grasses has declined over 4-fold, while sum of nested frequency for perennial forbs has increased slightly. Trend for the herbaceous understory is down.

TREND ASSESSMENT

soil - up (5)

browse - up slightly, but densities are still very low (4)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	44	57	33	16	18	13	1.29
G	Bromus brizaeformis (a)	-	-	6	-	-	2	.06
G	Bromus japonicus (a)	-	-	343	-	-	96	20.67
G	Bromus tectorum (a)	-	-	124	-	-	37	6.49
G	Poa bulbosa	_b 131	_c 340	_a 73	48	96	28	1.50
G	Poa pratensis	_c 309	_b 51	_a -	97	22	-	-
G	Poa secunda	-	9	-	-	4	-	-
Total for Annual Grasses		0	0	473	0	0	135	27.22
Total for Perennial Grasses		484	457	106	161	140	41	2.80
Total for Grasses		484	457	579	161	140	176	30.02
F	Achillea millefolium	5	7	-	2	3	-	-
F	Ambrosia psilostachya	_a -	_a -	_b 29	-	-	12	1.41
F	Artemisia ludoviciana	7	9	3	3	4	2	.16
F	Aster chilensis	_a 42	_b 109	_a 31	18	36	12	.53
F	Astragalus convallarius	-	4	4	-	1	1	.03
F	Balsamorhiza sagittata	_b 50	_b 48	_a 14	23	22	10	1.82
F	Calochortus nuttallii	3	4	-	1	3	-	-
F	Comandra pallida	3	8	6	1	4	2	.06
F	Cynoglossum officinale	-	2	-	-	1	-	-
F	Epilobium brachycarpum (a)	-	-	39	-	-	22	.51
F	Galium aparine (a)	-	-	5	-	-	2	.18
F	Grindelia squarrosa	_a 36	_a 28	_b 187	15	15	67	10.64
F	Hackelia patens	8	10	3	5	5	1	.03
F	Helianthus annuus (a)	15	33	18	7	18	9	.12
F	Helianthella uniflora	-	-	2	-	-	1	.00
F	Lappula occidentalis (a)	-	-	3	-	-	1	.00
F	Lactuca serriola	_a -	_b 99	_c 225	-	44	82	5.57
F	Lithospermum ruderae	8	11	12	4	6	7	.39
F	Navarretia intertexta (a)	-	-	6	-	-	4	.04
F	Phacelia spp.	7	-	-	3	-	-	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	Phlox longifolia	_a 1	_b 88	_a 5	1	37	2	.03
F	Polygonum douglasii (a)	-	-	7	-	-	4	.02
F	Sisymbrium altissimum (a)	-	-	46	-	-	22	1.87
F	Solidago spp.	1	-	-	1	-	-	-
F	Tragopogon dubius	_a -	_c 130	_b 65	-	59	28	1.22
F	Viola spp.	_a -	_b 16	_a -	-	11	-	-
F	Zigadenus paniculatus	2	-	-	1	-	-	-
Total for Annual Forbs		15	33	124	7	18	64	2.76
Total for Perennial Forbs		173	573	586	78	251	227	21.94
Total for Forbs		188	606	710	85	269	291	24.71

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

BROWSE TRENDS --

Herd unit 02 , Study no: 5

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata vaseyana	2	.78
B	Purshia tridentata	14	3.07
Total for Browse		16	3.85

BASIC COVER --

Herd unit 02 , Study no: 5

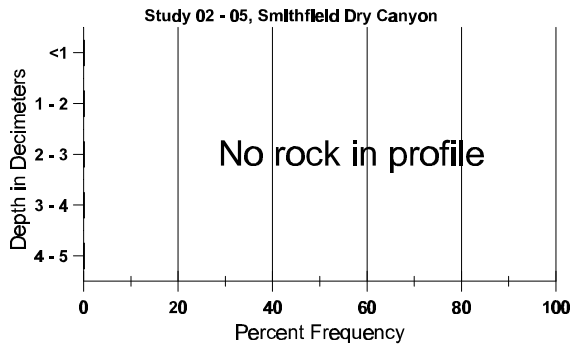
Cover Type	Nested Frequency	Average Cover %		
		'84	'90	'96
Vegetation	386	4.25	34.25	58.24
Rock	38	2.50	.25	.16
Pavement	17	.25	.25	.07
Litter	400	62.00	38.75	77.62
Cryptogams	-	0	0	0
Bare Ground	154	31.00	26.50	3.83

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 05, Smithfield Dry Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
27.5	71.6 (18.1)	7.1	24.3	28.4	47.4	3.3	17.0	284.8	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 5

Type	Quadrat Frequency '96
Rabbit	1

BROWSE CHARACTERISTICS --

Herd unit 02 , 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>Artemisia tridentata vaseyana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	1	1	-	-	-	-	-	-	2	-	-	-	66	25	17	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	24	17	1
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	37	60	2
D	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	1	-	-	1	-	-	-	-	-	1	-	-	1	66			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	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>							
'84		67%			33%			00%			+25%							
'90		00%			00%			25%			-70%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	99	Dec:	33%			
												'90	132		50%			
												'96	40		0%			
<i>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	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%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	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				
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	2	14	-	-	-	-	-	-	16	-	-	-	533	23 21	16	
	90	8	1	-	-	-	-	-	-	-	9	-	-	-	300	21 28	9	
	96	-	8	4	-	-	-	-	-	-	12	-	-	-	240	25 59	12	
D	84	-	-	12	-	-	-	-	-	-	12	-	-	-	400		12	
	90	9	4	-	1	-	-	-	-	-	13	-	-	1	466		14	
	96	-	1	1	-	-	-	-	-	-	2	-	-	-	40		2	
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		07%			93%			00%			-14%							
'90		21%			00%			04%			-62%							
'96		60%			33%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	933	Dec:	43%			
												'90	799		58%			
												'96	300		13%			

Trend Study 2-6-01

Study site name: Green Canyon Exclosure.

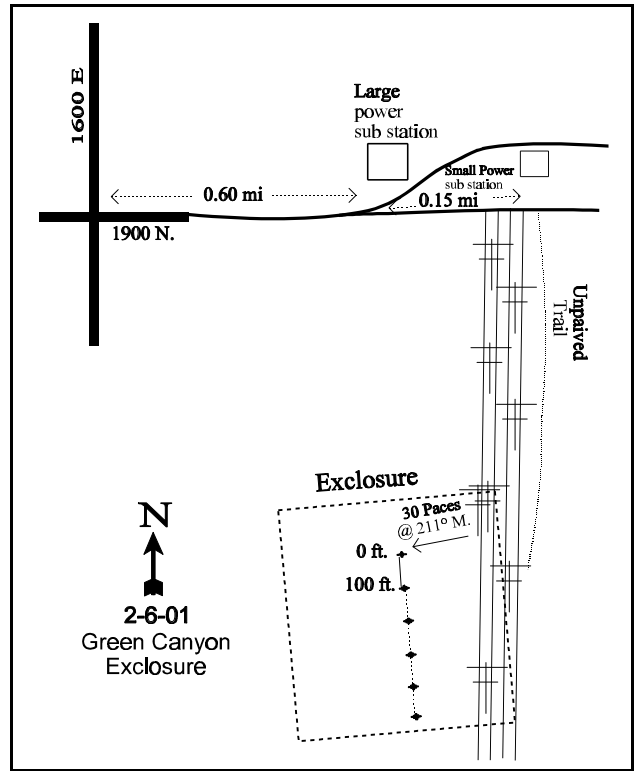
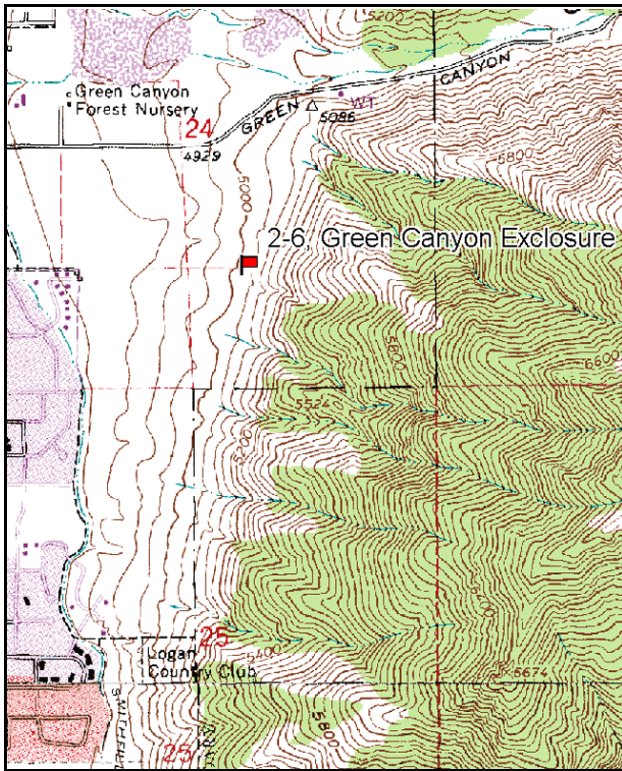
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 182 degrees magnetic.

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

LOCATION DESCRIPTION

At the corner of 1600 East and 1900 North in Logan, travel east down 1900 North for 0.6 miles until a road veers off to the north. Stay right and proceed 0.15 miles to an unpaved trail on the right hand side of the road. Walk south down the trail until you hit the exclosure. From the power pole at the corner of the exclosure, walk 30 paces at 211 degrees magnetic to the 0-foot stake. The baseline runs parallel to the second set of power lines at 182 degrees magnetic.



Map Name: Smithfield

Diagrammatic Sketch

Township 12N, Range 1E, Section 24

UTM 4623432 N, 434977 E

DISCUSSION

Trend Study No. 2-6

The Green Canyon Exclosure trend study replaces the original Green Canyon site which was not read in 1996. It was dropped at the request of DWR biologist and a new Green Canyon site was established in an old 40-acre livestock exclosure just south of the canyon. Slope on the site varies from 20% to 25%. Aspect is to the west with an elevation of 5,180 feet. Deer and elk pellet groups were encountered in small numbers in 1996 along with a few cattle pats. The exclosure fence is no longer maintained. A pellet group transect read at the study site in 2001 estimated only 3 deer days use/acre (7 ddu/ha). The past few mild winters have allowed deer to winter at higher elevations. Humans also impact the site as there is a hiking and running trail transecting the site. There are also grain fields and a subdivision to the west.

Soil is a loam in texture and moderately deep with some rock on the surface and in the profile. Effective rooting depth (see methods) is estimated at about 14 inches. The soil reaction is moderately alkaline (7.8 pH). Phosphorous could be a limiting factor at only 6.6 ppm as values of less than 10 ppm can limit plant growth and development. Average soil temperature is lower (64° F at 18 inches) than other sites along the Cache Valley front. This is likely due to the lack of rock on the surface or in the surface profile. Protective ground cover from herbaceous vegetation and litter is abundant and well dispersed, effectively limiting erosion.

Browse on the site consist of aggregated clumps of mountain big sagebrush with a few scattered bitterbrush. Sagebrush had a density of 840 plants/acre in 1996 with 67% classified as young. Utilization was light, vigor good, and there were no decadent individuals. Age class analysis indicated an expanding population. During the 2001 reading, density was estimated at 1,640 plants/acre. Use remains mostly light, vigor good, and percent decadence low at 6%. Mature sagebrush are large and vigorous with annual leader growth averaging 3.3 inches. Bitterbrush occur infrequently. Utilization was moderate in 1996 and light in 2001.

The herbaceous understory is abundant with grasses and forbs combining to produce 52% cover in 1996 and 59% cover in 2001. Grass composition is poor with rye and bulbous bluegrass accounting for 95% and 90% of the grass cover in 1996 and 2001 respectively. Annual brome grasses which dominate the understory vegetation of many sites in this herd unit are not abundant. Forbs are abundant. However, they consist mostly of weedy species like thistle, morning glory, willowweed, curlycup gumweed, sunflower, prickly lettuce, yellow salsify, and mule's ear. Useful forbs including arrowleaf balsamroot, yellow sweetclover, and alfalfa accounted for 20% of the forb cover in 1996 and 50% in 2001.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is abundant with little bare ground exposed (4%). Erosion is not a problem on this site. Browse is in short supply but the relatively small populations of mountain big sagebrush and bitterbrush appear vigorous and healthy. Mountain big sagebrush shows a high proportion of young plants (67%) and appears to have an expanding population. Utilization of sagebrush and bitterbrush is mostly light. The herbaceous understory composition is poor, but not dominated by annual brome grasses like many other winter range sites in this unit. Winter rye and bulbous bluegrass dominate the site by providing 74% of the understory cover. Native perennial grasses are represented by an occasional bluebunch wheatgrass. A few useful forb species are found on the site, yet the majority are weedy annuals and biennials.

2001 TREND ASSESSMENT

Trend for soil appears stable with similar ground cover characteristics compared to 1996. The ground surface is well protected by herbaceous vegetation and litter cover to help prevent accelerated erosion. Trend for the key browse species, mountain big sagebrush, is up. Density has increased 49%, use remains mostly light, vigor is normal, and percent decadence is low at only 6%. Recruitment is also good with 33% of the population consisting of young plants. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses increased. Nested frequency of bulbous bluegrass increased significantly while winter rye declined significantly. Japanese and rattlesnake brome, both annuals, increased significantly. Sum of nested frequency for perennial forbs declined since 1996. However, nested frequency of the more desirable forbs either remained stable or increased significantly. Overall the sum of nested frequency for perennial grasses and forbs remained similar to 1996 levels.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 6

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron cristatum	3	1	1	1	.03	.03
G	Agropyron spicatum	4	2	1	1	.21	.30
G	Agropyron trichoporum	-	2	-	2	-	.18
G	Bromus brizaeformis (a)	98	*134	32	53	.63	2.42
G	Bromus japonicus (a)	48	*79	16	25	.20	.67
G	Bromus tectorum (a)	65	47	17	15	.91	.89
G	Koeleria cristata	3	*12	2	4	.09	.51
G	Poa bulbosa	320	*416	78	93	13.11	25.28
G	Secale cereale (a)	375	*284	90	72	25.55	18.23
Total for Annual Grasses		586	544	155	165	27.30	22.22
Total for Perennial Grasses		330	433	82	101	13.44	26.30
Total for Grasses		916	977	237	266	40.75	48.52
F	Achillea millefolium	-	5	-	2	.03	.18
F	Agoseris glauca	-	1	-	1	-	.01
F	Alyssum alyssoides (a)	4	3	3	2	.04	.01
F	Aster spp.	4	4	1	3	.00	.06
F	Balsamorhiza sagittata	21	17	9	10	1.41	2.26
F	Cirsium undulatum	14	*-	7	-	.37	.03
F	Convolvulus arvensis	16	-	5	-	.75	-
F	Epilobium brachycarpum (a)	121	*29	47	14	2.46	.09

T y p e	Species	Nestled Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Erodium cicutarium</i> (a)	-	*53	-	17	-	1.98
F	<i>Euphorbia</i> spp.	18	*-	8	-	.28	-
F	<i>Galium aparine</i> (a)	-	3	-	1	-	.03
F	<i>Gilia</i> spp. (a)	1	1	1	1	.00	.00
F	<i>Grindelia squarrosa</i>	131	*67	48	32	3.22	.99
F	<i>Helianthus annuus</i> (a)	13	*-	7	-	.11	-
F	<i>Helianthella uniflora</i>	1	-	1	-	.03	-
F	<i>Lactuca serriola</i>	2	*12	1	7	.00	.25
F	<i>Lithospermum ruderales</i>	6	7	2	2	.30	.44
F	<i>Melilotus officinalis</i>	8	3	4	1	.21	.00
F	<i>Medicago sativa</i>	12	*28	4	9	.68	3.12
F	<i>Microsteris gracilis</i> (a)	-	2	-	1	-	.00
F	<i>Phacelia</i> spp.	3	-	1	-	.00	-
F	<i>Physalis longifolia</i>	-	*14	-	5	-	.19
F	<i>Tragopogon dubius</i>	21	19	9	10	.40	.24
F	Unknown forb-perennial	13	-	4	-	.59	-
F	<i>Wyethia amplexicaulis</i>	9	16	3	8	.36	.92
Total for Annual Forbs		139	91	58	36	2.62	2.13
Total for Perennial Forbs		279	193	107	90	8.67	8.73
Total for Forbs		418	284	165	126	11.29	10.86

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

BROWSE TRENDS --

Herd unit 02 , Study no: 6

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Artemisia tridentata vaseyana</i>	22	36	1.83	7.34
B	<i>Gutierrezia sarothrae</i>	12	16	.33	2.34
B	<i>Purshia tridentata</i>	3	2	.21	1.41
B	<i>Rhus glabra cismontana</i>	-	-	.03	-
Total for Browse		37	54	2.41	11.10

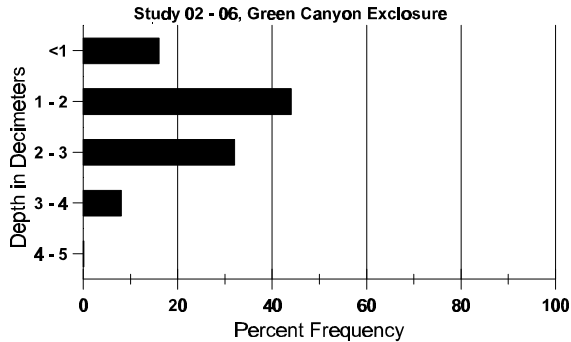
BASIC COVER --
Herd unit 02 , Study no: 6

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	488	459	57.42	65.75
Rock	88	26	.52	.28
Pavement	167	221	2.07	3.59
Litter	498	472	69.95	52.29
Cryptogams	20	17	.25	.21
Bare Ground	135	158	4.41	5.68

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 06, Green Canyon Enclosure

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.8	64.2 (17.5)	7.8	45.3	32.7	22.0	2.7	6.6	156.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 6

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Horse	-	1	-	-
Elk	1	-	-	-
Deer	3	1	35	3 (7)
Cattle	2	-	-	-

BROWSE CHARACTERISTICS --

Herd unit 02 , 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				
<i>Artemisia tridentata vaseyana</i>																		
S	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	96	28	-	-	-	-	-	-	-	28	-	-	-	560		28		
	01	26	1	-	-	-	-	-	-	27	-	-	-	540		27		
M	96	13	1	-	-	-	-	-	-	13	-	-	1	280	29	46	14	
	01	40	10	-	-	-	-	-	-	49	1	-	-	1000	34	45	50	
D	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	4	1	-	-	-	-	-	-	4	-	-	1	100		5		
X	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	-	-	-	-	-	-	-	-	-	-	-	-	60		3		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		02%			00%			02%			+49%							
'01		15%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	840	Dec:	0%				
											'01	1640		6%				
<i>Gutierrezia sarothrae</i>																		
S	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1		
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1		
Y	96	23	-	-	-	-	-	-	-	23	-	-	-	460		23		
	01	7	-	-	-	-	-	-	-	7	-	-	-	140		7		
M	96	28	-	-	-	-	-	-	-	28	-	-	-	560	14	19	28	
	01	89	-	-	-	-	-	-	-	89	-	-	-	1780	15	20	89	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
	01	-	-	-	-	-	-	-	-	-	-	-	-	120		6		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+47%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1020	Dec:	-				
											'01	1920		-				
<i>Purshia tridentata</i>																		
M	96	2	2	-	-	-	-	-	-	4	-	-	-	80	39	90	4	
	01	2	-	-	-	-	-	-	-	2	-	-	-	40	28	58	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		50%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	80	Dec:	-				
											'01	40		-				

Suspended

Trend Study 2-7-96

Study site name: Spawn Creek.

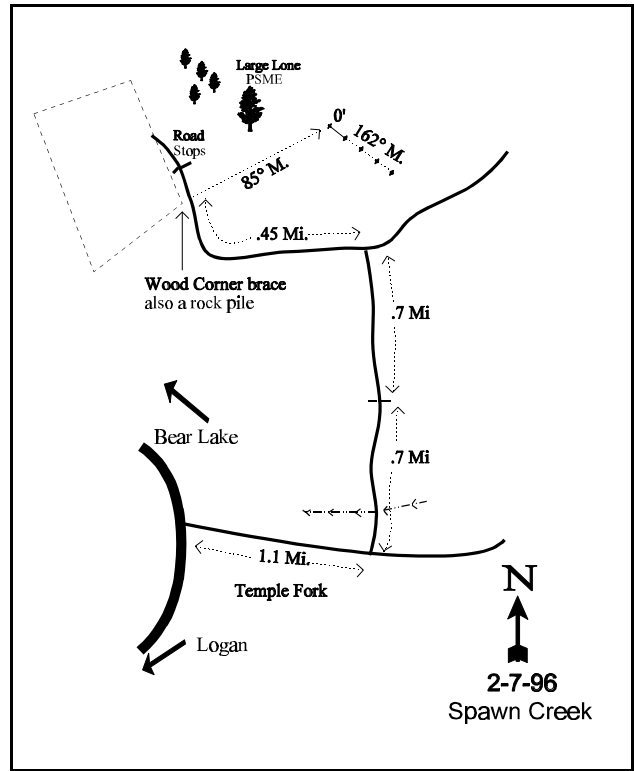
Vegetation type: Mountain Brush.

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

Proceed up Logan Canyon to the Temple Fork cut-off and turn right. Note mileage here and travel 1.1 miles up Temple Fork to a point where the road splits and crosses the creek to the left. Ford the creek and proceed straight 0.7 miles to the end of the road. From the road closure, walk up the road for 0.7 miles to a sharp left-hand fork. Turn left and walk 0.45 miles to the lip of a hill; note that road begins to run immediately to the right of a fence at the bottom of this short slope. At the lip of the slope note a large, lone mountain mahogany on right side with a green stake imbedded two feet away. Take a bearing of 85 degrees magnetic from the stake to the 0-foot baseline stake, which is about 30 paces past a large, lone Douglas fir. 0-foot stake is marked with browse tag #7930. Baseline runs at 162 degrees magnetic.



Map Name: Temple Peak

Diagrammatic Sketch

Township 13N, Range 3E, Section 30

UTM 4632638 N, 454374 E

DISCUSSION

Trend Study No. 2-7

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006.

The Spawn Creek study is a moderately high elevation (6,760 feet) site located in the Spawn Creek drainage. It is used primarily as elk winter range, but the area also appears to be a good quality spring-fall range and/or fawning habitat for deer. The study site is a densely vegetated mixed mountain brush type on a moderately steep, west-southwest facing slope. Other plant communities in the immediate vicinity include conifer, aspen, curleaf mountain mahogany, mountain big sagebrush-grass, and riparian zones which contain wet and dry meadows and numerous beaver ponds. The site is on USFS land and is grazed by cattle. A few deer and elk pellet groups were encountered, but use of this area by wildlife appears light.

Soil is a moderately deep loam with nearly equal amounts of sand, silt, and clay. Percent organic matter is high (6.8%) with a neutral soil reaction (pH of 7.2). Surface litter and vegetative cover are dense and continuous, interrupted only by an occasional livestock or wildlife trail. There is no apparent erosion.

Browse is the principal vegetative component and consists of several co-dominant species. These include mountain snowberry, mountain big sagebrush, black chokecherry, antelope bitterbrush, Saskatoon serviceberry, and snowbrush ceanothus. Less abundant shrubs are comprised of stickyleaf low rabbitbrush, Rocky Mountain maple, curleaf mountain mahogany, Rocky Mountain juniper, Oregon hollygrape, and woods rose. Composition is highly diverse and appears essentially stable. Most browse species display little to no use except serviceberry, mountain big sagebrush, bitterbrush, and occasionally a snowberry which showed some moderate to heavy use. Use of these shrubs has declined since 1984 when much heavier use was reported. Although cattle graze the area in the summer, their impact appears negligible.

Grass composition is also diverse and includes several desirable species. Grass species in their approximate order of abundance are bluebunch wheatgrass, mountain brome, Kentucky bluegrass, subalpine needlegrass, and oniongrass. Utilization is light on all species. However, some current use from cattle was apparent during past readings. The grass component is vigorous and is uniformly distributed over the entire study site.

Forb composition is especially diverse and includes many good quality species which show light levels of use. The forb component also has good vigor and shows little sign of compositional change.

1984 APPARENT TREND ASSESSMENT

Both soil and vegetative trends appear stable. Soil erosion is nearly nonexistent due to an almost complete cover of litter and vegetation of varying heights. Vegetative diversity is exceptional and unlikely to change in the future, unless the intensity of animal use increases significantly.

1990 TREND ASSESSMENT

The herbaceous understory is a key component on this high elevation winter and/or transition range. Meaningful increases were noted in several species with regard to sum of nested frequency and quadrat frequency values for grasses and forbs. Most of the grasses and forbs have increased with all plants exhibiting good vigor. Snowberry, Saskatoon serviceberry, snowbrush ceanothus, and big sagebrush are the most abundant and valuable of the browse species. Sagebrush canopy cover averaged about 9%. The most palatable browse plants include bitterbrush, serviceberry, and *Ceanothus*, which have been moderately hedged. Overall trends for the browse species are unchanged. Soil erosion is negligible.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly (4)

1996 TREND ASSESSMENT

Trend for soil continues to be stable with abundant vegetation and litter cover. Percent litter cover did decline slightly since 1990, but percent bare ground also declined. Trend for browse appears stable for the key species. Density of sagebrush declined from 1,399 to 760 plants/acre since 1990, probably more a function of the much larger sampling design used this year. It appears that the number of mature sagebrush remained similar, while the number of decadent plants declined. Other key browse species display stable population densities with most showing less heavy use than in 1990. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses increased slightly, whereas frequency of perennial forbs declined. Overall trend appears stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 7

T y p e	Species	Nested Frequency			Quadrat Frequency			Average
		'84	'90	'96	'84	'90	'96	Cover %
G	Agropyron spicatum	a ₆₅	a ₃₂	b ₂₀₆	24	15	69	10.06
G	Agropyron trachycaulum	a ₄₄	b ₁₀₅	a ₃₄	21	41	11	.58
G	Bromus marginatus	a ₉₆	b ₁₆₆	a ₁₀₅	41	67	40	2.17
G	Carex spp.	-	3	-	-	1	-	-
G	Melica bulbosa	4	10	2	2	6	1	.03
G	Poa pratensis	7	14	16	4	5	8	.71
G	Stipa columbiana	18	7	16	11	4	5	.14
G	Stipa lettermani	a ₋	b ₁₀	ab ₃	-	5	1	.00
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		234	347	382	103	144	135	13.71
Total for Grasses		234	347	382	103	144	135	13.71
F	Achillea millefolium	ab ₃₅	a ₂₉	b ₄₉	15	11	22	.33
F	Agastache urticifolia	8	7	5	5	4	3	.33
F	Arabis spp.	a ₋	b ₂₅	a ₇	-	11	4	.02
F	Aster chilensis	ab ₁₇	b ₃₇	a ₉	9	16	5	.36
F	Astragalus convallarius	1	6	-	1	3	-	-
F	Balsamorhiza hookeri	-	3	-	-	2	-	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	Balsamorhiza sagittata	25	21	19	14	13	8	2.45
F	Calochortus nuttallii	1	2	-	1	1	-	-
F	Chenopodium fremontii (a)	-	-	3	-	-	1	.00
F	Cirsium spp.	5	2	1	2	1	1	.03
F	Collomia linearis (a)	_a 3	_a -	_b 13	1	-	6	.03
F	Comandra pallida	29	41	36	12	20	16	.59
F	Collinsia parviflora (a)	-	-	56	-	-	23	.14
F	Crepis acuminata	35	64	38	24	30	18	.53
F	Cruciferae	-	3	-	-	1	-	-
F	Descurainia pinnata (a)	-	1	-	-	1	-	-
F	Eriogonum umbellatum	12	26	20	5	14	11	1.24
F	Hackelia patens	6	7	-	3	4	-	.03
F	Helianthella uniflora	_a -	_a -	_b 34	-	-	14	2.07
F	Lappula occidentalis (a)	-	-	9	-	-	3	.04
F	Linum lewisii	-	1	5	-	1	2	.18
F	Lithospermum ruderales	3	-	4	2	-	2	.16
F	Lupinus sericeus	_b 63	_a 39	_a 42	29	19	20	2.01
F	Machaeranthera canescens	_a 5	_b 24	_b 25	2	11	11	.76
F	Microsteris gracilis (a)	-	-	19	-	-	7	.03
F	Penstemon cyananthus	4	9	8	3	5	4	.19
F	Penstemon humilis	2	6	5	2	4	3	.04
F	Polygonum douglasii (a)	-	-	10	-	-	4	.02
F	Senecio integerrimus	_b 19	_c 35	_a -	10	20	-	-
F	Taraxacum officinale	-	4	-	-	2	-	-
F	Tragopogon dubius	-	4	6	-	3	2	.01
F	Unknown forb-perennial	-	3	8	-	1	3	.01
F	Veronica biloba (a)	-	-	158	-	-	52	1.72
F	Viola spp.	_a -	_b 58	_a -	-	32	-	-
F	Wyethia amplexicaulis	_b 46	_a 8	_a -	20	4	-	.00
Total for Annual Forbs		3	1	268	1	1	96	2.00
Total for Perennial Forbs		316	464	321	159	233	149	11.40
Total for Forbs		319	465	589	160	234	245	13.40

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

BROWSE TRENDS --
Herd unit 02 , Study no: 7

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Acer grandidentatum	1	.15
B	Amelanchier alnifolia	8	.36
B	Artemisia tridentata vaseyana	35	4.51
B	Ceanothus velutinus	12	2.63
B	Chrysothamnus viscidiflorus viscidiflorus	8	.89
B	Eriogonum heracleoides	27	1.23
B	Eriogonum microthecum	2	.15
B	Mahonia repens	82	5.70
B	Prunus virginiana	27	1.82
B	Purshia tridentata	9	1.16
B	Symphoricarpos oreophilus	76	15.50
Total for Browse		287	34.15

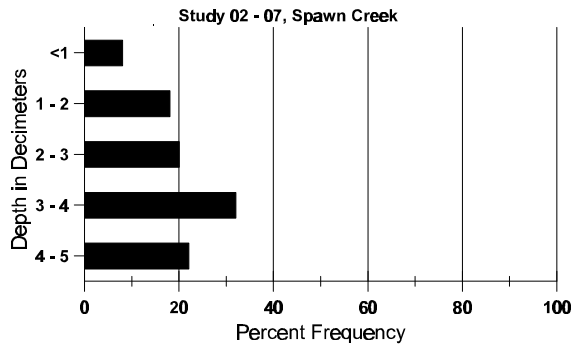
BASIC COVER --
Herd unit 02 , Study no: 7

Cover Type	Nested Frequency	Average Cover %		
		'96	'84	'90
Vegetation	352	.50	6.50	57.27
Rock	186	3.50	3.50	3.09
Pavement	137	3.75	1.25	1.32
Litter	397	84.00	76.25	66.00
Cryptogams	2	0	0	.03
Bare Ground	151	8.25	12.50	4.26

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 07, Spawn Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
19.2	56.0 (17.6)	7.2	36.6	31.1	32.4	6.8	21.6	326.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 7

Type	Quadrat Frequency '96
Elk	10
Deer	3
Cattle	2

BROWSE CHARACTERISTICS --

Herd unit 02 , 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			
Acer grandidentatum								
M	'84	-	-	-	-	-	-	0
	'90	-	-	-	-	-	-	0
	'96	1	-	-	-	-	-	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%
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec: -
						'90	0	-
						'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>Amelanchier alnifolia</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	3	-	-	-	-	-	-	-	-	-	3	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	1	-	1	-	-	-	1	-	-	2	-	-	1	200	39	18	
	96	5	-	2	-	-	-	-	-	-	4	3	-	-	140	37	54	
D	84	-	-	1	-	-	-	-	-	-	-	-	1	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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%			50%			50%			+50%							
'90		00%			25%			25%			-25%							
'96		00%			20%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	132	Dec:	50%			
												'90	266		0%			
												'96	200		0%			
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	1	-	-	-	-	-	2	1	-	-	200		3	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	2	1	-	-	-	-	-	-	2	1	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	1	9	-	-	-	-	-	-	6	-	4	-	666	29	23	
	90	9	1	-	1	-	-	-	-	-	8	2	1	-	733	31	33	
	96	21	7	-	2	-	-	-	-	-	28	-	2	-	600	28	38	
D	84	-	4	19	-	-	-	-	-	-	11	3	9	-	1533		23	
	90	9	-	1	-	-	-	-	-	-	8	-	-	2	666		10	
	96	4	1	-	-	-	-	-	-	-	3	-	-	2	100		5	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		19%			81%			36%			-42%							
'90		05%			05%			14%			-46%							
'96		21%			00%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2399	Dec:	64%			
												'90	1399		48%			
												'96	760		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>Ceanothus velutinus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	18	2	-	-	-	-	-	-	-	15	5	-	-	400	22	36	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		14%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	420		-				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66	24	41	1
	96	14	-	-	1	-	-	-	-	-	15	-	-	-	300	17	19	15
D	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%			+79%							
'96		00%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	66		0%				
											'96	320		6%				
<i>Eriogonum heracleoides</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	54	-	-	3	-	-	-	-	-	57	-	-	-	1140	8	17	57
% 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	1140		-				

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				
Eriogonum microthecum																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	4	-	-	-	-	-	-	-	-	-	-	-	80	10	26	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%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			
Mahonia repens																		
Y	84	308	-	-	-	-	-	-	-	-	308	-	-	-	20533		308	
	90	22	-	-	16	-	-	2	-	-	33	7	-	-	2666		40	
	96	123	-	-	70	-	-	-	-	-	193	-	-	-	3860		193	
M	84	168	-	-	-	-	-	-	-	-	168	-	-	-	11200	6	5	168
	90	53	-	-	26	-	-	15	-	-	66	28	-	-	6266	4	3	94
	96	728	-	-	180	-	-	-	-	-	908	-	-	-	18160	5	6	908
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-72%							
'90		00%			00%			00%			+59%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	31733	Dec:	-			
												'90	8932		-			
												'96	22020		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Prunus virginiana													
S	84	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	0	-	-	0
	96	5	-	-	4	-	-	-	-	9	-	-	9
Y	84	-	-	-	-	-	-	-	-	0	-	-	0
	90	9	-	-	13	-	-	6	-	13	15	-	28
	96	59	-	-	10	-	-	-	-	69	-	-	69
M	84	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	0	-	-	0
	96	18	4	-	-	-	-	-	-	22	-	-	22
X	84	-	-	-	-	-	-	-	-	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>					
'84		00%		00%		00%							
'90		00%		00%		00%						- 2%	
'96		04%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	-
										'90	1866		-
										'96	1820		-
Purshia tridentata													
M	84	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	6	2	-	-	-	-	-	7	-	-	8
D	84	-	-	1	-	-	-	-	-	66	-	-	1
	90	-	1	-	1	-	-	-	-	133	-	-	2
	96	1	-	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'84		00%		100%		00%						+50%	
'90		50%		00%		00%						+26%	
'96		67%		22%		22%							
Total Plants/Acre (excluding Dead & Seedlings)										'84	66	Dec:	100%
										'90	133		100%
										'96	180		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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	9	-	-	-	-	-	11	-	-	-	220			11
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	11	1	-	4	-	-	3	-	-	16	3	-	-	1266			19
	96	12	-	-	6	-	-	-	-	-	17	1	-	-	360			18
M	84	9	8	-	-	-	-	-	-	-	17	-	-	-	1133	30	42	17
	90	11	3	-	5	3	-	4	-	-	22	4	-	-	1733	32	37	26
	96	128	1	1	3	-	-	-	-	-	132	-	-	1	2660	30	53	133
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	4	4	-	1	-	-	-	-	-	4	-	-	5	180			9
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	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>							
'84		53%			00%			00%			+59%							
'90		15%			00%			00%			+ 4%							
'96		03%			.62%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1266	Dec:	0%			
												'90	3065		2%			
												'96	3200		6%			

Suspended

Trend Study 2-8-96

Study site name: Millville Canyon.

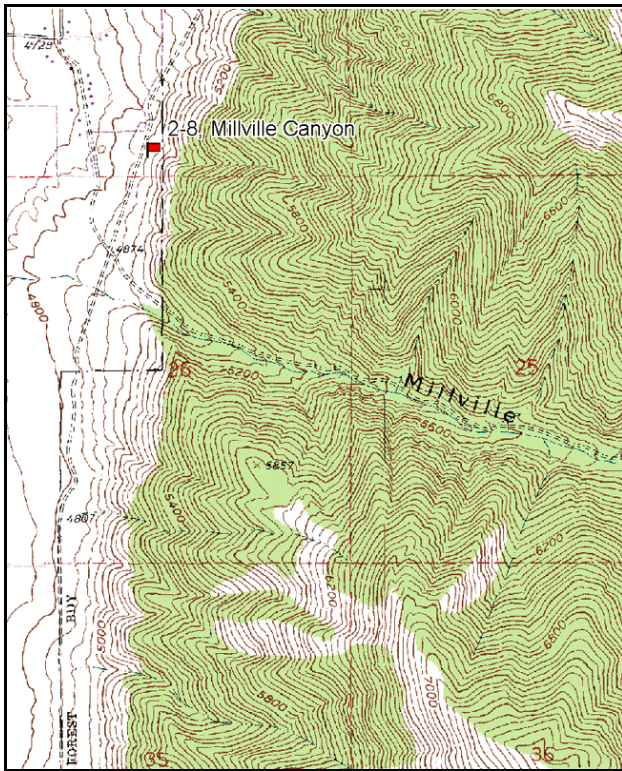
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

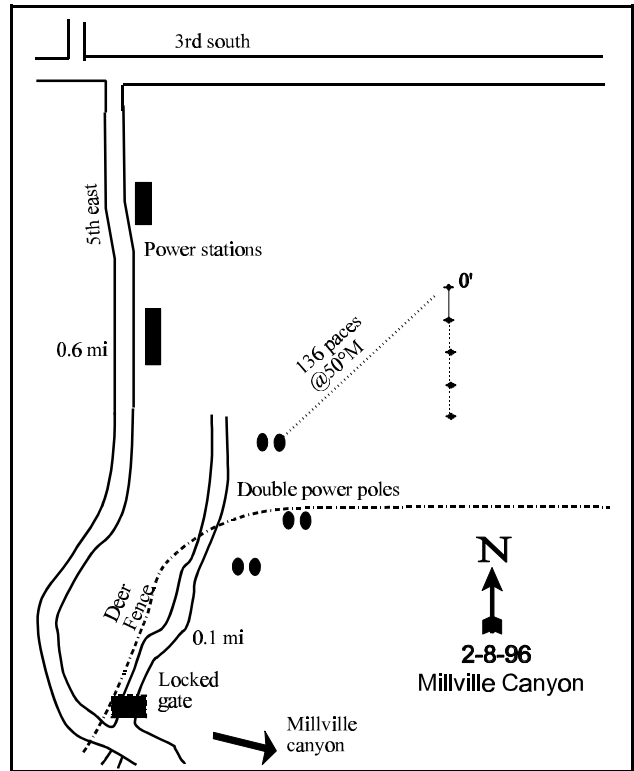
LOCATION DESCRIPTION

From 500 East and 300 South in Millville travel south 0.6 miles. At the intersection just beyond the deer fence turn left (north). Proceed 0.1 miles and stop just opposite the northernmost pair of power poles just east of the road. From the easternmost pole walk 136 paces at 50 degrees magnetic to 0-foot baseline stake, marked by browse tag #7986. Baseline runs at 165 degrees magnetic.



Map Name: Logan

Township 11N, Range 1E, Section 26



Diagrammatic Sketch

UTM 4613406 N, 433117 E

DISCUSSION

Trend Study No. 2-8

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. The site was suspended after inspection by the project leader. It is located in close proximity to 2 other trend study sites, Broad Hollow Flat (2-10) and Mouth of Blacksmith Fork Canyon (2-2). There was very little sign of any wildlife use on the site.

The Millville Canyon study site lies on the steep west-facing slope of the Cache "face" near Millville Canyon. The area contains an important stand of mountain big sagebrush without the general association of bitterbrush and a somewhat scattered population of Utah juniper. This site is immediately north of Millville Canyon at an elevation of 5,180 feet. It is quite steep (75%) with a rocky and eroded soil surface. Animal use was observed as extremely heavy in 1984. Additionally, eight deer and one elk carcass were found near the site as a result of the harsh winter of 1983-84. No elk and few deer pellet groups were found on the site in 1996. No pellet groups were found in 2001.

Soil is a "Richmond Very Stony Loam," similar to that described and reported in studies at Smithfield Dry Canyon (#5) and Green Canyon Exclosure (#6). Soil at the site is fairly deep (almost 17 inches), but rocky with poor structure and high erosion potential. It has a loam texture and a relatively low percent organic matter content (1.6%). Both phosphorus and potassium could be limiting at 5.6 and 3.2 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium can limit normal plant growth and development. Average soil temperature is also quite high at nearly 75° F, due mostly to the abundance of rock on the surface and in the profile. Steep slope and poor cover resulting from intense animal use and trampling effects have caused accelerated soil erosion in the past, but current conditions appear more stable.

Browse composition is dominated by one of the few remaining stands of mountain big sagebrush on this portion of the Cache Valley "face." Estimated density in 1984 was approximately 732 plants/acre, which constitutes a moderately sparse stand that appeared to be slowly declining. The population was dominated by heavily browsed decadent plants in poor vigor. Little reproduction was evident. During the 1990 reading, the sagebrush population was split into mountain big sagebrush and a hybrid form, a cross between black sagebrush and mountain big sagebrush. Estimated density of the hybrid sagebrush was about 400 plants/acre in 1990. The population was moderately hedged, mostly decadent (83%), yet it displayed good vigor. Mountain big sagebrush numbered only 132 plants/acre with light to moderate use. Percent decadency was 50%. Density of the big sagebrush/black sagebrush hybrid increased to 740 plants/acre by 1996. Decadency declined to 54% with moderate use. Mountain big sagebrush numbered 360 plants/acre with light use and good vigor. Because the community structure is basically discontinuous and clumped, the much larger sampling design used in 1996 greatly improves the accuracy for population estimates.

Herbaceous composition is poor. Unlike the Green Canyon site, annual grasses including cheatgrass, Japanese brome, and rattlesnake brome are abundant here. These three species alone accounted for 67% of the grass cover in 1996. Preferred perennials include bluebunch wheatgrass and Sandberg bluegrass. Also encountered in 1996 were winter rye and jointed goatgrass.

Forb composition consists chiefly of annual and perennial weeds. The only forbs of value are arrowleaf balsamroot, yellow salsify, gray Lomatium, and perhaps thistle. Dyers woad was found on the site in 1990 and it has since increased significantly in nested frequency.

1984 APPARENT TREND ASSESSMENT

This site is in perhaps the poorest condition of any that we observed on the herd unit in 1984. Soil and vegetative trend are definitely declining and in view of the steep slope, combined with the presence of the big game fence, there is probably little or no corrective action feasible.

1990 TREND ASSESSMENT

Sagebrush appears to continue to decline. New growth on the shrubs is very vigorous and there is good seed production, but no seedling or young plants were found. Sagebrush canopy cover was estimated at 5%. There was an increase in perennial grass nested and quadrat frequency values. This is largely due to increases in Sandberg bluegrass and bluebunch wheatgrass. Forb composition is poor. The soil remains loose and easily disturbed, with a high potential for erosion. However, the condition appears to have stabilized since 1984.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - up slightly (4)

1996 TREND ASSESSMENT

Soil trend is improved slightly due to an increase in litter cover and a decline in percent bare ground from 7% to 3%. Trend for browse is up for mountain big sagebrush due to increased density, lighter utilization, good vigor, declining percent decadency, and improved recruitment. Trend for the more preferred mountain big sagebrush/black sagebrush hybrid is stable. Due to the lack of young plants, the increased density would be mostly the result of the much larger sample size used in 1996. Percent decadency declined, but a majority are still decadent (54%) and use is slightly heavier. Overall, trend for browse is slightly up. The composition of the herbaceous understory is poor and dominated by annual grasses and weedy forbs. Sum of nested frequency for perennial grasses declined while frequency of perennial forbs increased. Sum of nested frequency for bluebunch wheatgrass and Sandberg bluegrass declined significantly since 1990. The increase in forb frequency is due primarily to a significant increase in dyers woad which changed from a quadrat frequency of 11% to 55%. It is currently the most numerous forb on the site. Trend is considered slightly down.

TREND ASSESSMENT

soil - slightly improved (4)

browse - up slightly (4)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	<i>Aegilops cylindrica</i> (a)	-	-	7	-	-	2	.03
G	<i>Agropyron spicatum</i>	_a 49	_b 88	_{ab} 72	24	36	26	3.52
G	<i>Bromus brizaeformis</i> (a)	-	-	293	-	-	96	4.97
G	<i>Bromus japonicus</i> (a)	-	-	81	-	-	27	.96
G	<i>Bromus tectorum</i> (a)	-	-	305	-	-	87	10.07
G	<i>Poa bulbosa</i>	_a -	_b 15	_c 40	-	6	13	1.07
G	<i>Poa secunda</i>	_{ab} 170	_b 202	_a 136	67	78	52	2.47
G	<i>Secale cereale</i> (a)	-	-	75	-	-	29	.89
Total for Annual Grasses		0	0	761	0	0	241	16.95
Total for Perennial Grasses		219	305	248	91	120	91	7.07
Total for Grasses		219	305	1009	91	120	332	24.02
F	<i>Alyssum alyssoides</i> (a)	-	-	52	-	-	23	.11
F	<i>Artemisia ludoviciana</i>	3	7	6	1	3	3	.33
F	<i>Balsamorhiza sagittata</i>	-	2	1	-	1	1	.09
F	<i>Cirsium undulatum</i>	_a -	_{ab} 8	_b 8	-	4	6	.87
F	<i>Comandra pallida</i>	1	4	1	1	2	1	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	17	-	-	9	.04
F	<i>Holosteum umbellatum</i> (a)	-	-	7	-	-	3	.01
F	<i>Ipomopsis aggregata</i>	3	7	14	1	6	6	.03
F	<i>Isatis tinctoria</i>	_a -	_b 23	_c 119	-	11	55	1.80
F	<i>Lactuca serriola</i>	-	-	7	-	-	2	.01
F	<i>Lomatium grayi</i>	3	-	-	1	-	-	-
F	<i>Melilotus alba</i>	-	-	8	-	-	3	.33
F	<i>Phlox longifolia</i>	-	-	1	-	-	1	.00
F	<i>Ranunculus testiculatus</i> (a)	-	-	1	-	-	1	.00
F	<i>Tragopogon dubius</i>	_a 34	_a 23	_b 94	18	12	45	1.72
Total for Annual Forbs		0	0	77	0	0	36	0.17
Total for Perennial Forbs		44	74	259	22	39	123	5.21
Total for Forbs		44	74	336	22	39	159	5.38

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

BROWSE TRENDS --
Herd unit 02 , Study no: 8

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata-nova hybrid	29	2.69
B	Artemisia tridentata vaseyana	16	2.25
B	Gutierrezia sarothrae	38	.56
B	Rhus glabra cismontana	10	.24
Total for Browse		93	5.74

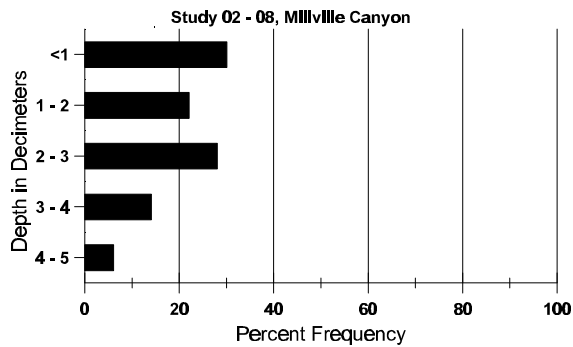
BASIC COVER --
Herd unit 02 , Study no: 8

Cover Type	Nested Frequency	Average Cover %		
		'96	'84	'90
Vegetation	381	3.75	4.00	41.35
Rock	318	22.25	20.50	24.38
Pavement	234	17.50	35.25	5.16
Litter	394	39.00	32.00	38.56
Cryptogams	112	3.50	1.00	1.79
Bare Ground	110	14.00	7.25	2.76

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 08, Millville Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.5	74.7 (17.4)	8.0	50.6	31.4	18.0	1.6	5.6	3.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 8

Type	Quadrat Frequency '96
Rabbit	3
Deer	6

BROWSE CHARACTERISTICS --

Herd unit 02 , 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				
Artemisia tridentata-nova hybrid																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	11	6	-	-	-	-	-	-	-	17	-	-	-	340	20	39	17
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	6	12	1	1	-	-	-	-	-	19	-	1	-	400			20
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	440			22
3	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	2	4	-	-	-	-	-	-	-	6	-	-	400			6
	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		33%			67%			00%			+46%							
'96		49%			03%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	400		0%			
												'96	740		54%			

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	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	14	17	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	24	25	1
	96	10	2	-	-	-	-	-	-	-	12	-	-	-	240	31	45	12
D	84	-	-	10	-	-	-	-	-	-	3	-	5	2	666		10	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			64%			-82%							
'90		50%			00%			00%			+63%							
'96		17%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	732	Dec:	91%				
											'90	132		50%				
											'96	360		6%				
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	40		2	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	19	-	-	-	-	-	-	-	-	19	-	-	-	380		19	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	12	18	4
	96	66	-	-	-	-	-	-	-	-	66	-	-	-	1320	12	15	66
% 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%			+84%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	266		-				
											'96	1700		-				

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	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	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	50%			00%			00%									
	'96	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-		
												'90	133		-		
												'96	0		-		
Rhus glabra cismontana																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	96	1	5	-	-	-	-	-	-	-	6	-	-	-	120	14	16
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%									
	'96	26%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	380		-		

Trend Study 2-9-01

Study site name: Beirdneau.

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).

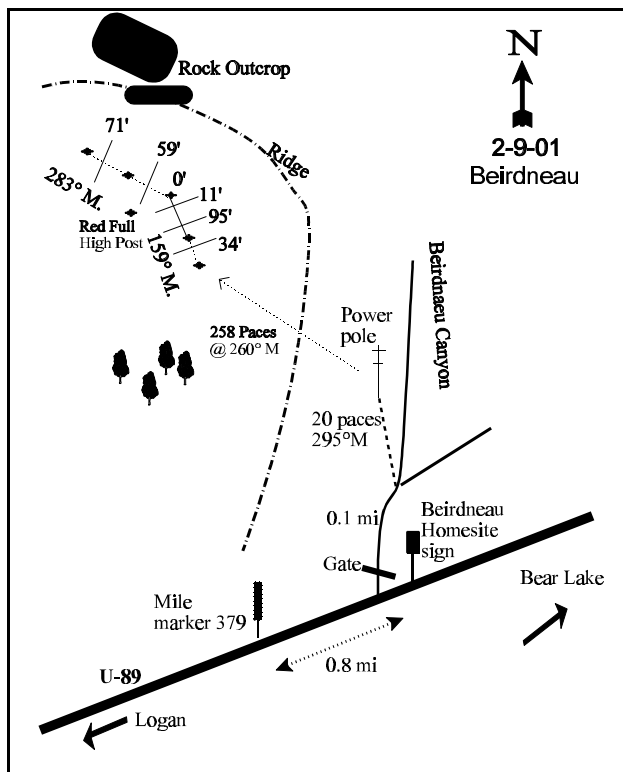
LOCATION DESCRIPTION

Proceed up Logan Canyon to mile marker 379 and begin to note mileage. Continue 0.8 miles to the Forest Service sign "Beirdneau Summer Home Sites." Turn left here and proceed 0.1 miles to a fork and stop. Walk to the power pole on the left at a bearing of 295 degrees magnetic and about 20 paces. Take a bearing of 260 degrees magnetic from the pole and walk 258 paces to the 0-foot stake of the baseline marked by browse tag #7928. The baseline runs at 159 degrees magnetic. The second stake is places 50 feet down the slope at the same bearing. The third and fourth stake are placed 100 feet apart above the 0-foot baseline stake at a bearing of 283 degrees magnetic.



Map Name: Mt. Elmer

Township 12N, Range 2E, Section 23



Diagrammatic Sketch

UTM 4623776 N, 441999 E

DISCUSSION

Trend Study No. 2-9

The Beirdneau trend study is located on a steep (55%) south-facing slope at 5,560 feet in elevation. It is slightly north of the Beirdneau summer home site in Logan Canyon. The area is considered a normal deer winter range that possesses a good mix of mountain big sagebrush and antelope bitterbrush, interspersed with juniper. Like many of the sites in this unit, wildlife use was heavy in 1984, but is currently light. A pellet group transect read at the site in 2001 estimated 17 deer and 3 elk days use/acre (41 ddu/ha and 8 edu/ha). Elk and deer pellet groups appear to be mostly from winter use.

The soil is moderately deep (14 inches), yet rather rocky and well-drained. It appears that some of the soil has been colluvially deposited and/or weathered-in-place from limestone parent material. Texture is a clay loam which is moderately alkaline (pH of 7.9). Phosphorous could be a limiting factor at only 8.7 ppm as values less than 10 ppm may limit normal plant growth and development. Vegetation and litter cover appear adequate to control runoff from all but the highest intensity summer storms. An erosion condition class was determined to be slight during the 2001 reading.

Browse composition consists of a mixture of bitterbrush and mountain big sagebrush with an understory of smaller shrubs. Both of the dominant browse species tend to be large shrubs, especially bitterbrush which in some instances reaches a height of 6 or 7 feet. Both species demonstrated moderate to heavy levels of hedging and high levels of decadence in 1984. A confounding factor in assessing age structure, reported in 1984, was a fairly recent die-off of bitterbrush and sagebrush that affected 10% to 20% of the total population. Although some of the deaths are obviously the result of rodent activity during the winters of 1983-85, a complete explanation of the die-off is not possible. Disease or insect infestation is also a possibility. Seventeen percent of the sagebrush population displayed poor vigor in 1984 increasing to 18% in 1990. Decadency rates were also moderately high at 67% in 1984 and 55% in 1990. The browse stand on this area is at best, thought barely stable in 1984. Age and form class both suggested declining populations. During the 1996 reading, the sample size was greatly increased. Estimated density of mountain big sagebrush declined to 360 plants/acre. Dead plants, first counted in 1996, numbered nearly as many as live ones (300 plants/acre). Some of the decline in density is due to the larger sample. However, the large proportion of dead plants in the population indicates a sagebrush decline. This is most likely the result of prolonged drought along with winter injury, which has been common for the sagebrush populations of Utah. No seedlings and few young plants were encountered in 1996. By 2001, density of sagebrush had stabilized at 300 plants/acre. Use was mostly light to moderate, vigor was normal on all plants, and percent decadence declined from 44% in 1996 to 27% in 2001.

Bitterbrush density has remained relatively stable since 1984 at about 600 plants/acre. Use was extremely heavy in 1984 but more moderate since then. Percent decadence has also declined from a high of 78% in 1984 to 21% in 2001. Vigor has remained good and bitterbrush is vigorous with good seed production. Annual leader growth averaged 3 inches in 2001.

Grasses and forbs are irregularly distributed, but provide good cover. Composition is poor, because of the predominance of weedy annuals. Cheatgrass and Japanese brome alone, accounted for 82% of the grass cover in 1996 and 2001. Bluebunch wheatgrass and bulbous bluegrass are the only moderately abundant perennial grasses found on the site. The forb component has fair diversity and quality. The most common forbs would include yellow salsify, gray Lomatium, and yellow sweetclover. Most forbs showed some evidence of use in 1984. Annual and biennial weeds are common and include a species of particular note, dyers woad.

1984 APPARENT TREND ASSESSMENT

Both soil and vegetative trends appear to be marginally stable at this time. However, careful monitoring will be necessary to detect changes in the sagebrush and bitterbrush populations as well as accompanying changes in the occurrence of increaser species. Soil trend appears marginally stable on a soil that is potentially very erodible.

1990 TREND ASSESSMENT

The most preferred browse, bitterbrush, has increased in density while sagebrush has declined slightly. Both sagebrush and bitterbrush tend to have a moderately hedged growth form. Canopy cover from bitterbrush was estimated at 6%, while sagebrush averaged only 1% cover. Cheatgrass and Japanese brome are the most prevalent grass species. Bluebunch wheatgrass is still quite common, but it did have decreased values for nested frequency and quadrat frequency. There is a fair diversity of perennial forbs, but many are weedy increasers.

TREND ASSESSMENT

soil - stable but fair condition (3)

browse - stable (3)

herbaceous understory - stable for grasses and up for forbs, slightly up overall (4)

1996 TREND ASSESSMENT

Soil trend is stable. Protective ground cover is abundant and more than adequate to protect the soil from erosion. The sagebrush and bitterbrush die-off, which started in the early 1980's, appears to have stabilized. Mountain big sagebrush is lightly utilized with improved vigor and a declining decadency rate. Bitterbrush is moderately utilized with good vigor and no decadent plants sampled. No seedlings or young have been sampled during any reading. Trend for browse is considered stable with the decline in density counterbalanced by the lighter use and improved vigor. Some of the lower population estimates can also be attributed to the much larger sample now being taken which gives better estimates for populations that are discontinuous and/or clumped. The herbaceous understory is dominated by annual grasses and weedy forbs which adversely effect shrub recruitment. Sum of nested frequency for perennial grasses increased since 1990, but this increase comes largely from the appearance of bulbous bluegrass. Bluebunch wheatgrass increased slightly in nested frequency. Sum of nested frequency for forbs declined slightly overall. Nested frequency for dyers woad increased significantly since 1990. Trend for the herbaceous understory is considered stable but in poor condition because it is dominated by weedy species.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable but dominated by annuals and weedy species (3)

2001 TREND ASSESSMENT

Trend for soil is stable due to abundant herbaceous and litter cover. There is little unprotected bare ground on the site and the erosion condition class is slight. Trend for the key browse species, bitterbrush followed by mountain big sagebrush, is considered stable. Bitterbrush shows moderate use, good vigor, and 21% decadence. Mountain big sagebrush numbers only 300 plants/acre. It displays light to moderate use, good vigor, and a declining decadency rate (44% to 27%). Trend for the herbaceous understory is also stable. Sum of nested frequency for perennial grasses and forbs have remained similar to 1996 estimates. The primary

perennial grasses, bluebunch wheatgrass and bulbous bluegrass, have declined slightly in nested frequency but not significantly. Annual grasses have changed in composition from predominately Japanese brome to cheatgrass brome since 1996, but percent cover of annual and perennial grasses have remained similar. The perennial forbs, yellow sweet clover and yellow salsify, have declined significantly in nested frequency.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , 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	125	105	108	95	50	41	44	40	2.99	3.35
G	Agropyron trachycaulum	-	-	7	-	-	-	2	-	.06	-
G	Bromus brizaeformis (a)	-	-	2	10	-	-	1	5	.00	.05
G	Bromus japonicus (a)	-	-	_b 343	_a 152	-	-	98	62	17.68	2.40
G	Bromus tectorum (a)	-	-	_a 204	_b 302	-	-	60	87	8.41	24.20
G	Poa bulbosa	-	-	83	73	-	-	32	26	2.65	2.36
G	Poa pratensis	4	10	-	-	1	3	-	-	-	-
G	Poa secunda	_a -	_{ab} 10	_a 3	_b 19	-	5	3	9	.04	.09
Total for Annual Grasses		0	0	549	464	0	0	159	154	26.10	26.65
Total for Perennial Grasses		129	125	201	187	51	49	81	75	5.74	5.82
Total for Grasses		129	125	750	651	51	49	240	229	31.85	32.48
F	Achillea millefolium	_b 14	_a -	_a -	_{ab} 8	5	-	-	4	-	.21
F	Agoseris glauca	_{ab} 14	_b 26	_a 1	_a 1	8	13	1	1	.00	.03
F	Allium acuminatum	_b 45	_b 29	_a 6	_b 26	24	16	2	14	.04	.17
F	Alyssum alyssoides (a)	-	-	137	151	-	-	49	55	.39	.71
F	Artemisia ludoviciana	4	3	10	6	2	1	5	2	.26	.30
F	Aster chilensis	_b 49	_b 40	_a 2	_a 4	17	16	1	2	.00	.01
F	Astragalus spp.	_a -	_b 13	_a -	_a -	-	6	-	-	-	-
F	Astragalus utahensis	1	3	2	1	1	1	1	1	.00	.03
F	Balsamorhiza sagittata	5	5	3	5	2	3	2	2	.53	.22
F	Camelina microcarpa (a)	-	-	-	6	-	-	-	2	-	.01
F	Chaenactis douglasii	-	1	-	-	-	1	-	-	-	-
F	Cirsium undulatum	2	5	5	-	1	3	3	-	.33	-
F	Comandra pallida	8	-	2	-	3	-	1	-	.03	-
F	Crepis acuminata	-	-	-	1	-	-	-	1	-	.02
F	Cymopterus spp.	-	-	-	-	-	-	-	-	.03	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Cynoglossum officinale</i>	_a 5	_b 27	_a 2	_a 11	2	15	1	5	.00	.12
F	<i>Epilobium brachycarpum</i> (a)	-	-	_b 46	_a 24	-	-	21	8	.22	1.66
F	<i>Galium aparine</i> (a)	-	-	36	-	-	-	13	-	.40	-
F	<i>Gilia aggregata</i>	-	4	-	-	-	3	-	-	-	-
F	<i>Hackelia patens</i>	_a 1	_{ab} 10	_a -	_b 47	1	5	-	18	-	.79
F	<i>Holosteum umbellatum</i> (a)	-	-	5	6	-	-	2	2	.01	.03
F	<i>Isatis tinctoria</i>	_a -	_b 23	_c 65	_b 25	-	10	31	11	1.33	1.20
F	<i>Lappula occidentalis</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Lactuca serriola</i>	_a -	_c 67	_b 28	_c 99	-	38	13	42	.15	.93
F	<i>Linum lewisii</i>	20	22	29	15	9	12	14	8	.37	.16
F	<i>Lithospermum ruderales</i>	10	8	9	11	5	4	4	8	.54	.58
F	<i>Lomatium grayi</i>	97	118	107	125	37	45	41	46	2.96	6.04
F	<i>Melilotus officinalis</i>	_a 2	_a 15	_b 100	_a 4	2	7	41	3	5.01	.19
F	<i>Penstemon humilis</i>	_a 2	_b 10	_a 1	_{ab} 3	2	5	1	3	.03	.06
F	<i>Phlox hoodii</i>	_b 12	_b 13	_a -	_a -	5	5	-	-	-	-
F	<i>Tragopogon dubius</i>	_b 159	_b 163	_b 156	_a 102	68	70	68	51	2.96	1.90
F	<i>Trifolium</i> spp.	_a -	_a -	_a -	_b 32	-	-	-	12	-	.45
F	Unknown forb-perennial	-	-	1	-	-	-	1	-	.06	-
F	<i>Veronica biloba</i> (a)	-	-	_a 31	_b 103	-	-	13	36	.11	.60
Total for Annual Forbs		0	0	255	291	0	0	98	104	1.15	3.03
Total for Perennial Forbs		450	605	529	526	194	279	231	234	14.70	13.46
Total for Forbs		450	605	784	817	194	279	329	338	15.85	16.49

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

BROWSE TRENDS --
Herd unit 02 , Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	14	14	2.04	1.60
B	Chrysothamnus viscidiflorus viscidiflorus	4	5	.30	.15
B	Gutierrezia sarothrae	10	11	.43	.51
B	Juniperus osteosperma	1	0	-	-
B	Juniperus scopulorum	0	0	.85	-
B	Purshia tridentata	17	20	9.03	6.37
B	Symphoricarpos oreophilus	10	9	1.38	1.96
Total for Browse		56	59	14.05	10.60

CANOPY COVER --
Herd unit 02 , Study no: 9

Species	Percent Cover	
	'96	'01
Juniperus scopulorum	-	1

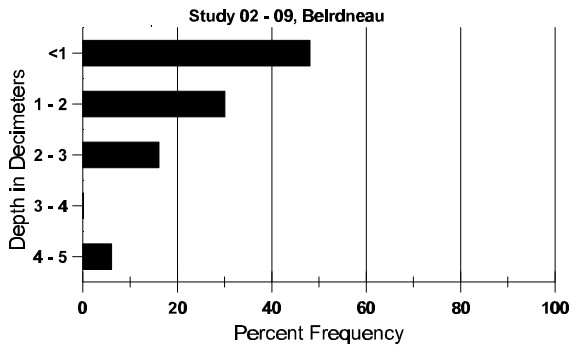
BASIC COVER --
Herd unit 02 , Study no: 9

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	394	376	1.25	14.50	54.68	54.55
Rock	219	187	20.25	9.00	12.78	11.34
Pavement	184	277	19.50	31.00	5.56	16.53
Litter	400	377	48.00	39.00	48.74	43.50
Cryptogams	14	14	.25	0	.20	.07
Bare Ground	127	136	10.75	6.50	6.39	5.70

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 09, Beirdneau

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.8	64.6 (15.8)	7.9	26.7	38.0	35.3	3.2	8.7	211.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 9

Type	Quadrat Frequency	
	'96	'01
Deer	1	6
Elk	-	-

Pellet Transect	
Pellet Groups per Acre '01	Days Use per Acre (ha) '01
218	17 (41)
44	3 (8)

BROWSE CHARACTERISTICS --

Herd unit 02 , 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>Artemisia tridentata vaseyana</i>														
Y	84	-	1	-	-	-	-	-	1	-	-	66		1
	90	-	-	-	-	-	-	-	-	-	-	0		0
	96	1	-	-	-	-	-	-	1	-	-	20		1
	01	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	-	5	-	-	-	-	5	-	-	333	22 27	5
	90	5	-	-	-	-	-	-	5	-	-	333	24 32	5
	96	7	2	-	-	-	-	-	9	-	-	180	23 40	9
	01	10	1	-	-	-	-	-	11	-	-	220	30 45	11
D	84	-	-	12	-	-	-	-	9	-	3	800		12
	90	5	1	-	-	-	-	-	4	-	1	400		6
	96	2	4	-	2	-	-	-	7	-	1	160		8
	01	2	1	-	1	-	-	-	4	-	-	80		4
X	84	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	300		15
	01	-	-	-	-	-	-	-	-	-	-	360		18
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
'84		06%		94%		17%		-39%						
'90		09%		00%		18%		-51%						
'96		33%		00%		06%		-17%						
'01		13%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'84	1199	Dec:	67%	
										'90	733		55%	
										'96	360		44%	
										'01	300		27%	
<i>Chrysothamnus nauseosus albicaulis</i>														
M	84	-	-	-	-	-	-	-	-	-	-	0	- -	0
	90	-	-	-	-	-	-	-	-	-	-	0	- -	0
	96	-	-	-	-	-	-	-	-	-	-	0	45 61	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							
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
S	84	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	1	-	1	
	96	-	-	-	-	-	-	-	0	-	0	
	01	-	-	-	-	-	-	-	0	-	0	
Y	84	-	-	-	-	-	-	-	0	-	0	
	90	2	-	-	-	-	-	-	133	-	2	
	96	1	-	-	-	-	-	-	20	-	1	
	01	-	-	-	-	-	-	-	0	-	0	
M	84	-	-	-	-	-	-	-	0	-	0	
	90	1	-	-	-	-	-	-	66	25	30	1
	96	3	-	-	1	-	-	-	80	28	41	4
	01	6	-	-	-	-	-	-	120	24	21	6
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%		-50%				
'96		00%		00%		00%		+29%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%			
						'90	199		0%			
						'96	100		0%			
						'01	140		14%			
<i>Gutierrezia sarothrae</i>												
Y	84	7	-	-	-	-	-	-	7	-	7	
	90	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	0	-	0	
	01	-	-	-	-	-	-	-	0	-	0	
M	84	21	-	-	-	-	-	-	1400	15	19	21
	90	1	-	-	-	-	-	-	66	9	14	1
	96	20	-	-	-	-	-	-	400	14	17	20
	01	29	-	-	-	-	-	-	580	13	17	29
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		00%		00%		00%		-96%				
'90		00%		00%		00%		+84%				
'96		00%		00%		00%		+31%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	1866	Dec:	-			
						'90	66		-			
						'96	400		-			
						'01	580		-			

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	-	-	-	-	-	-	-	-	-	-	-	-	-	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%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	0		-			
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	133	45	53	2
	90	3	4	-	-	-	-	-	-	-	7	-	-	-	466	63	92	7
	96	4	12	1	-	2	-	-	-	-	19	-	-	-	380	52	88	19
	01	2	15	1	-	3	-	-	-	-	20	1	-	-	420	58	93	21
D	84	-	-	7	-	-	-	-	-	-	7	-	-	-	466			7
	90	2	1	-	-	-	-	-	-	-	2	-	-	1	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	2	2	1	1	-	-	-	-	6	-	-	-	120			6
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			+10%							
'90		50%			00%			10%			-43%							
'96		74%			05%			00%			+32%							
'01		75%			11%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	599	Dec:	78%			
												'90	666		30%			
												'96	380		0%			
												'01	560		21%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total							
		1	2	3	4		1	2								
Symphoricarpos oreophilus																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	8	-	-	-	-	-	-	-	8	-	-	-	160		8
Y	84	3	-	-	-	-	-	-	-	3	-	-	-	200		3
	90	2	-	-	-	-	3	-	-	5	-	-	-	333		5
	96	3	-	-	-	-	-	-	-	3	-	-	-	60		3
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	2	-	-	-	-	-	-	2	-	-	-	133	32 31	2
	90	2	-	-	1	-	-	3	-	6	-	-	-	400	16 28	6
	96	3	1	-	4	-	-	-	-	6	-	2	-	160	24 51	8
	01	8	-	-	2	-	-	-	-	10	-	-	-	200	30 57	10
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		40%			00%			00%			+55%					
'90		00%			00%			00%			-67%					
'96		08%			00%			17%			-17%					
'01		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%	
												'90	733		0%	
												'96	240		8%	
												'01	200		0%	

Suspended

Trend Study 2-10-96

Study site name: Broad Hollow Flat.

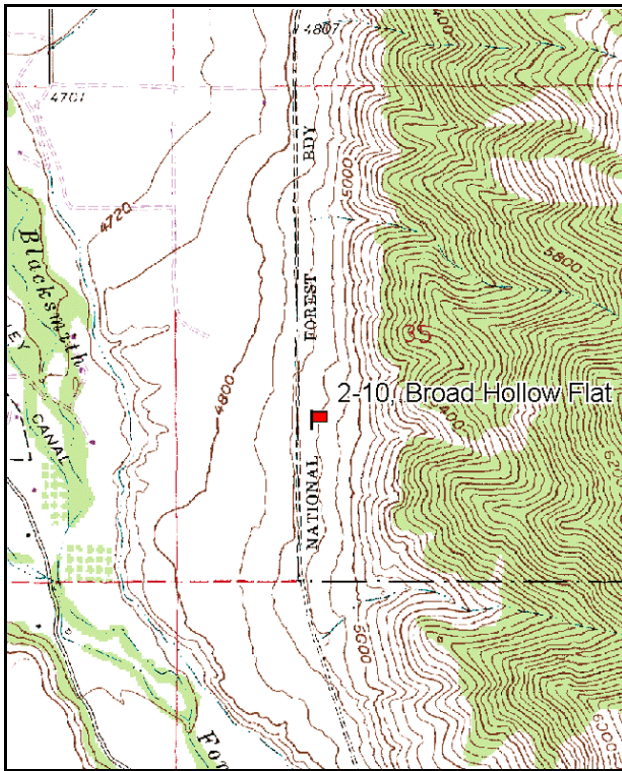
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 163 degrees magnetic.

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

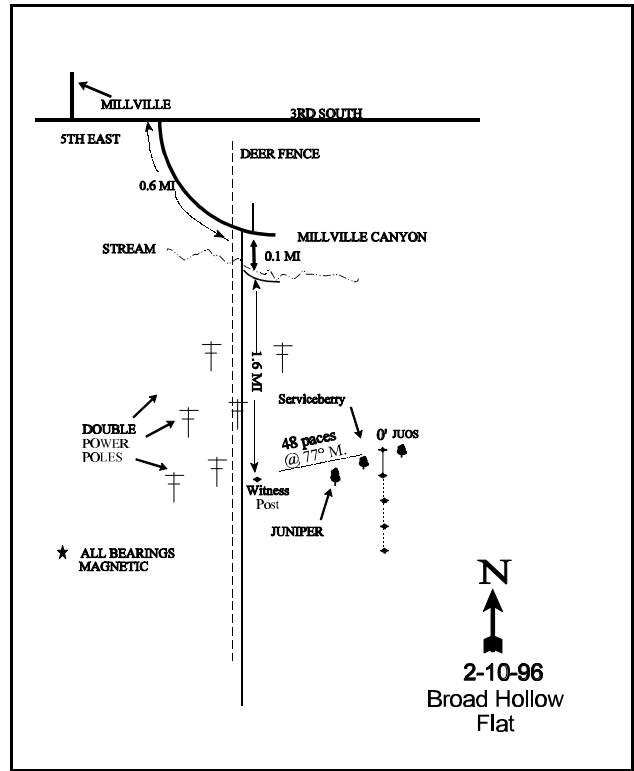
LOCATION DESCRIPTION

From 500 East and 200 South in Millville turn right (south) and proceed 0.6 miles; just beyond the deer fence turn right (south). Travel 0.1 miles (passing a small stream) and bear right at the fork. Follow the deer fence for 1.6 miles and stop at the witness post on the left. Note that the power poles cross the road and there are two sets on the right side of the road. The witness post is directly opposite the second two poles on the right. Proceed from the witness post 57 paces at 85 degrees magnetic to the 0-foot stake of the baseline marked by browse tag #7931. The baseline runs on a bearing of 163 degrees magnetic.



Map Name: Logan

Township 11N, Range 1E, Section 35



Diagrammatic Sketch

UTM 4610596 N, 432781 E

DISCUSSION

Trend Study No. 2-10

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site was evaluated by the project leader. Abundant elk pellet groups were found, but the site is dominated by bulbous bluegrass with a few scattered, unused sagebrush and bitterbrush. Elk are being fed hay in the area during the winter by nearby landowners. This trend study is also in close proximity to two other trend study sites, Millville Canyon (2-8) and Mouth of Blacksmith Fork (2-2).

The Broad Hollow trend study samples an area slightly north of Broad Hollow on moderately steep (25%) terrain located a few hundred meters east of the big game fence on the Cache Valley face. Exposure is westerly with an elevation of approximately 4,960 feet. Topographically, terrain is level to gently sloping for 100 to 200 meters east of the fence, then becomes abruptly very steep. The level terrain is the only area that presents an opportunity for any rehabilitation of the vegetative community. The steep slopes are almost totally devoid of browse species, and they are too steep for mechanical treatment. The study area, like most of the remaining gentle terrain, has remnant populations of mountain big sagebrush and bitterbrush and a few Rocky Mountain junipers that have been highlined to a height of 7 or 8 feet. Utilization of all browse species was extremely intense during the severe winters of the early 1980's. Like most of the winter range east of the big game fence between the Logan and Blacksmith Fork rivers, this area has been seriously depleted of browse forage. Quadrat frequency of elk pellet groups was high at 41% in 1996 indicating a relatively high level of elk use. Some local people actually feed elk in the winter near the study site. Cattle pats occurred in 20% of the quadrats while deer pellet groups had a quadrat frequency of 12%.

Soil characteristics are very similar to those described in the writeup for the Mouth of Blacksmith Fork study (2-2), which is located about one mile south on the same lake terrace. The most recent soil survey names this soil as "Sterling Gravelly Loam" (Erickson and Mortensen, 1974). Soils at the site have a clay loam texture that is very compact, and restrictive to soil depth estimated to approximately 10 inches. Rooting depth is obviously not totally restrictive as evidenced by the presence of deeper rooted (14-15 inches) mountain big sagebrush. Rocks are not common on the surface, although there is a layer of rock or large gravel that occurs in the soil profile between 3 and 8 inches under the soil surface. Soil temperatures are also relatively high at 73° F with an average depth of nearly 10 inches. The soil reaction is moderately alkaline (7.8 pH). Phosphorus could be a limiting factor at only 4.9 ppm as values less than 10 ppm may limit normal plant growth and development. Protective ground cover is abundant with no accelerated erosion noticeable.

Vegetation at this site is different than at the Mouth of Blacksmith Fork trend study. Mountain big sagebrush is present but it is far less abundant and even more decadent. The site had been seeded (i.e., drilled) with crested wheatgrass prior to study establishment in 1984. The seeding treatment has been at least moderately successful and has helped control annual and perennial weeds.

The remaining browse is in extremely poor condition. It should be noted again that some local people are receiving free hay locally and feeding the elk in the winter, causing excessively high concentrations of animals and heavier than normal use on the remaining shrubs. A once numerous stand of mountain big sagebrush has been reduced to a mere 200 plants/acre. Moreover, those that remain were classified as 100% decadent in 1984 and 1990. No reproduction was apparent and browsing was so intense that almost no seed was produced. During the 1996 reading, the sample size was increased three fold. Estimated density was 220 mostly mature plants/acre. Utilization is light and vigor improved from previous readings. Percent decadence has declined to 9%. Some reproduction is evident with the appearance of seedlings and seed production noted on mature plants. Seedling establishment will have considerable competition due to an abundant herbaceous understory that is dominated by bulbous bluegrass which contributes 69% of the grass cover.

A few large serviceberry and bitterbrush plants still occur on the site. These shrubs are better equipped to deal with the browsing pressure. Furthermore, these species are longer-lived, and more resistant to use. They will likely outlast the sagebrush. Broom snakeweed, an increaser, was sampled in small numbers in 1990, but did not appear to be expanding. However, it had expanded dramatically from 266 plants/acre to 9,740 by 1996. Sixty percent of the population consists of young plants and its reproductive potential is also high at 42% (percent of seedlings to its estimated population). Age class analysis would indicate an expanding population.

Grass cover is vigorous and dense accounting for nearly 70% of the total vegetative cover. Grasses consist chiefly of crested and intermediate wheatgrass, which were seeded, with smaller amounts of bluebunch wheatgrass and Sandberg bluegrass. Undesirable annual or perennial grasses include winter rye, jointed goatgrass, and small amounts of annual brome grasses.

Forbs are less important than grasses on this site as they only contribute 22% of the herbaceous cover. They include a number of undesirable invaders and increasers. The most abundant perennial forbs include dyers woad, ragweed, yellow salsify, and curlycup gumweed. Alfalfa, although rather infrequent, is the best quality forb on the site.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Vegetative and litter cover are both extensive and there is little runoff or erosion. A bigger problem is sedimentation from the steeper slopes to the east. Vegetative condition is poor and trend appears to be declining. Although establishment of crested wheatgrass has helped stabilize the site from a watershed point of view, it has meant little to wintering wildlife. From the data, it appears that in time, most of the remaining browse plants will be gone.

1990 TREND ASSESSMENT

Sagebrush canopy cover is too low on this site to be measured by the variable plot method. Only 1 decadent sagebrush was encountered. Grasses that have increased substantially include annual rye, Sandberg bluegrass, bulbous bluegrass, and crested wheatgrass. Many undesirable forb species, especially dyers woad, gumweed, and ragweed, also appear to be increasing at the expense of more useful species. There is little deer use on this site, but elk use has been high since they began feeding them hay in the winter nearby.

TREND ASSESSMENT

soil - stable (3)

browse - down, there is little browse left on the site (1)

herbaceous understory - grasses are up, but the forb trend is downward, overall trend is up (5)

1996 TREND ASSESSMENT

Ground cover characteristics have improved slightly since 1990 due to a major decline in percent bare ground from 23% to 5%. Since percent litter cover also declined, the decrease in bare ground comes mostly from the dramatic increase in bulbous bluegrass which has nearly doubled in nested frequency. Browse is still depleted but shows some improvement. There are only 200 mountain big sagebrush plants/acre, but vigor has improved, utilization is light, percent decadency has declined to 9%, and some mature plants are producing seed. Only future monitoring will determine if the few seedlings found this year can become established in an understory dominated by bulbous bluegrass, crested wheatgrass, intermediate wheatgrass, and winter rye. Sum of nested frequency has remained stable for grasses and increased for forbs. Sum of nested frequency for crested wheatgrass and intermediate wheatgrass increased slightly, while sum of nested frequency for bulbous

bluegrass nearly doubled. Sum of nested frequency for Sandberg bluegrass and bluebunch wheatgrass declined. Sum of nested frequency of ragweed, milkweed, curlycup gumweed, and dyers woad increased slightly as frequency for yellow salsify more than doubled. Trend for the herbaceous understory is slightly up but composition is very poor.

TREND ASSESSMENT

soil - up slightly (4)

browse - up slightly but depleted (4)

herbaceous understory - slightly up, but composition is poor (4)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 10

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	<i>Aegilops cylindrica</i> (a)	_a 3	_a 2	_b 15	1	1	7	.06
G	<i>Agropyron cristatum</i>	_b 247	_a 164	_a 194	78	65	67	6.13
G	<i>Agropyron intermedium</i>	_a 3	_a 30	_b 44	2	9	15	1.06
G	<i>Agropyron spicatum</i>	52	52	28	22	24	13	.75
G	<i>Aristida purpurea</i>	-	2	-	-	1	-	.03
G	<i>Bromus brizaeformis</i> (a)	-	-	11	-	-	5	.19
G	<i>Bromus japonicus</i> (a)	-	-	69	-	-	23	.91
G	<i>Bromus tectorum</i> (a)	-	-	25	-	-	11	.20
G	<i>Poa bulbosa</i>	_a -	_b 155	_c 308	-	67	84	24.20
G	<i>Poa pratensis</i>	-	1	-	-	1	-	-
G	<i>Poa secunda</i>	_a 27	_b 166	_a 14	14	64	7	.06
G	<i>Secale cereale</i> (a)	-	_b 73	_a 40	-	27	13	1.60
Total for Annual Grasses		3	75	160	1	28	59	2.98
Total for Perennial Grasses		329	570	588	116	231	186	32.25
Total for Grasses		332	645	748	117	259	245	35.23
F	<i>Achillea millefolium</i>	-	-	8	-	-	3	.04
F	<i>Agoseris glauca</i>	-	-	3	-	-	1	.00
F	<i>Alyssum alyssoides</i> (a)	-	-	34	-	-	13	.09
F	<i>Ambrosia psilostachya</i>	_a 3	_{ab} 16	_b 27	1	6	9	1.11
F	<i>Artemisia ludoviciana</i>	5	11	11	3	5	5	.50
F	<i>Asclepias asperula</i>	10	9	16	6	5	6	1.27
F	<i>Aster</i> spp.	-	-	2	-	-	1	.03
F	<i>Astragalus utahensis</i>	7	6	2	3	4	1	.00
F	<i>Cirsium</i> spp.	_a -	_a -	_b 11	-	-	6	.10
F	<i>Comandra pallida</i>	_b 13	_a -	_a -	5	-	-	-
F	<i>Epilobium brachycarpum</i> (a)	-	-	3	-	-	2	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	<i>Erodium cicutarium</i> (a)	-	-	23	-	-	9	.19
F	<i>Gilia</i> spp. (a)	-	-	42	-	-	17	.18
F	<i>Grindelia squarrosa</i>	_a 3	_b 35	_b 37	1	14	16	.99
F	<i>Hackelia patens</i>	_b 21	_a -	_a -	12	-	-	-
F	<i>Helianthus annuus</i> (a)	-	-	41	-	-	20	.28
F	<i>Holosteum umbellatum</i> (a)	-	-	21	-	-	8	.14
F	<i>Isatis tinctoria</i>	13	13	22	7	5	9	.14
F	<i>Lactuca serriola</i>	_a -	_a -	_b 48	-	-	21	.18
F	<i>Melilotus alba</i>	-	-	3	-	-	1	.03
F	<i>Medicago sativa</i>	_{ab} 2	_a -	_b 9	2	-	4	.12
F	<i>Oenothera caespitosa</i>	5	-	-	2	-	-	-
F	<i>Tragopogon dubius</i>	_b 177	_a 82	_c 210	76	34	82	4.34
F	Unknown forb-perennial	-	3	3	-	2	2	.09
F	<i>Veronica biloba</i> (a)	-	-	1	-	-	1	.00
Total for Annual Forbs		0	0	165	0	0	70	0.90
Total for Perennial Forbs		259	175	412	118	75	167	8.97
Total for Forbs		259	175	577	118	75	237	9.88

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

BROWSE TRENDS --

Herd unit 02 , Study no: 10

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	<i>Amelanchier alnifolia</i>	1	-
B	<i>Artemisia tridentata vaseyana</i>	11	1.37
B	<i>Gutierrezia sarothrae</i>	61	4.55
Total for Browse		73	5.93

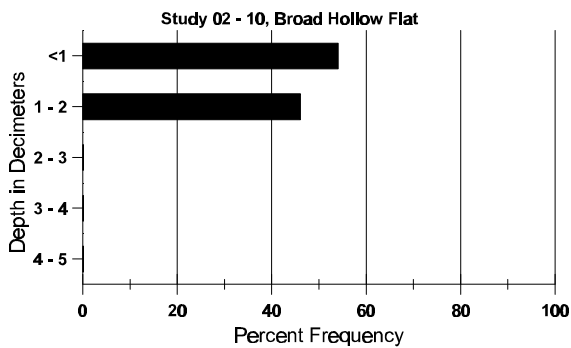
BASIC COVER --
Herd unit 02 , Study no: 10

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	394	1.00	11.00	54.75
Rock	127	9.75	7.25	3.37
Pavement	104	7.00	6.25	2.19
Litter	396	62.50	51.50	46.81
Cryptogams	62	5.50	.75	.58
Bare Ground	201	14.25	23.25	4.56

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 10, Broad Hollow Flat

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.6	73.0 (9.7)	7.8	28.7	40.0	31.3	2.9	4.9	211.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 10

Type	Quadrat Frequency '96
Elk	41
Deer	12
Cattle	20

BROWSE CHARACTERISTICS --

Herd unit 02 , 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				
<i>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	95	71	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		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	9	1	-	-	-	-	-	-	-	10	-	-	-	200	25	31	10
D	84	-	-	6	-	-	-	-	-	-	2	-	-	4	200			6
	90	-	1	-	-	-	-	-	-	-	-	-	-	1	33			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
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%			100%			67%			-84%							
'90		100%			00%			100%			+85%							
'96		09%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	100%			
												'90	33		100%			
												'96	220		9%			

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	206	-	-	-	-	-	-	-	-	206	-	-	-	4120		206	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	290	-	-	-	-	-	-	-	-	290	-	-	-	5800		290	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	233	11	18	
	96	197	-	-	-	-	-	-	-	-	197	-	-	-	3940	11	16	
% 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%			+97%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	266		-				
											'96	9740		-				
<i>Juniperus scopulorum</i>																		
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33	69	59	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33	102	67	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			00%			+ 0%							
'90		00%			00%			00%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	33	Dec:	-				
											'90	33		-				
											'96	0		-				
<i>Purshia tridentata</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	49	79	
% 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 2-12-01

Study site name: Second Dam Blacksmith Fork.

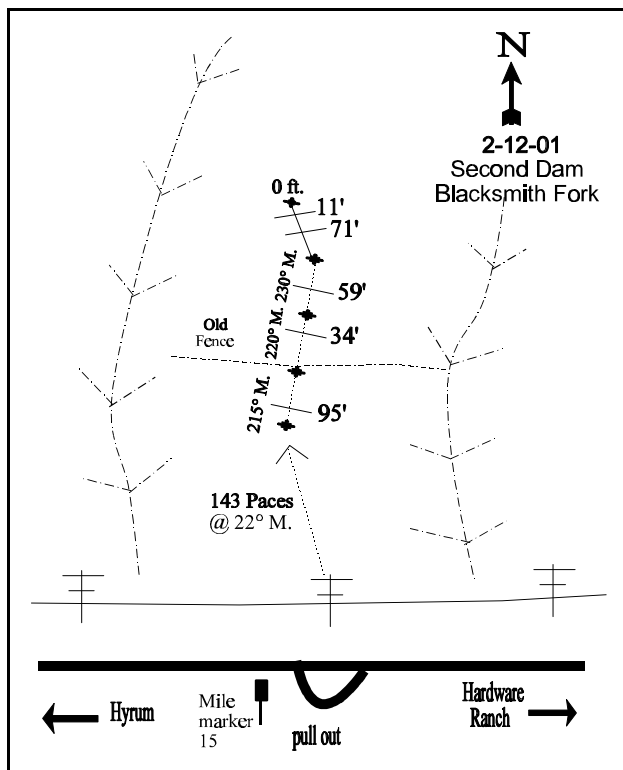
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 151 degrees magnetic.

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

LOCATION DESCRIPTION

In Hyrum, proceed east up Blacksmith Fork Canyon (U-101) to mile marker 15. Continue 200 feet to the pull-out. Look for a power pole north of the east of the pull-out. From the pole, take a azimuth of 22 degrees magnetic and walk 143 paces to the 400-foot baseline stake marked by browse tag #7985. The baseline bearing is 151 degrees magnetic. Note: due to the rocky terrain the 100-foot stake is actually at the 95 foot mark; adjust the tape and belts accordingly. Line 2 runs 230 degrees magnetic. Line three runs 220 degrees magnetic. Line 4 runs 215 degrees magnetic.



Map Name: Logan Peak

Diagrammatic Sketch

Township 10N, Range 2E, Section 1

UTM 4608526 N, 444151 E

DISCUSSION

Trend Study No. 2-12

The Second Dam Blacksmith Fork trend study samples critical deer winter range north of the second reservoir in Blacksmith Fork Canyon. This area is typical of the south-facing slopes all along the winter range within the canyon. The slope is moderately steep (35% to 40%), and elevation is approximately 5,560 feet. Utilized primarily by deer during all but the most severe winters, hedging of the dominant mountain big sagebrush and antelope bitterbrush has been heavy in the past, although deer and elk pellet groups occurred at low frequencies in 1996. A pellet group transect read on site in 2001 estimated 6 elk and 12 deer days use/acre (15 edu/ha & 30 ddu/ha). Mild winters for the past few years have likely resulted in lighter use than was observed in the past.

The soil survey goes into very little detail, simply classifying area as "Rock Land." This category includes steep mountain slopes with significant areas of exposed bedrock and very shallow soils derived primarily from limestone and quartzite. Soils show little development and tend to erode easily because of the steep slopes. The soil on the site is moderately shallow due to underlying limestone, and has an estimated effective rooting depth of just over 8 inches. The rock near the surface made soil collection and temperature readings difficult. The soil temperature at a depth of nearly 9 inches was 59° F. Rock and pavement cover on the surface is abundant and consists of dark colored limestone which elevates daytime ground surface temperatures. The soil reaction is slightly alkaline (7.4 pH). There is little bare ground exposed and erosion does not appear to be a problem. The erosion condition class was classified as stable in 2001.

Browse composition consists of a moderately low density of mountain big sagebrush with an associated sparse population of antelope bitterbrush. Other species such as Saskatoon Serviceberry, blueberry elder, Rocky Mountain maple, true mountain mahogany, and Rocky Mountain juniper provide a desirable variety of forage but they are of minor importance because of their limited abundance. Density of mountain big sagebrush was estimated at 933 plants/acre in 1984. Utilization was extremely heavy at that time as 82% of the population displayed heavy use, and the majority of the population was decadent (64%). Vigor was also poor on 29% of the shrubs. Utilization was light in 1990, but density still declined to 633 plants/acre and percent decadence rose to 68%. In 1996, density declined an additional 40% to 380 plants/acre. A further witness to the decline in sagebrush is the large proportion of dead plants (500 plants/acre) counted in 1996, which meant that more of the population was dead than alive. Utilization was light to moderate, yet vigor was poor on 16% of the population and percent decadence was still moderately high at 53%. The much larger sample used in 1996 is likely partly responsible for the change in numbers, but it is obvious that sagebrush has declined on this site. In 2001, density remained similar to 1996 at 300 plants/acre. Use was moderate on 80% of the sagebrush sampled and vigor reduced on 20% of the plants. Percent decadence remained stable at 53%.

Bitterbrush displayed a stable population density at nearly 200 plants/acre from 1984 through 1996. Use was heavy on all plants in 1984, but light to moderate in 1990 and 1996. Percent decadence was high at 67% in 1984, declining to 33% in 1990 and 0% in 1996. Utilization was moderate to heavy in 2001 with vigor remaining good on all plants during all readings. Reproduction is limited with no seedlings encountered during any of the 3 readings, and only a few young were observed in 1996. The rosaceous shrubs are apparently not as affected by the extended drought as the sagebrush and appear to recover more quickly because they are more deeply rooted.

The most abundant shrub on the site is broom snakeweed which was first picked up in 1996 with the larger sample. There were approximately 1,200 broom snakeweed plants/acre in 1996 and 1,080 in 2001. Age class structure indicates a young and possibly expanding population. The extended baseline (increased sample size) used in 1996 is partly the reason for the increased density of broom snakeweed but some snakeweed were also found along the original baseline.

Grasses and forbs are moderately abundant and produced 28% cover in 1996 increasing to 42% by 2001. The principal perennial grasses include bluebunch wheatgrass, prairie Junegrass, and Sandberg bluegrass. Three annual brome grasses are also abundant and accounted for nearly half (48%) of the grass cover in 1996. Both frequency and cover of cheatgrass brome increased significantly in 2001. Japanese and cheatgrass brome currently ('01) account for 67% of the grass cover and 49% of the total herbaceous cover.

Forbs are diverse, yet contain few valuable perennial species. The majority are annuals or weedy biennials and perennials. Common species include pale alyssum, wild onion, arrowleaf balsamroot, bastard toadflax, tapertip hawksbeard, dyers woad, rock goldenrod, and yellow salsify.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be declining. This site has an exceptionally rocky and poorly developed soil which shows abundant evidence of down slope movement. Plant pedestalling is common and a considerable area of erosion pavement is exposed. Vegetative trend is in doubt. Upon initial examination, it appears that the key browse species are declining in density. However, the causative factors are not entirely clear. Our best estimate at this time is that trend is declining or at best barely stable.

1990 TREND ASSESSMENT

No significant changes in density or composition have occurred on this site. The browse component appears to have improved growth and vigor. The mountain big sagebrush and bitterbrush were classified as lightly hedged in 1990. No young of these key species were found and there is an excessively high percentage of decadent sagebrush (68%) in the population. Sagebrush canopy cover averages 6%. Grasses in the understory are productive and competitive. Ground cover components are unchanged on the erodible, 40% slope, as soil erosion appears to continue.

TREND ASSESSMENT

soil - down slightly (2)

browse - stable (3)

herbaceous understory - stable but in poor condition (3)

1996 TREND ASSESSMENT

Soil trend is up, with percent bare ground declining from 16% to 5%. Litter cover has increased. Mountain big sagebrush is still probably in a state of decline with a continuing high percent decadence, poor vigor, and little reproduction. Antelope bitterbrush displays a stable trend with a decline in percent decadence (33% to 0%) and light to moderate use. Overall browse trend is considered slightly down due to the condition of the sagebrush population and the high density of broom snakeweed. Trend for grasses is stable. Sum of nested frequency of perennial grasses have remained similar to 1996 levels. Sum of nested frequency of perennial forbs increased due largely to the 122-point increase in nested frequency of yellow salsify. However, the forb composition is still poor with few valuable forage species. Overall herbaceous trend is stable.

TREND ASSESSMENT

soil - up (5)

browse - slightly downward (2)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1996. Percent bare ground is low at almost 5%. The abundance of rock and pavement on the surface armor the soil from erosion. The erosion condition class was determined to be stable. Trend for the key browse species, mountain big sagebrush and bitterbrush, appears to be declining slightly. Bitterbrush displays heavier use compared to 1996. Vigor is normal, but percent decadence has increased since 1996 to 25%. Plants were flowering and producing seed during the 2001 reading, but no seedlings and young were encountered in the density strips. It appears that some layering is occurring in these large spread out shrubs which average about 6 feet in crown diameter. Annual leader growth averaged 2.8 inches. The lower population density recorded in 2001 is likely the result of the difficulty in counting density with spread out shrubs which are reproducing by layering. Regardless of the population density, bitterbrush occurs in low numbers and does not produce much forage. Mountain big sagebrush also occurs in low numbers. It displays moderate use, and vigor is poor on 20% of the population. Although percent decadence has remained stable at 53%, 38% (60 plants/acre) of the decadent sagebrush appear to be dying and there are currently no young plants to replace these. Dead plants currently number slightly more than live plants. It is obvious that the thick cover of annual grasses and forbs combined with the high surface temperatures caused by the dark colored surface rock cover, make seedling establishment very difficult. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs has remained similar. However, percent cover of annual grasses has increased from 10% to 21%. The increase is a function of timing of precipitation since sum of nested frequency of annual grasses remained similar to 1996. One compositional change that has taken place is a change from mostly Japanese brome to cheatgrass. The forb composition is still dominated by annuals and weedy perennials and biennials.

TREND ASSESSMENT

soil - stable (3)

browse - slightly downward (2)

herbaceous understory - stable, but dominated by annuals (3)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 12

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	151	176	154	168	61	69	61	71	6.40	6.50
G	Bromus brizaeformis (a)	-	-	a11	b49	-	-	7	22	.03	.35
G	Bromus japonicus (a)	-	-	b280	a95	-	-	84	36	5.56	1.16
G	Bromus tectorum (a)	-	-	a213	b347	-	-	65	99	4.00	19.09
G	Koeleria cristata	18	8	11	9	8	4	3	5	.21	.11
G	Poa bulbosa	-	-	4	8	-	-	2	3	.01	.18
G	Poa pratensis	-	4	-	-	-	2	-	-	-	-
G	Poa secunda	a66	b162	b158	b164	34	70	57	65	3.68	2.92
Total for Annual Grasses		0	0	504	491	0	0	156	157	9.60	20.61
Total for Perennial Grasses		235	350	327	349	103	145	123	144	10.30	9.72
Total for Grasses		235	350	831	840	103	145	279	301	19.91	30.33
F	Achillea millefolium	6	1	-	-	2	1	-	-	-	-
F	Agoseris glauca	a-	ab1	ab3	b9	-	1	1	5	.00	.16
F	Allium acuminatum	c60	ab3	b28	a24	31	1	7	12	2.14	.09
F	Alyssum alyssoides (a)	-	-	a227	b286	-	-	74	92	.89	4.43
F	Astragalus utahensis	a2	a4	a1	b-	1	4	1	-	.03	-
F	Balsamorhiza sagittata	17	24	12	11	12	11	6	6	.43	1.60
F	Castilleja linariaefolia	-	-	-	1	-	-	-	1	-	.03
F	Camelina microcarpa (a)	-	-	-	1	-	-	-	1	-	.00
F	Calochortus nuttallii	2	1	3	-	2	1	1	-	.00	-
F	Cirsium undulatum	2	4	5	-	1	2	2	-	.19	.12
F	Collomia linearis (a)	7	-	1	6	4	-	1	3	.00	.01
F	Comandra pallida	b35	a2	ab17	a10	15	2	9	4	.07	.09
F	Collinsia parviflora (a)	-	-	7	5	-	-	3	3	.01	.01
F	Crepis acuminata	a5	b28	ab17	a8	3	14	7	5	.25	.19
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	1	-	.00
F	Draba spp. (a)	-	-	-	3	-	-	-	1	-	.00
F	Epilobium brachycarpum (a)	-	-	b11	a-	-	-	5	-	.02	-
F	Erodium cicutarium (a)	-	-	-	5	-	-	-	3	-	.06
F	Eriogonum umbellatum	1	2	2	5	1	1	1	2	.15	.03
F	Galium aparine (a)	-	-	3	3	-	-	2	1	.01	.03
F	Hackelia patens	-	-	-	2	-	-	-	1	-	.00
F	Holosteum umbellatum (a)	-	-	a10	b161	-	-	5	53	.05	.81
F	Isatis tinctoria	a-	b13	b19	a-	-	7	9	-	.07	-
F	Lactuca serriola	a-	b15	ab5	c58	-	9	2	31	.06	.62
F	Linum lewisii	2	1	3	-	1	1	2	-	.03	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Lithospermum ruderales	2	-	-	5	1	-	-	2	.03	.06
F	Lomatium grayi	_{ab} 13	_b 27	_a 4	_a 5	6	13	2	3	.01	.01
F	Melilotus officinalis	-	5	1	-	-	2	1	-	.00	-
F	Penstemon spp.	-	-	3	-	-	-	1	-	.03	-
F	Petrorhiza pumila	_{bc} 34	_c 34	_a 9	_{ab} 10	13	16	4	6	.71	.89
F	Ranunculus testiculatus (a)	-	-	13	31	-	-	5	10	.02	.07
F	Senecio spp.	1	-	-	-	1	-	-	-	-	-
F	Tragopogon dubius	_a 18	_b 53	_d 175	_c 98	8	26	74	47	2.85	1.29
F	Veronica biloba (a)	-	-	46	54	-	-	21	17	.15	.67
Total for Annual Forbs		7	0	318	558	4	0	116	185	1.17	6.14
Total for Perennial Forbs		200	218	307	246	98	112	130	125	7.10	5.22
Total for Forbs		207	218	625	804	102	112	246	310	8.28	11.36

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

BROWSE TRENDS --

Herd unit 02 , Study no: 12

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	19	13	3.20	1.74
B	Chrysothamnus nauseosus hololeucus	2	2	.76	1.96
B	Chrysothamnus viscidiflorus viscidiflorus	5	4	.06	.23
B	Eriogonum heracleoides	1	0	-	-
B	Gutierrezia sarothrae	25	26	.65	.66
B	Purshia tridentata	9	5	1.99	1.41
B	Rosa woodsii	0	2	-	.15
Total for Browse		61	52	6.67	6.17

BASIC COVER --

Herd unit 02 , Study no: 12

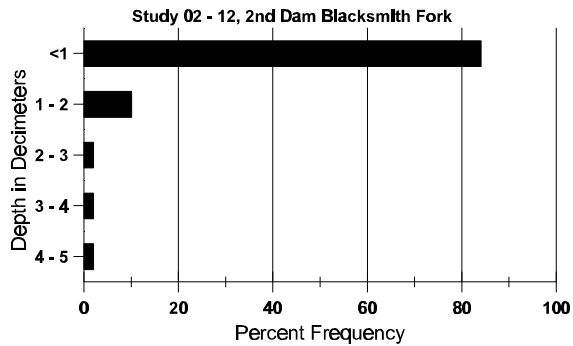
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	374	371	1.25	9.75	33.04	52.43
Rock	331	321	43.00	39.00	31.60	29.89
Pavement	204	190	12.25	8.25	3.85	2.98
Litter	387	362	26.25	25.00	31.88	36.83
Cryptogams	119	109	4.25	1.75	4.36	3.26
Bare Ground	197	133	13.00	16.25	4.64	4.52

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 12, 2nd Dam Blacksmith Fork

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.2	58.8 (8.8)	7.4	36.6	35.1	28.4	3.4	10.0	176.0	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 12

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Elk	6	1	78	6 (15)
Deer	8	4	157	12 (30)

BROWSE CHARACTERISTICS --

Herd unit 02 , 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>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	54	47	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	51	52	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	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	2	8	-	-	-	-	-	-	8	2	-	-	333	34	30	10
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200	30	31	6
	96	7	1	-	-	-	-	-	-	-	8	-	-	-	160	30	47	8
	01	1	6	-	-	-	-	-	-	-	6	1	-	-	140	29	40	7
D	84	-	3	15	-	-	-	-	-	-	9	1	8	-	600		18	
	90	13	-	-	-	-	-	-	-	-	12	-	-	1	433		13	
	96	6	3	1	-	-	-	-	-	-	7	-	-	3	200		10	
	01	2	6	-	-	-	-	-	-	-	5	-	-	3	160		8	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	500		25	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	340		17	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		18%			82%			29%			-32%							
'90		00%			00%			05%			-40%							
'96		21%			05%			16%			-21%							
'01		80%			00%			20%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	933	Dec:	64%			
												'90	633		68%			
												'96	380		53%			
												'01	300		53%			

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 hololeucus												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	40	47	72	2
	01	2	-	-	-	-	-	-	40	33	44	2
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%						
'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	40					
						'01	40					
Chrysothamnus viscidiflorus viscidiflorus												
Y	84	1	-	-	-	-	-	-	33			1
	90	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	0			0
M	84	2	-	-	-	-	-	-	66	15	10	2
	90	3	-	-	-	-	-	-	100	18	23	3
	96	6	-	-	-	-	-	-	120	18	30	6
	01	5	-	-	-	-	-	-	100	15	25	5
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%		00%		00%		-24%				
'90		00%		00%		00%		+29%				
'96		00%		00%		00%		-29%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	132	Dec:	25%			
						'90	100		0%			
						'96	140		0%			
						'01	100		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>Eriogonum heracleoides</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	3	4	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		-			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	22	-	-	-	-	-	-	-	-	22	-	-	-	440			22
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	41	-	-	-	-	-	-	-	-	41	-	-	-	820	10	16	41
	01	54	-	-	-	-	-	-	-	-	54	-	-	-	1080	9	13	54
% 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%			-14%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	1260		-			
												'01	1080		-			

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				
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	20			1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	84	-	-	2	-	-	-	-	-	-	-	-	-	66	28	36	2	
	90	3	-	-	1	-	-	-	-	-	-	-	-	133	24	30	4	
	96	4	4	-	-	-	-	-	-	-	-	-	-	160	33	76	8	
	01	1	1	-	-	-	1	-	-	-	-	-	-	60	39	76	3	
D	84	-	-	4	-	-	-	-	-	-	-	-	-	133			4	
	90	1	1	-	-	-	-	-	-	-	-	-	-	66			2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	-	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		00%			100%			00%			+ 0%							
'90		17%			00%			00%			-10%							
'96		44%			00%			00%			-44%							
'01		60%			20%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	67%			
												'90	199		33%			
												'96	180		0%			
												'01	100		40%			
Rosa woodsii																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	2	-	-	-	-	-	-	-	-	-	-	-	40			2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	10	6	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	40		-			

Trend Study 2-13-01

Study site name: Hardware Plateau.

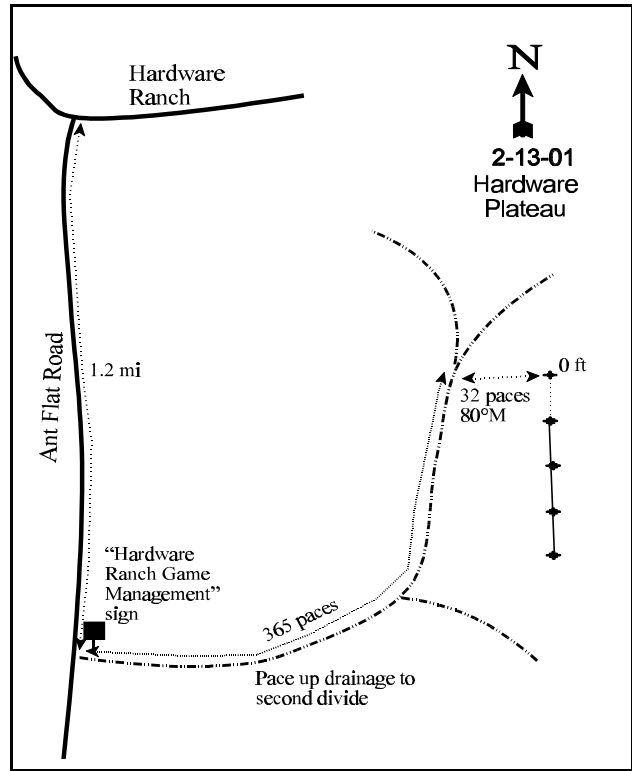
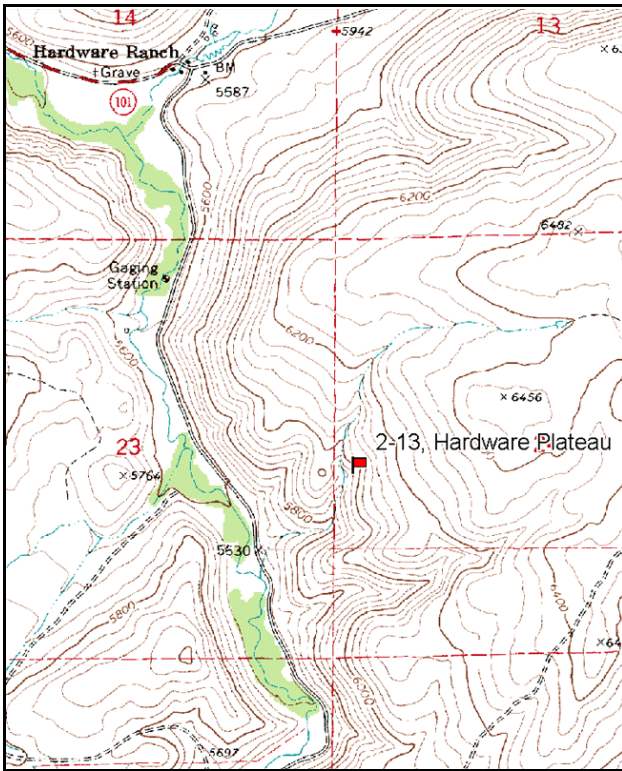
Vegetation type: Big Sagebrush.

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 Hardware Ranch, proceed south on the Ant Flat road for 1.2 miles. This mileage should end at a sign that reads: "Welcome to Hardware Ranch Game Management Area." Stop here. Walk up the bottom of the wash (to the east of the sign) 365 paces, to the second very definite fork in the drainage. From the point where the wash divides take a bearing of 80 degrees magnetic and walk 32 paces to the 0-foot stake of the baseline, marked by browse tab #7984. The baseline runs at 163 degrees magnetic.



Map Name: Hardware Ranch

Diagrammatic Sketch

Township 10N, Range 3E, Section 24

UTM 4603964 N, 453491 E

DISCUSSION

Trend Study No. 2-13

The Hardware Plateau trend study is located a short distance up one of the small draws at the western edge of the Hardware Plateau. These areas are relatively small in acreage, yet important to wintering deer and elk. The site has a moderately steep (50%), west-facing slope with an elevation of 5,960 feet. The range type is mountain big sagebrush/grass which also contains a scattered mixture of other shrub species. Pellet groups were abundant and two carcasses from the 1983-84 winter were found on the site during study establishment in 1984. Use appeared significantly lighter in 1996 with quadrat frequencies of deer and elk pellet groups at 18% and 7% respectively. One deer was flushed from a drainage near the site and 3 dead deer and 1 dead elk were found near the site in 1996. A pellet group transect read at the site in 2001 estimated 39 deer and 13 elk days use/acre (96 ddu/ha and 32 edu/ha). Yellow bellied marmots are numerous around the larger rock outcrops.

Soils in this area are classed as "Yeates Hollow Extremely Rocky Silt Loam, 30 to 60 Percent Slopes." These are moderately shallow soils where bedrock is normally encountered at about 4 feet in depth. Derived from quartzite and sandstone, the Yeates soil has poor permeability and runoff is normally quite rapid. Roots penetrate to bedrock and soil reaction ranges from neutral to slightly acidic (Erickson and Mortensen, 1974). On the study site, the soil has a loam texture and is very rocky on the surface and through the profile. Due to the rocky nature of the soil, effective rooting depth (see methods) was estimated at about 10 inches with a soil penetrometer. This is obviously an underestimate as deeper rooted shrubs including mountain big sagebrush and antelope bitterbrush are growing on the site, but it gives a relative index of rooting depth. The rocky surface and profile, along with the moderately steep west aspect contribute to a relatively high soil temperature (74° F). Some inevitable soil erosion occurs on the site due to the steep slope, but protective ground cover is abundant and well dispersed. There is little unprotected bare soil and even though there is some rills and active gullies on site, the erosion condition class was determined to be only slight in 2001.

Although the study site is classified as a big sagebrush-grass type, increaser shrubs, including narrowleaf low rabbitbrush, mountain snowberry, woods rose, and Oregon hollygrape are quite numerous and accounted for 62% of the browse cover in 1996 and 64% in 2001. Mountain big sagebrush occurs in low densities. Use was heavy in 1984 and 1990, and percent decadence was extremely high at 70% and 75% respectively. Use was mostly moderate in 1996 and 2001. Percent decadence declined to 21% in 1996 but increased to 50% in 2001. Dead plants, first counted in 1996, numbered more than the live plants (480 dead) indicating a die-off had occurred. The number of dead sagebrush plants are a concern as they outnumber live ones by a ratio of nearly 2 to 1. This kind of loss for sagebrush has been noted on many marginal sites throughout Utah. Because of slope (50%), aspect (west), soils, extended drought, intraspecific competition, and relatively high soil temperatures, some thinning and die-off would be expected for mountain big sagebrush.

Serviceberry and bitterbrush offer additional preferred forage yet these shrubs also occur in relatively low numbers. Serviceberry currently ('01) numbers only 160 plants/acre and produces less than 1% of the shrub cover. Bitterbrush has steadily declined in density from 333 plants/acre in 1984 to only 80 plants/acre in 1996 and 2001. However, some of this change can be explained by the much larger sample size used in 1996 and 2001 which gives a more accurate population estimate for species that characteristically have distributions that are clumped or discontinuous. Use of the bitterbrush has been heavy during all readings. Vigor has been normal even though no seedlings or young plants have been encountered during any reading.

The study area has good grass cover and fair forb cover. Perennial species predominate, however, a few annuals, especially cheatgrass brome, provide a high amount of fine fuel litter when dry. Annual brome grasses accounted for 35% of the grass cover in 1996 and 19% in 2001. The most important perennial grasses include bluebunch wheatgrass and Sandberg bluegrass. These species combined to produce nearly 26% cover, which represents 81% of the grass cover in 2001. Common perennial forbs include Louisiana sagebrush, arrowleaf balsamroot, western yarrow, and silvery lupine. Forbs and grasses show little evidence of any current grazing use and are in good vigor.

1984 APPARENT TREND ASSESSMENT

Considering the extremely rocky and undeveloped nature of this soil, erosion is noticeable. However, the erosion level is probably within acceptable limits. Rock itself is a significant ground cover element with many of the interspaces and rock crevices covered with a light litter cover. Grass and forb cover are fair and probably exceed that of shrubs. Soil trend appears stable or slightly declining. With respect to preferred browse species, trend seems to be declining. Excessive use on the more important browse species is causing their decline and allowing a concurrent increase of less desirable shrubs.

1990 TREND ASSESSMENT

Browse continues to decline on this DWR winter range property which is used by deer, elk, moose, and domestic sheep. Chukars are common. The overall poor vigor and heavy use of the browse is compounded by extended drought and competition with annual grasses and forbs. Together, this is causing low seed production. Even with good seed production, there are not many safe sites for seedling establishment. A majority of the sagebrush, bitterbrush, and serviceberry plants are decadent or already dead. The serviceberry classified as young are sprouts from old root crowns. The samples of these key species are small due to the sparsity of the browse population, but all the data indicate a decline in density. Grasses, mainly bluebunch wheatgrass, Sandberg bluegrass, and cheatgrass are the dominant vegetation. Forbs are also prominent. They have increased slightly. Considering the steep slope, erosion is within acceptable limits due to the good cover values.

TREND ASSESSMENT

soil - stable (3)

browse - down except for slight increase for serviceberry (1)

herbaceous understory - slightly up (4)

1996 TREND ASSESSMENT

Ground cover characteristics have changed somewhat since 1990. Percent rock cover is up from 21% to 25%, and pavement cover increased from 1% to 5%. Litter cover increased slightly although percent bare ground declined from 17% to 7%. Erosion is minimal due to the high proportion of grass and forb cover. Trend for soil is considered slightly up. Key browse species, mountain big sagebrush, appears to have an improving trend. Density is still low at only 280 plants/acre. However, young plants comprise 14% of the population, utilization is more moderate, vigor improved, and percent decadency has declined from 75% to 21%. Bitterbrush has displayed a continual decline in density since 1984, although it only contributes 6% of the browse cover. Population density is currently down to less than 100 plants/acre, but utilization is not as heavy (from 100% down to 50% heavy use) and percent decadence has declined from 50% to 25%. Serviceberry also shows reduced heavy use, improved vigor, and less decadent plants. Overall trend for browse is slightly up but depleted. Trend for the herbaceous understory is down. Sum of nested frequency for perennial grasses are down 23%, while sum of nested frequency of forbs has declined 48%. Nested frequency for the key perennial grass, bluebunch wheatgrass, has declined significantly. Key forbs include western yarrow, arrowleaf balsamroot, sulfur eriogonum, and silvery lupine which have all declined significantly since 1990.

TREND ASSESSMENT

soil - up slightly (4)

browse - slightly improved but in relatively low numbers (4)

herbaceous understory - down (1)

2001 TREND ASSESSMENT

Trend for soil is stable. There is some erosion occurring but this is unavoidable due to the steep slope. There is abundant herbaceous vegetation cover and the erosion condition class was determined to be slight. Trend for browse appears stable but depleted. Mountain big sagebrush currently numbers only 120 plants/acre, half of these being decadent. Use is heavier than 1996 levels but vigor remains good and there are a few young plants in the population. Bitterbrush also shows heavier use than in 1996. There are only an estimated 80 plants/acre. Vigor is normal and percent decadence has remained stable. Trend for the herbaceous understory appears stable with similar sum of nested frequency values for perennial grasses and forbs. Nested frequency of the dominant grass, bluebunch wheatgrass, has remained stable although cover increased from 10% to 18%. Annual cheatgrass declined significantly in nested frequency and cover declined from 10% to 6%.

TREND ASSESSMENT

soil - stable (3)

browse - stable but depleted (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 13

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	_a 267	_b 305	_a 232	_a 244	94	100	85	84	9.70	17.86
G	Bromus japonicus (a)	-	-	10	14	-	-	5	6	.05	.10
G	Bromus tectorum (a)	-	-	_b 296	_a 250	-	-	89	84	9.67	5.96
G	Koeleria cristata	-	2	-	2	-	2	-	1	-	.03
G	Poa fendleriana	-	-	4	-	-	-	3	-	.04	-
G	Poa pratensis	-	4	3	3	-	2	1	1	.03	.03
G	Poa secunda	244	252	197	249	93	89	66	88	7.83	7.89
Total for Annual Grasses		0	0	306	264	0	0	94	90	9.72	6.06
Total for Perennial Grasses		511	563	436	498	187	193	155	174	17.61	25.82
Total for Grasses		511	563	742	762	187	193	249	264	27.33	31.88

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Achillea millefolium</i>	_b 175	_b 133	_a 69	_a 65	62	58	34	30	.82	1.52
F	<i>Agoseris glauca</i>	-	1	-	6	-	1	-	2	-	.04
F	<i>Alyssum alyssoides</i> (a)	-	-	_a 64	_b 95	-	-	26	41	.42	.30
F	<i>Arabis</i> spp.	-	6	8	2	-	3	3	1	.01	.00
F	<i>Artemisia ludoviciana</i>	15	20	21	23	5	7	7	8	2.30	1.77
F	<i>Balsamorhiza sagittata</i>	_b 60	_b 61	_a 26	_a 19	34	31	13	9	.77	.60
F	<i>Calochortus nuttallii</i>	-	3	-	-	-	1	-	-	-	-
F	<i>Cirsium undulatum</i>	10	19	5	13	5	9	4	6	.19	.71
F	<i>Collomia linearis</i> (a)	-	-	_a -	_b 15	-	-	-	7	-	.03
F	<i>Comandra pallida</i>	-	-	-	1	-	-	-	1	-	.00
F	<i>Collinsia parviflora</i> (a)	-	-	50	66	-	-	20	28	.15	.16
F	<i>Crepis acuminata</i>	_a -	_c 153	_b 28	_b 18	-	72	18	9	.34	.45
F	<i>Cymopterus</i> spp.	_a -	_a -	_a 2	_b 21	-	-	1	9	.00	.40
F	<i>Draba</i> spp. (a)	-	-	_a -	_b 21	-	-	-	7	-	.03
F	<i>Epilobium brachycarpum</i> (a)	-	-	_b 83	_a 11	-	-	35	6	.93	.03
F	<i>Erodium cicutarium</i> (a)	-	-	_a 52	_b 132	-	-	23	38	.65	7.74
F	<i>Eriogonum umbellatum</i>	_b 20	_b 12	_{ab} 7	_a -	9	6	3	-	.33	-
F	<i>Hackelia patens</i>	_b 27	_{ab} 15	_b 33	_a 7	12	9	16	2	.33	.07
F	<i>Holosteum umbellatum</i> (a)	-	-	_a 12	_b 168	-	-	6	61	.03	.65
F	<i>Isatis tinctoria</i>	-	-	-	1	-	-	-	1	-	.15
F	<i>Lappula occidentalis</i> (a)	-	-	-	1	-	-	-	1	-	.03
F	<i>Lactuca serriola</i>	-	-	16	19	-	-	7	8	.03	.07
F	<i>Lomatium grayi</i>	-	1	-	1	-	1	-	1	-	.03
F	<i>Lupinus argenteus</i>	_c 58	_b 34	_a 12	_a 11	34	18	6	5	.34	.39
F	<i>Microsteris gracilis</i> (a)	-	-	-	4	-	-	-	2	-	.01
F	<i>Penstemon humilis</i>	13	12	4	4	7	5	2	4	.06	.24
F	<i>Phacelia</i> spp.	_a -	_a -	_{ab} 12	_b 10	-	-	4	5	.48	.12
F	<i>Ranunculus testiculatus</i> (a)	-	-	_b 23	_a 13	-	-	10	5	.07	.05
F	<i>Senecio multilobatus</i>	_b 80	_a -	_a -	_a -	44	-	-	-	-	-
F	<i>Sisymbrium altissimum</i> (a)	-	-	12	-	-	-	7	-	.09	-
F	<i>Tragopogon dubius</i>	2	-	2	3	2	-	2	2	.01	.06
Total for Annual Forbs		0	0	296	526	0	0	127	196	2.36	9.05
Total for Perennial Forbs		460	470	245	224	214	221	120	103	6.05	6.67
Total for Forbs		460	470	541	750	214	221	247	299	8.41	15.72

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

BROWSE TRENDS --

Herd unit 02 , Study no: 13

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	9	7	.06	.03
B	Artemisia tridentata vaseyana	14	6	1.30	.36
B	Chrysothamnus viscidiflorus viscidiflorus	17	16	1.79	1.27
B	Eriogonum heracleoides	0	1	-	-
B	Mahonia repens	15	19	.07	.67
B	Prunus virginiana	5	4	.03	.03
B	Purshia tridentata	3	3	.38	1.00
B	Rosa woodsii	12	16	.72	.51
B	Sambucus cerulea	0	2	-	.03
B	Symphoricarpos oreophilus	6	4	1.31	1.62
Total for Browse		81	78	5.68	5.55

BASIC COVER --

Herd unit 02 , Study no: 13

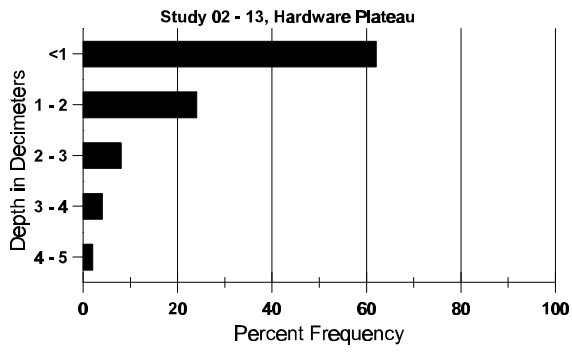
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	368	374	1.75	16.25	43.72	48.98
Rock	326	319	17.50	20.50	25.35	30.16
Pavement	212	211	2.25	.75	5.00	4.30
Litter	389	357	66.75	44.50	45.87	33.00
Cryptogams	83	82	6.50	1.25	1.18	1.94
Bare Ground	180	136	5.25	16.75	7.04	4.88

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 13, Hardware Plateau

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.9	73.8 (10.1)	6.7	42.3	31.7	26.0	4.0	34.0	307.2	.5

Stoniness Index



PELLET GROUP FREQUENCY -- Herd unit 02 , Study no: 13

Type	Quadrat Frequency	
	'96	'01
Rabbit	-	6
Elk	7	3
Deer	18	19

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
226	N/A
165	13 (31)
505	39 (96)

BROWSE CHARACTERISTICS --

Herd unit 02 , 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				
Amelanchier alnifolia																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	8	1	-	-	-	-	-	-	9	-	-	-	300		9	
	90	-	2	6	3	1	1	-	-	-	10	2	-	1	433		13	
	96	6	5	1	-	-	-	-	-	-	12	-	-	-	240		12	
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	27	22	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	3	7	-	-	-	-	-	-	10	-	-	-	200	17	21	10
	01	3	2	2	-	-	-	-	-	-	7	-	-	-	140	20	21	7
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	2	-	2	-	-	-	-	4	-	-	-	133		4	
	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		82%			18%			00%			+35%							
'90		29%			53%			06%			-22%							
'96		36%			36%			00%			-64%							
'01		38%			25%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	366	Dec:	9%				
											'90	566		23%				
											'96	440		0%				
											'01	160		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																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	2	-	-	-	-	-	-	-	3	-	-	-	100	14	9	3
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33	13	13	1
	96	-	7	2	-	-	-	-	-	-	9	-	-	-	180	24	34	9
	01	1	1	-	-	-	-	-	-	-	1	1	-	-	40	32	37	2
D	84	1	1	5	-	-	-	-	-	-	7	-	-	-	233			7
	90	-	-	3	-	-	-	-	-	-	3	-	-	-	100			3
	96	-	3	-	-	-	-	-	-	-	2	-	-	1	60			3
	01	-	3	-	-	-	-	-	-	-	3	-	-	-	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	480			24
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		30%			50%			00%			-60%							
'90		00%			75%			25%			+53%							
'96		71%			14%			07%			-57%							
'01		67%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	70%			
												'90	133		75%			
												'96	280		21%			
												'01	120		50%			

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	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	19	-	-	-	-	-	-	-	-	18	-	1	-	633	16	18	19
	90	10	1	-	1	-	-	-	-	-	12	-	-	-	400	17	21	12
	96	20	2	-	-	-	-	-	-	-	20	2	-	-	440	15	24	22
	01	24	-	-	-	-	-	-	-	-	21	3	-	-	480	12	22	24
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		04%			00%			04%			-43%							
'90		08%			00%			00%			+ 2%							
'96		09%			00%			00%			+12%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	766	Dec:	4%				
											'90	433		0%				
											'96	440		0%				
											'01	500		0%				
Eriogonum heracleoides																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	7	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 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						
Gutierrezia sarothrae																					
Y	84	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	33	7	11	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%											
'90		00%				00%				00%											
'96		00%				00%				00%											
'01		00%				00%				00%											
Total Plants/Acre (excluding Dead & Seedlings)												'84		66	Dec:		-				
												'90		0			-				
												'96		0			-				
												'01		0			-				
Mahonia repens																					
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	8	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	01	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	41	-	-	-	-	-	-	-	-	-	-	-	41	-	-	-	820	4	5	41
	01	151	-	-	-	-	-	-	-	-	-	-	-	149	2	-	-	3020	4	5	151
D	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%				+69%							
'01		00%				00%				00%											
Total Plants/Acre (excluding Dead & Seedlings)												'84		0	Dec:		0%				
												'90		0			0%				
												'96		980			0%				
												'01		3120			1%				

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>Prunus virginiana</i>																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	1	1	-	-	-	-	-	-	-	-	-	40			2
	01	1	1	-	-	-	-	-	-	-	-	-	-	40			2
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	1	2	-	-	-	-	-	-	-	-	60	19	18	3
	01	-	3	-	-	-	-	-	-	-	-	-	-	60	16	35	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		20%				40%				00%				+ 0%			
'01		80%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	100		-		
												'01	100		-		
<i>Purshia tridentata</i>																	
M	84	-	-	4	-	-	-	-	-	-	-	-	-	133	18	20	4
	90	-	-	2	-	-	-	-	-	-	-	-	-	66	15	18	2
	96	-	-	-	2	-	1	-	-	-	-	-	-	60	19	36	3
	01	-	-	3	-	-	-	-	-	-	-	-	-	60	20	44	3
D	84	-	-	6	-	-	-	-	-	-	-	-	-	200			6
	90	-	-	2	-	-	-	-	-	-	-	-	-	66			2
	96	-	-	1	-	-	-	-	-	-	-	-	-	20			1
	01	-	1	-	-	-	-	-	-	-	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		00%				100%				00%				-60%			
'90		00%				100%				00%				-39%			
'96		00%				50%				00%				+ 0%			
'01		25%				75%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	60%		
												'90	132		50%		
												'96	80		25%		
												'01	80		25%		

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>Rhus glabra cismontana</i>																		
M	84	1	1	-	-	-	-	-	-	-	2	-	-	-	66	43	41	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	50%			00%			00%										
	'90	00%			00%			00%										
	'96	00%			00%			00%										
	'01	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	0		-			
<i>Rosa woodsii</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	1	11	-	-	-	-	-	-	17	-	-	-	340			17
	01	17	5	-	-	-	-	-	-	-	22	-	-	-	440			22
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	16	7	36	-	-	-	-	-	-	59	-	-	-	1180	12	11	59
	01	39	-	-	-	-	-	-	-	-	39	-	-	-	780	13	12	39
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	00%			00%			00%										
	'96	11%			62%			00%			-20%							
	'01	08%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	1520		-			
												'01	1220		-			

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	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	1	-	-	-	-	-	-	1	-	-	-	33	31	20	1
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	84	135	0
	'01	1	-	-	2	-	-	-	-	-	3	-	-	-	60	47	69	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			100%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	33		-			
												'96	0		-			
												'01	60		-			
Symphoricarpos oreophilus																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	4	4	-	-	-	-	-	-	-	8	-	-	-	160			8
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	14	-	-	-	-	-	-	-	15	-	-	-	300	20	27	15
	'01	5	-	-	-	-	-	-	-	-	4	1	-	-	100	26	50	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		78%			00%			00%			-78%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	460		-			
												'01	100		-			

Suspended

Trend Study 2-14-96

Study site name: Dry Canyon.

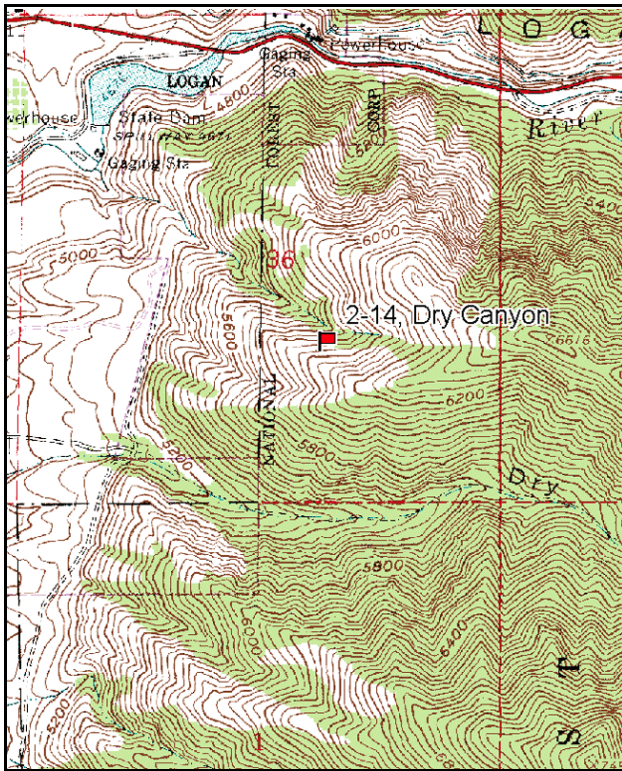
Vegetation type: Juniper.

Compass bearing: frequency baseline 146 degrees magnetic.

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

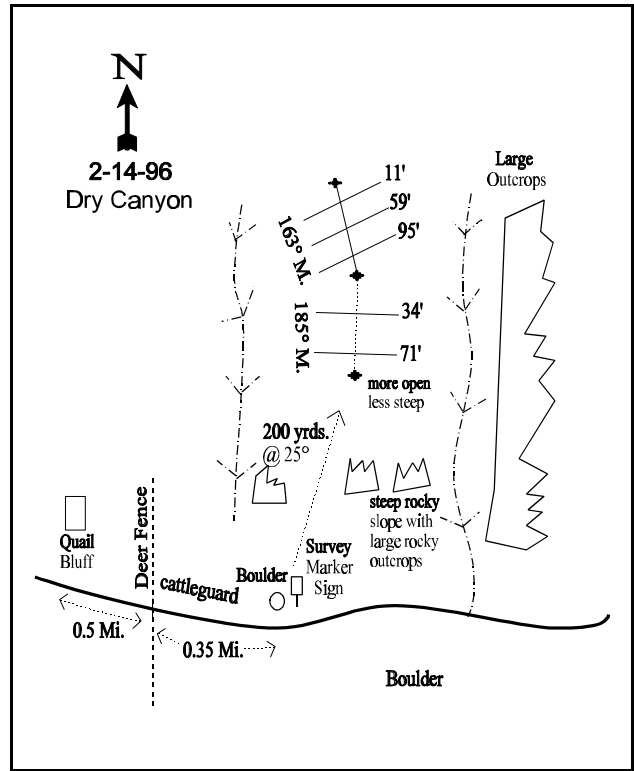
LOCATION DESCRIPTION

Proceed up Mountain Road in Logan past Quail Hollow Housing development to the intersection of 25 North and 1400 East. Begin to note mileage here. Proceed 0.5 miles to a cattleguard and deer fence. Continue up the road for 0.35 miles to a survey post marker sign. Walk approximately 200 yards at a bearing of 25 degrees magnetic from the survey sign to the 200-foot baseline stake. The 0-foot baseline stake is marked by browse tag #7934. Bearing of the baseline is 163 degrees magnetic. Line 2 has a bearing of 185 degrees magnetic.



Map Name: Logan

Township 12N, Range 1E, Section 36



Diagrammatic Sketch

UTM 4620313 N, 434989 E

DISCUSSION

Trend Study No. 2-14

*****SUSPENDED** - This site was suspended in 2001 and will be discontinued. Text and data tables are included from the 1996 Utah Big Game Trend Studies report. This site is considered winter range for big game. It does provide good thermal cover but it supports very little forage.

The Dry Canyon trend study site occurs on a steep (65% to 70%) and rocky south-facing slope located approximately 1/4 mile up Dry Canyon at an elevation of 5,580 feet. The range type is scattered Utah juniper (approximately 70 trees/acre) associated with an equally depleted and sparse understory. Deer use of the area was reported heavy during the 1984 reading. Many pellet groups were found that year and available browse was heavy utilized. Currently, deer use appears light and pellet groups infrequent. Due to a very limited amount of browse forage, this area is likely used primarily for its thermal cover.

Soil is "Richmond Very Stony Loam" similar to that found elsewhere on the Cache "face." This is a shallow and exceptionally rocky soil with a high erosion potential. The site has many variable sized rocks on the surface which easily move down slope. Although not on the study area proper, many nearby sites have small talus slopes and outcrops of exposed bedrock. Parent material is limestone. Effective rooting depth (see methods) was estimated at 12 inches in 1996. Soil temperature is moderately high at 70° F at about 12 inches. The soil has little structure and is easily disturbed. Soil reaction is moderately alkaline (7.9 pH). Both phosphorus and potassium could be limiting at 4.2 and 6.2 ppm respectively as values of 10 and 70 ppm may limit plant growth and development. Due to the abundant rock cover, erosion is not excessive.

Browse production is low. Apart from Utah juniper which has a canopy cover of 18% and accounts for 83% of the browse cover, the only shrub of any significance is black sagebrush. Population density of black sagebrush was estimated between 700 and 900 plants/acre in 1984 and 1990 respectively. Utilization was heavy in 1984 and mostly light in 1990. The greatly enlarged sample size used in 1996 estimated only 120 plants/acre, with the majority (66%) classified as decadent. No seedlings or young were sampled. There are as many dead sagebrush as there are live plants. The number of dead plants still does not account for the loss from about 900 plants/acre in 1990 to 120 plants/acre in 1996. Because of the clumped and discontinuous nature of the black sagebrush population, most of the change in the population must be attributed to the larger sample size which gives greatly improved accuracy for this kind of browse population. This explanation still does not downplay the fundamental importance of such a low population estimate for a critically key browse species on this site.

Broom snakeweed numbers nearly 2,000 plants/acre and has an age class structure characteristic of an expanding population. Other shrubs are sporadic in their occurrence. They include littleleaf mountain mahogany, ocean-spray, Rocky Mountain smooth sumac, and silver rubber rabbitbrush.

The herbaceous understory is depleted and dominated by rattlesnake brome and cheatgrass which account for 86% of the herbaceous cover. Perennial herbaceous plants occur infrequently. Bluebunch wheatgrass is the only fairly abundant perennial grass. A few low value forbs are scattered throughout the area but combine to produce less than 1% total cover and probably account for less than 10 pounds/acre of forage.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be declining. A rocky and unproductive soil is rapidly being eroded away because of lack of vegetative cover and a very steep slope. Vegetatively, the trend appears relatively stable despite poor condition. Both black sagebrush and Utah juniper appear to have stable populations.

1990 TREND ASSESSMENT

This juniper dominated slope has a very low site potential due to the shallow, rocky and undeveloped soil. The soil is easily disturbed on the steep slope. Rock and pavement together make up 72% of the ground cover. As in 1984, the vegetative trend appears stable, but in poor condition when considering it as a deer winter range. The black sagebrush appears very vigorous and lightly hedged. It has increased some since 1984. Junipers number 84 trees/acre. Most are highlined mature trees. The nested and quadrat frequencies of perennial grasses and forbs are low, and show slight declines.

TREND ASSESSMENT

soil- stable but in poor condition (3)

browse - stable but depleted (3)

herbaceous understory - slightly declining (2)

1996 TREND ASSESSMENT

The soil is poor and undeveloped. However, percent litter cover increased by 42% and percent bare ground has declined from 11% to 3%. Trend is considered up slightly but in poor condition. Browse is depleted on the site. Density estimates from the new, larger sample used in 1996, indicate only 120 plants/acre, 67% of which are decadent. There are not enough dead plants to indicate the reduction was solely a die-off, therefore most of the noted decrease could be attributed to the larger sample size giving a better estimate for this discontinuously distributed browse species. Utilization is lighter, but no reproduction is evident and trend is considered down. Trend for the herbaceous understory is also down. Sum of nested frequency for bluebunch wheatgrass, the only abundant perennial grass, declined significantly. Sum of nested frequency for forbs increased, yet a large part of the increase is the result of the appearance of dyers woad on the site. Combined, forbs produce less than 1% cover.

TREND ASSESSMENT

soil - up slightly but in poor condition (4)

browse - down and depleted (1)

herbaceous understory - down and depleted (1)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 14

T y p e	Species	Nested Frequency			Quadrat Frequency			Average
		'84	'90	'96	'84	'90	'96	Cover %
G	Agropyron spicatum	_b 138	_b 124	_a 73	63	59	33	2.58
G	Bromus brizaeformis (a)	-	-	266	-	-	90	3.40
G	Bromus tectorum (a)	-	-	343	-	-	97	14.56
G	Oryzopsis hymenoides	9	9	-	4	3	-	-
G	Poa pratensis	_a -	_b 18	_a -	-	8	-	-
G	Poa secunda	_{ab} 15	_a 5	_b 26	6	2	10	.32
Total for Annual Grasses		0	0	609	0	0	187	17.96
Total for Perennial Grasses		162	156	99	73	72	43	2.90
Total for Grasses		162	156	708	73	72	230	20.87

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	<i>Alyssum alyssoides</i> (a)	-	-	82	-	-	32	.29
F	<i>Cirsium undulatum</i>	3	6	-	1	2	-	-
F	<i>Cryptantha</i> spp.	5	4	3	3	2	1	.03
F	<i>Isatis tinctoria</i>	-	-	43	-	-	24	.44
F	<i>Oenothera caespitosa</i>	2	-	6	1	-	2	.03
F	<i>Sisymbrium altissimum</i> (a)	-	-	1	-	-	1	.00
F	<i>Tragopogon dubius</i>	_b 38	_a 7	_a 19	22	6	9	.12
F	Unknown forb-perennial	-	2	-	-	1	-	-
Total for Annual Forbs		0	0	83	0	0	33	0.29
Total for Perennial Forbs		48	19	71	27	11	36	0.62
Total for Forbs		48	19	154	27	11	69	0.92

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

BROWSE TRENDS --

Herd unit 02 , Study no: 14

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	<i>Artemisia nova</i>	5	.53
B	<i>Gutierrezia sarothrae</i>	39	.80
B	<i>Juniperus osteosperma</i>	5	6.50
Total for Browse		49	7.84

BASIC COVER --

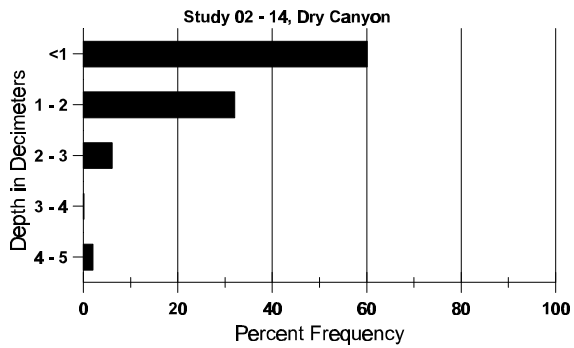
Herd unit 02 , Study no: 14

Cover Type	Nested Frequency	Average Cover %		
		'84	'90	'96
Vegetation	357	.25	2.00	30.41
Rock	366	51.00	53.25	49.99
Pavement	58	9.75	19.25	1.37
Litter	367	19.25	14.00	23.96
Cryptogams	105	5.50	.25	1.38
Bare Ground	145	14.25	11.25	3.12

SOIL ANALYSIS DATA --
 Herd Unit 02, Study no: 14, Dry Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.0	70.0 (12.1)	7.9	46.7	34.0	19.3	2.2	4.2	6.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 14

Type	Quadrat Frequency '96
Rabbit	1
Deer	7

BROWSE CHARACTERISTICS --

Herd unit 02 , 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 nova																		
S	84	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	90	7	-	-	-	-	-	-	-	7	-	-	-	233		7		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	84	3	4	-	-	-	-	-	-	7	-	-	-	233		7		
	90	11	-	-	-	-	-	-	-	11	-	-	-	366		11		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	84	-	2	2	-	-	-	-	-	4	-	-	-	133	16	33	4	
	90	5	-	1	-	-	-	-	-	6	-	-	-	200	19	22	6	
	96	2	-	-	-	-	-	-	-	2	-	-	-	40	15	33	2	
D	84	-	-	11	-	-	-	-	-	9	-	2	-	366		11		
	90	9	1	-	-	-	-	-	-	10	-	-	-	333		10		
	96	2	2	-	-	-	-	-	-	4	-	-	-	80		4		
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		27%			59%			09%			+19%							
'90		04%			04%			00%			-87%							
'96		33%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	732	Dec:	50%			
												'90	899		37%			
												'96	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				
Gutierrezia sarothrae																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
Y	84	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	400		12	
	96	39	-	-	-	-	-	-	-	-	39	-	-	-	780		39	
M	84	18	-	-	-	-	-	-	-	-	18	-	-	-	600	11	12	18
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	400	7	9	12
	96	59	-	-	-	-	-	-	-	-	59	-	-	-	1180	10	15	59
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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%			+ 4%							
'90		00%			00%			00%			+58%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	800	Dec:	0%			
												'90	833		4%			
												'96	1960		0%			
Juniperus osteosperma																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	49	36	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	157	157	1
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	100	-	-	5
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%			+ 0%							
'90		00%			00%			00%			+34%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	100		-			

Trend Study 2-15-01

Study site name: Lower Hodges Canyon.

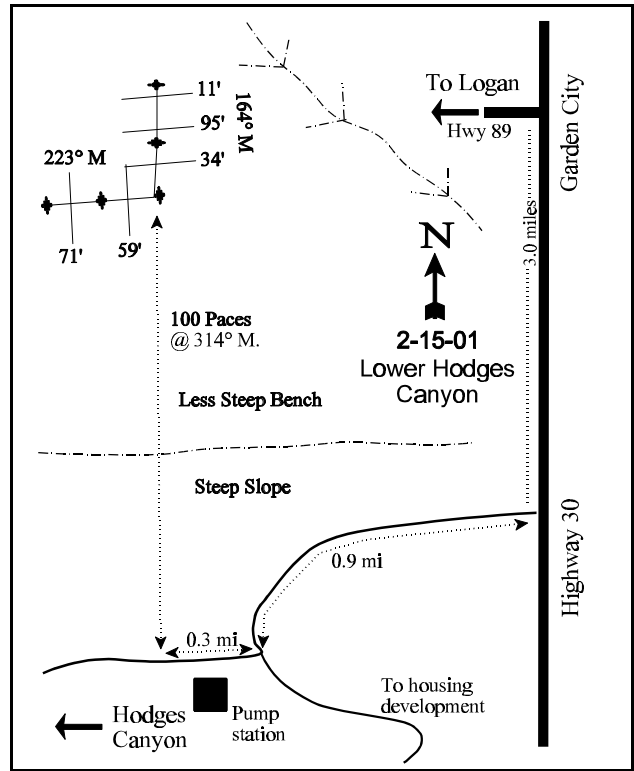
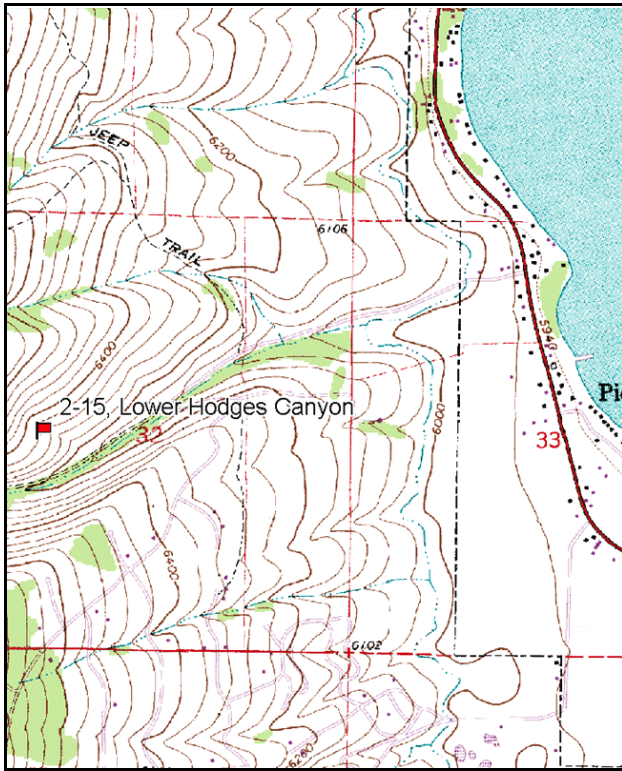
Vegetation type: Mountain Brush.

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 Garden City junction of U-89 and U-30 proceed south for 3.0 miles and turn right. Travel west for 0.9 miles to a point where the main road curves sharply to the left. Continue straight up Hodges Canyon from this point for 0.3 miles to a small concrete pump station on the left. At the pump station take a bearing of 314 degrees magnetic and walk up the steep slope for approximately 100 paces to the 200-foot stake of the baseline. Walk two hundred feet beyond at 344 degrees magnetic to the 0-foot stake of the baseline, marked by browse-tag #7980. The bearing of the baseline is 164 degrees magnetic. The baseline doglegs at the 200-foot baseline stake and runs 223 degrees magnetic.



Map Name: Garden City

Diagrammatic Sketch

Township 14N, Range 5E, Section 32

UTM 4639974 N, 465649 E

DISCUSSION

Trend Study No. 2-15

The Lower Hodges Canyon trend study is one of several studies established within the Rich County portion of management unit 2. The site is on a south-facing, 30% to 35% slope at an elevation of 6,340 feet. This location is considered within the severe winter range on this portion of the unit. The vegetative community is a mountain big sagebrush-grass type, which also contains good numbers of other shrubs. Deer pellet groups can be found in moderate numbers along with a few elk pellet groups. A pellet group transect read on site in 2001 estimated 91 deer and 6 elk days use/acre (225 ddu/ha and 15 edu/ha).

The Rich County soil survey classifies the soil at the study site within the "Yeates Hollow-Obray complex." All of the soils in this mapping unit are deep, well-drained, and derived from sedimentary rock. Although not highly permeable to water, the Yeates Hollow soil has good water holding qualities and only a moderate erosion hazard (Campbell and Lacey 1982). Soils on the site are moderately shallow and rocky throughout the profile. Due to the rocky nature of the soil, effective rooting depth (see methods) was estimated at only about 12 inches in 1996. However, deeper rooted shrubs are numerous, indicating no rooting depth restrictions within some micosites on this study area. The soil reaction is slightly acidic (pH of 6.5). Texture is a sandy clay loam. The soil surface is adequately protected from erosion due to abundant and well dispersed vegetation and litter cover.

The key browse species include mountain big sagebrush and antelope bitterbrush which accounted for 64% of the browse cover in 1996 and 57% in 2001. Mountain big sagebrush has maintained a stable population of just about 1,200 plants/acre between 1984 and 1996. However, the population continued to have a high decadency rate, ranging from 68% in 1984 to 53% in 1996. In addition, 42% of the decadent sagebrush sampled in 1996 were classified as dying. Dead plants, first sampled in 1996, were almost as numerous as live plants. Utilization was moderate to heavy in 1984 and light to moderate in 1990 and 1996. Vigor has continued to be poor on about one-third of the shrubs sampled since 1984. Reproduction is also limited with no seedlings being encountered during any of the readings. In 1990, young plants were found in good numbers (133 plants/acre) but few (40 plants/acre) were found in 1996. During the 2001 reading, the mountain big sagebrush population declined by 28%. Percent decadence is still high at 60%, and vigor is still poor on about one-third of the population. It appears that the population is still in a state of decline with 56% of the decadent shrubs classified as dying (280 plants/acre) and no seedlings and young encountered within the density strips in 2001. Utilization was light to moderate in 2001, but due to the dry conditions leader growth was low averaging 1.3 inches.

Bitterbrush displays a more stable trend since 1984. Population density has increased from 333 plants/acre estimated in 1984 to 1,320 by 2001. The population is moderate to heavily utilized, in good vigor, and percent decadence is low. Bitterbrush is becoming increasingly mature but reproduction appears adequate to maintain the population. Leader growth was quite low in 2001, averaging only 1.5 inches.

Shrubs of secondary importance include serviceberry and snowberry. Together they provided an additional 26% of the browse cover in 1996 and 34% in 2001. Serviceberry currently ('01) number only 340 plants/acre. The average mature shrub measures 2.5 feet high with a crown diameter of nearly 4 feet. Utilization has been moderate since 1996. There are no decadent plants but two-thirds of the population displayed poor vigor due to a rust infestation in 1996. Vigor was normal in 2001. Snowberry has a moderately dense population but use is mostly light.

A diverse mixture of grass species provides the bulk of the understory production and cover. Six perennial grasses are found on the site, but only bluebunch wheatgrass and Sandberg bluegrass are abundant. Annual grasses were reported to occur infrequently in 1984. By 1996, cheatgrass was abundant and provided 63% of the grass cover and 55% of the total herbaceous cover. In 2001, nested frequency of cheatgrass declined significantly and cover declined from 21% to 6%. Forbs provide comparatively little forage. However, they are still an important source of variety. Composition is fairly typical for this kind of site. Common perennial species include arrowleaf balsamroot, bastard toadflax, tapertip hawksbeard, a Penstemon, and yellow salsify.

1984 APPARENT TREND ASSESSMENT

This is a good condition site which appears to have a stable soil and vegetative trend. Soil erosion is minimal and there is little evidence to suggest any significant change in vegetative composition or density is forthcoming.

1990 TREND ASSESSMENT

Most all vegetative components on this site have stayed about the same or have increased on this diverse mountain brush site. Both the bitterbrush and sagebrush are generally moderately hedged and appear to have stable populations. Use is lighter on sagebrush but heavier on bitterbrush. Some of the population parameters have improved for mountain big sagebrush even though the population still displays poor vigor on about one-third of the plants sampled. Percent decadence has declined from 68% to 47%, but this is still relatively high for sagebrush. Browse trend is considered slightly up. The herbaceous understory shows good increases in quadrat and nested frequencies and remains dominated by bluebunch wheatgrass.

TREND ASSESSMENT

soil - stable (3)

browse - slightly up (4)

herbaceous understory - up (5)

1996 TREND ASSESSMENT

Soil trend is up with increased litter cover and a decline in percent bare ground from 9% in 1990 to only 1% in 1996. Unfortunately it appears that the decline in bare ground and increase in litter cover is the result of the abundance of cheatgrass. Annual grasses and forbs were not previously included in the sampling, so no comparisons can be made. However, it was reported in 1984 that annual grasses were infrequent. Now, cheatgrass accounts for over half (55%) of the herbaceous cover and has a nested frequency value close to the maximum of 400. The browse trend appears slightly down for sagebrush but stable for bitterbrush. The sagebrush population is mostly decadent with one-third of the population in poor vigor. Reproduction is limited. Utilization has not been extremely heavy on the site so the high proportion of decadent sagebrush is likely a result of prolonged drought. The bitterbrush population is becoming increasingly mature. Utilization is moderate and vigor good. Overall, the browse trend is considered stable. Trend for the herbaceous understory is down. Sum of nested frequency for perennial grasses is down 28%, while sum of nested frequency for perennial forbs has declined 43%. Three of the five perennial grasses found on the site declined in nested frequency, 2 species declining significantly.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - down (1)

2001 TREND ASSESSMENT

Trend for soil is stable due to abundant vegetation and litter cover. There is little bare ground and the erosion condition class was classified as stable. Trend for the key browse species, mountain big sagebrush and bitterbrush, are mixed. The sagebrush population appears to be in a state of decline. Population density has declined 28%. Use is mostly light but percent decadence has increased from 53% in 1996 to 60% by 2001. In addition, 56% (280 plants/acre) of the decadent plants sampled in 2001 were classified as dying (>50% crown death). Reproduction is poor with no seedlings or young encountered. This trend appears to be driven more by climate than heavy use by wildlife. Use was moderate to heavy in 1984, but since then it has been light to moderate. Percent decadence was extremely high in 1984 at 68% and it has remained high. Leader growth for sagebrush averaged only 1.3 inches in 2001. Bitterbrush displays a stable trend. Utilization has been moderate to heavy since 1990, but vigor has remained normal and percent decadence is low. Recruitment in the form of young plants has been more than adequate to maintain the population. Leader growth is also poor averaging only 1.5 inches. Overall, the browse trend is considered down slightly due to the decline in sagebrush. Trend for the herbaceous understory is up due to a substantial increase in the sum of nested frequency of perennial grasses and forbs combined with a significant decline in cheatgrass. The dominant perennial grasses, bluebunch wheatgrass and Sandberg bluegrass, both increased significantly in nested frequency. Perennial forbs are still limited but most of the key species remained at similar frequencies or increased since 1996.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down, but stable for bitterbrush (2)

herbaceous understory - up (5)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 15

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	_a 139	_b 196	_b 209	_b 210	57	71	75	75	12.21	11.26
G	Bromus tectorum (a)	-	-	_b 330	_a 207	-	-	88	75	16.36	5.45
G	Koeleria cristata	16	11	21	19	10	7	9	10	.63	.43
G	Poa fendleriana	_b 19	_{ab} 11	_a 4	_a 6	11	5	2	3	.06	.18
G	Poa pratensis	_b 64	_b 89	_a 6	_a 14	28	36	4	5	.12	.48
G	Poa secunda	_a 10	_b 119	_b 118	_c 201	4	54	47	76	3.69	6.65
G	Sitanion hystrix	-	-	-	2	-	-	-	1	-	.03
Total for Annual Grasses		0	0	330	207	0	0	88	75	16.36	5.45
Total for Perennial Grasses		248	426	358	452	110	173	137	170	16.72	19.04
Total for Grasses		248	426	688	659	110	173	225	245	33.09	24.49
F	Achillea millefolium	7	4	6	7	3	2	4	4	.19	.07
F	Agoseris glauca	-	8	4	20	-	3	2	8	.01	.44
F	Alyssum alyssoides (a)	-	-	148	169	-	-	53	60	1.20	.87
F	Arabis spp.	_a -	_b 11	_a -	_a -	-	5	-	-	-	-
F	Artemisia ludoviciana	-	-	2	-	-	-	1	-	.15	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Astragalus beckwithii</i>	-	-	3	5	-	-	1	2	.03	.03
F	<i>Astragalus convallarius</i>	_b 18	_{ab} 6	_b 8	_a -	9	2	5	-	.02	-
F	<i>Balsamorhiza sagittata</i>	_{ab} 6	_{ab} 4	_b 8	_a -	3	2	4	-	.59	.30
F	<i>Camelina microcarpa</i> (a)	-	-	3	3	-	-	1	1	.00	.00
F	<i>Calochortus nuttallii</i>	-	3	3	2	-	1	1	1	.00	.00
F	<i>Chaenactis douglasii</i>	-	1	-	-	-	1	-	-	-	-
F	<i>Cirsium undulatum</i>	4	11	4	9	2	5	3	6	.06	.25
F	<i>Collomia linearis</i> (a)	-	-	1	-	-	-	1	-	.00	-
F	<i>Comandra pallida</i>	_a 22	_b 40	_{ab} 27	_a 24	9	16	10	12	.22	.28
F	<i>Collinsia parviflora</i> (a)	-	-	_a 18	_b 62	-	-	7	27	.06	.13
F	<i>Cordylanthus ramosus</i> (a)	-	-	2	-	-	-	1	-	.03	-
F	<i>Crepis acuminata</i>	_a 10	_{ab} 90	_b 49	_c 99	5	39	25	44	.72	2.98
F	<i>Cymopterus</i> spp.	-	-	-	4	-	-	-	1	-	.00
F	<i>Descurainia pinnata</i> (a)	-	-	-	1	-	-	-	1	-	.01
F	<i>Draba</i> spp. (a)	-	-	-	2	-	-	-	1	-	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	_b 14	_a -	-	-	8	-	.04	-
F	<i>Erigeron</i> spp.	-	-	6	10	-	-	2	3	.18	.18
F	<i>Eriogonum umbellatum</i>	6	3	-	1	2	3	-	1	-	.03
F	<i>Hackelia patens</i>	-	-	9	4	-	-	4	3	.09	.04
F	<i>Holosteum umbellatum</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Lactuca serriola</i>	-	-	2	4	-	-	2	2	.01	.03
F	<i>Linum lewisii</i>	-	2	3	-	-	1	2	-	.03	-
F	<i>Lomatium</i> spp.	-	-	-	3	-	-	-	1	-	.03
F	<i>Lupinus argenteus</i>	3	-	-	-	1	-	-	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	_a -	_b 27	-	-	-	10	-	.05
F	<i>Penstemon humilis</i>	-	-	-	3	-	-	-	1	-	.00
F	<i>Penstemon</i> spp.	_a 33	_b 70	_a 21	_a 14	16	33	13	6	.41	.24
F	<i>Phlox longifolia</i>	_a 3	_c 122	_a 22	_b 64	1	48	12	25	.08	.52
F	<i>Senecio integerrimus</i>	-	-	-	1	-	-	-	1	-	.03
F	<i>Tragopogon dubius</i>	_{ab} 28	_a 14	_b 43	_b 43	16	6	17	20	.49	.49
F	Unknown forb-perennial	3	2	-	-	1	2	-	-	-	-
Total for Annual Forbs		0	0	186	265	0	0	71	101	1.33	1.07
Total for Perennial Forbs		143	391	220	317	68	169	108	141	3.34	5.99
Total for Forbs		143	391	406	582	68	169	179	242	4.68	7.07

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

BROWSE TRENDS --

Herd unit 02 , Study no: 15

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	16	15	1.43	1.27
B	Artemisia tridentata vaseyana	44	36	7.25	8.51
B	Chrysothamnus viscidiflorus viscidiflorus	13	13	.65	1.37
B	Eriogonum heracleoides	6	7	1.41	.33
B	Eriogonum microthecum	21	21	.78	1.57
B	Pediocactus simpsonii	0	1	-	-
B	Purshia tridentata	55	55	11.32	11.55
B	Symphoricarpos oreophilus	49	48	6.24	10.67
B	Tetradymia canescens	2	3	.03	.03
Total for Browse		206	199	29.13	35.32

BASIC COVER --

Herd unit 02 , Study no: 15

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	394	363	1.00	12.25	66.81	60.50
Rock	86	76	2.25	3.75	1.15	1.22
Pavement	80	143	1.25	1.75	.69	1.45
Litter	400	395	86.75	72.75	77.68	58.52
Cryptogams	57	52	.25	.50	.49	1.03
Bare Ground	87	111	8.50	9.00	1.20	2.56

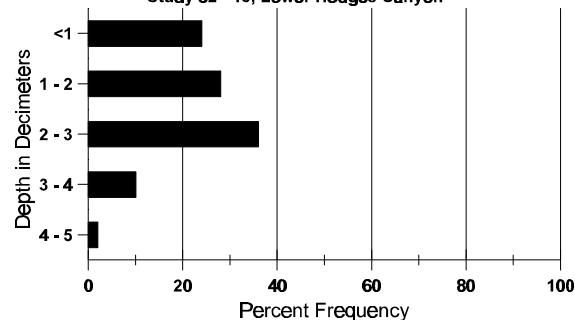
SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 15, Lower Hodges Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.7	53.8 (12.0)	6.5	49.3	25.7	25.0	2.7	23.1	198.4	.4

Stoniness Index

Study 02 - 15, Lower Hodges Canyon



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 15

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Coyote	-	1	-	-
Rabbit	1	2	-	-
Elk	3	9	78	6 (15)
Deer	19	34	1183	91 (225)

BROWSE CHARACTERISTICS --

Herd unit 02 , 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						
<i>Amelanchier alnifolia</i>											
S	84	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	0	-	0
	96	1	-	-	-	-	-	-	20	1	1
	01	-	-	-	-	-	-	-	0	-	0
Y	84	-	-	-	-	-	-	-	0	-	0
	90	1	-	-	3	-	-	1	333	5	5
	96	1	3	-	6	-	-	-	200	10	10
	01	2	1	-	1	-	-	-	80	4	4
M	84	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	2	1	-	-	200	37	33
	96	-	10	3	-	-	-	-	260	26	46
	01	3	7	-	-	2	1	-	260	30	43
X	84	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	0	-	0
	96	-	-	-	-	-	-	-	40	2	2
	01	-	-	-	-	-	-	-	20	1	1
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>						
'84		00%	00%	00%							
'90		13%	00%	00%	-14%						
'96		57%	13%	74%	-26%						
'01		59%	06%	00%							
Total Plants/Acre (excluding Dead & Seedlings)					'84	0	Dec:	-			
					'90	533		-			
					'96	460		-			
					'01	340		-			

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>																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	1	-	-	-	-	-	-	-	-	133			2
	96	2	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	4	2	-	-	-	-	-	-	-	-	5	-	-	1	6
	90	4	2	-	1	-	-	-	-	-	-	-	7	-	-	-	7
	96	13	8	2	1	1	-	-	-	-	-	-	21	-	4	-	25
	01	13	2	1	-	-	-	1	-	-	-	-	17	-	-	-	17
D	84	1	8	4	-	-	-	-	-	-	-	-	8	-	5	-	13
	90	4	3	-	1	-	-	-	-	-	-	-	2	1	1	4	8
	96	11	12	4	4	-	-	-	-	-	-	-	16	-	2	13	31
	01	17	6	2	-	-	-	-	-	-	-	-	11	-	-	14	25
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	940			47
	01	-	-	-	-	-	-	-	-	-	-	-	-	780			39
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		63%				32%				32%				-11%			
'90		29%				00%				29%				+ 2%			
'96		36%				10%				33%				-28%			
'01		19%				07%				33%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	1266	Dec:	68%		
												'90	1132		47%		
												'96	1160		53%		
												'01	840		60%		
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
M	84	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
	90	1	-	-	1	-	-	-	-	-	-	-	2	-	-	-	2
	96	16	-	-	-	-	-	-	-	-	-	-	16	-	-	-	16
	01	11	-	-	-	-	-	-	-	-	-	-	11	-	-	-	11
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
	01	2	-	-	1	-	-	-	-	-	-	-	2	-	-	1	3
% 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%				+61%			
'96		00%				00%				00%				-18%			
'01		00%				00%				07%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%		
												'90	133		0%		
												'96	340		6%		
												'01	280		21%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total				
		1	2	3	4		1	2					
Eriogonum heracleoides													
M	84	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	0	-	-	0	
	96	11	-	-	-	-	-	-	11	9	15	11	
	01	5	2	-	2	-	-	1	10	7	16	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		20%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	-				
						'90	0		-				
						'96	220		-				
						'01	200		-				
Eriogonum microthecum													
M	84	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	0	-	-	0
	96	28	-	-	6	-	-	-	34	14	22	34	
	01	24	-	-	2	-	-	2	27	13	19	28	
% 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%		-18%					
'01		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	-				
						'90	0		-				
						'96	680		-				
						'01	560		-				
Pediocactus simpsonii													
M	84	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	1	-	-	-	-	1	-	-	-	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%		100%		00%							
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	-				
						'90	0		-				
						'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									
Purshia tridentata																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	-	2	-	-	-	-	-	-	2	-	-	-	133		2	
	96	2	-	-	2	-	-	-	-	4	-	-	-	80		4	
	01	1	-	-	2	-	-	-	-	3	-	-	-	60		3	
M	84	3	-	-	-	-	-	-	-	3	-	-	-	200	15	27	3
	90	-	2	2	2	2	1	-	-	8	-	1	-	600	18	32	9
	96	16	38	8	9	2	-	-	-	73	-	-	-	1460	22	41	73
	01	5	27	20	-	2	3	-	-	56	-	1	-	1140	22	52	57
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	-	5	-	-	-	-	6	-	-	-	400		6	
	96	-	1	1	-	-	-	-	-	1	-	-	1	40		2	
	01	1	2	1	-	2	-	-	-	6	-	-	-	120		6	
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%			+71%						
'90		41%			18%			06%			+28%						
'96		52%			11%			01%			-16%						
'01		50%			36%			02%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	333	Dec:	0%				
										'90	1133		35%				
										'96	1580		3%				
										'01	1320		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			
Symphoricarpos oreophilus											
S	84	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	0		0
	96	5	-	-	2	-	-	-	140		7
	01	-	-	-	-	-	-	-	0		0
Y	84	8	-	-	-	-	-	-	533		8
	90	6	-	-	2	-	-	1	600		9
	96	2	-	-	7	-	-	-	180		9
	01	-	-	-	-	-	-	-	0		0
M	84	9	-	-	-	-	-	-	600	29 44	9
	90	43	15	-	4	-	-	-	4133	25 35	62
	96	42	4	-	28	-	-	-	1480	24 41	74
	01	44	-	-	7	-	-	2	1060	26 46	53
D	84	-	-	-	-	-	-	-	0		0
	90	4	-	-	-	-	-	-	266		4
	96	-	-	-	-	-	-	-	0		0
	01	10	-	-	-	-	-	-	200		10
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		00%		00%		00%		+77%			
'90		20%		00%		05%		-67%			
'96		05%		00%		08%		-24%			
'01		00%		00%		19%					
Total Plants/Acre (excluding Dead & Seedlings)						'84	1133	Dec:	0%		
						'90	4999		5%		
						'96	1660		0%		
						'01	1260		16%		

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	3	-	-	-	-	-	-	-	-	3	-	-	-	60	19	30	3
	'01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	16	22	2
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	60		0%			
												'01	60		33%			

Trend Study 2-16-01

Study site name: Garden City Canyon.

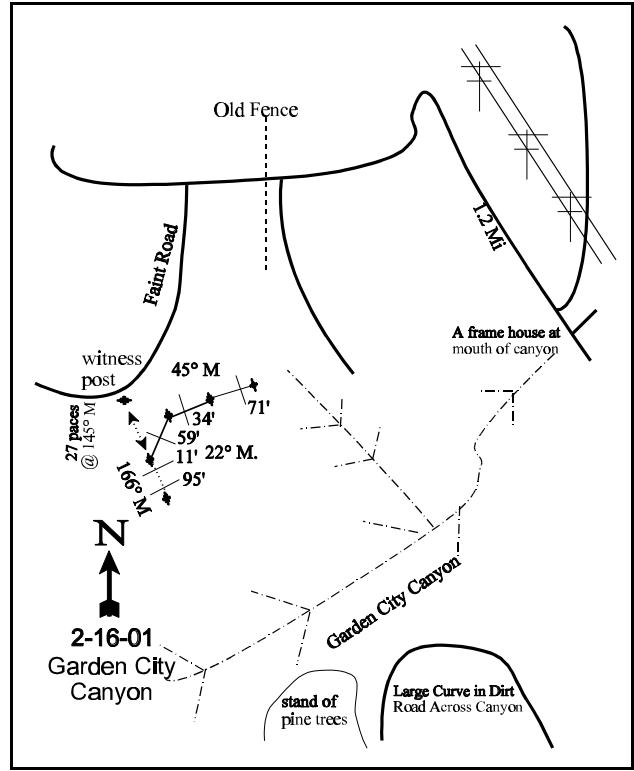
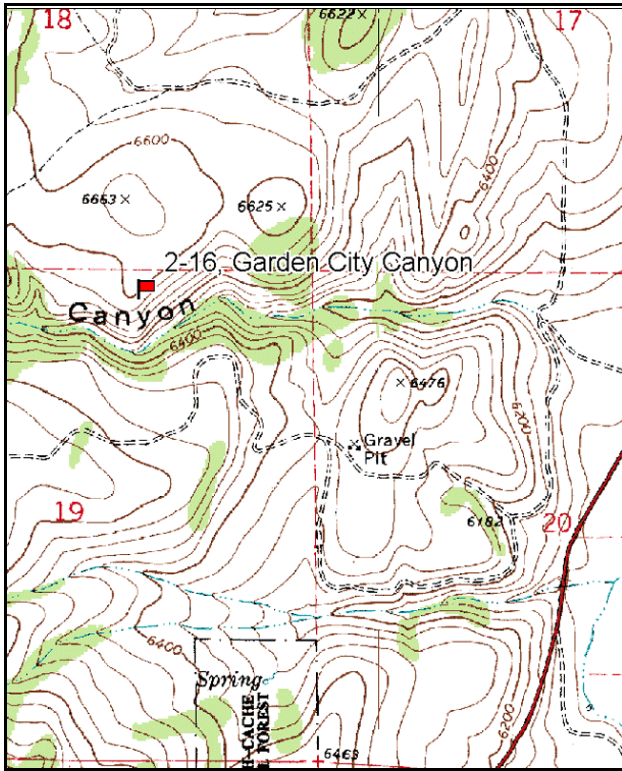
Vegetation type: Curlleaf Mahogany.

Compass bearing: frequency baseline 166 degrees magnetic.

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

LOCATION DESCRIPTION

From Garden City, proceed west on US-89. Turn right at 525 W. Proceed 0.25 miles and turn right. Stay left and continue for 1.2 miles to a fence with a gate. Follow a faint road to the left, it may eventually be impassable. From here walk down the road to a witness post on the edge of the canyon. From the witness post walk 27 paces at 145 degrees magnetic to the 0-foot stake of the baseline. The 0-foot stake is marked by browse tag #7936. Azimuth of the baseline is 166 degrees magnetic. Line 2 runs 22 degrees magnetic. Lines 3 and 4 run 45 degrees magnetic.



Map Name: Garden City

Diagrammatic Sketch

Township 14N, Range 5E, Section 19

UTM 4644019 N, 464684 E

DISCUSSION

Trend Study No. 2-16

The Garden City Canyon study samples winter range on the north rim of Garden City Canyon in Rich County. The study site is found on a moderately steep (45%), south to southeast-facing slope with an elevation of 6,580 feet. The vegetational type is characterized by curlleaf mountain mahogany with an associated mixture of mountain brush. The site is heavily used by deer and elk. It is typical of the small mahogany knolls and hillsides so common in this area. More level sites adjacent to the knolls support vigorous stands of mountain big sagebrush and bitterbrush. However, big game seem to prefer the more exposed and less densely vegetated knolls and hillsides. Pellet group data also shows a moderately high number of elk utilize the site. Pellet group transect data from the site estimated 55 deer and 16 elk days use/acre in 2001 (136 ddu/ha and 40 edu/ha). All of the elk and about 60% of the deer pellet groups were from winter use, while about 40% of the deer pellet groups were more recent (late spring/early summer).

Soil is classified as "Foxol Very Stony Loam", a soil series that occurs on moderately steep slopes. Foxol soil is shallow, slightly acidic, moderately permeable, and excessively drained. Soil parent material is quartzite and depth to bedrock is normally about 15 inches (Campbell and Lacey 1982). Soil on the site has a clay loam texture with an effective rooting depth (see methods) estimated at only 9 inches in 1996. The soil reaction is moderately acidic (pH of 5.8). The surface is exceptionally rocky with many large boulders and exposed bedrock. In spite of these characteristics, there is relatively little erosion. Cover from vegetation, litter, and rock is abundant, leaving little unprotected soil. The soil erosion condition class was determined to be stable in 2001.

Browse composition is highly variable which makes designating a single key species difficult. The most conspicuous shrub, although not the most numerous, is curlleaf mountain mahogany. Many of the mahogany are large and tree-like in stature. Estimates from the shrub density strips indicated a population of 280 plants/acre in 1996 and 220 plants/acre in 2001. A majority of the mahogany are mature plants which are highlined and mostly unavailable to further browsing. The average height of all available mature plants was estimated at nearly 4 feet in 2001. Overhead canopy cover of mahogany is highly variable but averages about 16%. Most of the tall mahogany have been highlined and utilization of available plants is moderate to heavy. Vigor is normal for most individuals and percent decadency was moderate at 21% in 1996, increasing to 36% by 2001.

Other important browse on the site include a combination of low sagebrush and mountain big sagebrush, bitterbrush and serviceberry. Low sagebrush (*Artemisia arbuscula*) is much more abundant and widespread. It accounted for 50% of the understory shrub cover in 1996 with an estimated density of 2,600 plants/acre. In 2001, it provided 44% of the understory shrub cover. Utilization was heavy in 1984, but light to moderate use has occurred since then. The percentage of plants showing poor vigor has declined since 1984 and 1990. Percent decadence declined until 1996, then rebounded to 20% in 2001.

Bitterbrush is not abundant with density being estimated at just over 100 plants/acre. They display heavy use, but have good vigor and low decadence. Serviceberry has also been heavily browsed in the past, but current use is classified as light to moderate. Density is low at around 200 plants/acre. Mature plants are stunted and measure only about 2 feet in height. Percent decadence has improved from 67% in 1990 to 10% in 2001. Vigor is currently normal on all plants sampled.

The herbaceous understory consisted primarily of perennial grasses in 1984. Most important were bluebunch wheatgrass followed by Sandberg bluegrass and Kentucky bluegrass. Annual grasses, especially cheatgrass brome, occurred only in scattered patches. By 1996, cheatgrass is by far the most numerous herbaceous species on the site. Cheatgrass, along with Japanese brome accounted for 66% of the grass cover. It was reported in 1996 that about half of the brome grasses were infected with smut. Bluebunch wheatgrass remained the most abundant perennial grass with Sandberg bluegrass also being fairly abundant. Prairie Junegrass, mutton bluegrass, and Kentucky bluegrass were not found in the surveys of 1990 or 1996. During the 2001 reading, cheatgrass declined significantly in frequency and cover similar to other trend studies in unit 2. The dominant perennial species, bluebunch wheatgrass, remained stable while Sandberg bluegrass increased significantly.

Forbs are a minor component. Composition includes relatively few species of high or even medium palatability. All perennial forbs combined produce less than 2% cover. It is possible that the shallow and excessively drained soil is not conducive to a productive forb component.

1984 APPARENT TREND ASSESSMENT

Most of the measured trend indicators suggest stable soil and vegetative trends. Although soil is shallow and rocky, there is no evidence of significant erosion problems. Vegetatively, the area should continue to possess a strong grass understory and a mixed stand of browse with curleaf mountain mahogany as the dominant species.

1990 TREND ASSESSMENT

This study site is representative of curleaf mountain mahogany winter range on south-facing slopes and ridge tops along the eastern side of the herd unit. Snow limits use in some winters, but the area is frequented by deer, elk, and moose. Within the diverse browse community, only curleaf mountain mahogany is heavily to severely hedged. This is not unusual as it is the most preferred browse. The bulk of the mahogany forage production is unavailable to most big game animals because of its height. Its population has increased slightly because of the young age class. The increased decadency should not be of concern because it is a long-lived species. It is not unusual to find individuals more than 300 years of age in most areas of Utah. Data for sagebrush shows a stable population of low sagebrush. The herbaceous understory remains dominated by bluebunch wheatgrass. Considering the steep slope and rockiness of the site, there is minimal erosion due to adequate litter and vegetative cover.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The soil trend is up slightly due to a slight increase in litter cover and a decline in bare ground. Trend for the key browse species, curleaf mountain mahogany, appears stable. The greatly increased sample size used this year may be partly responsible for the change in mahogany density. Mahogany on the site are very unevenly distributed. Utilization is more moderate on available plants and percent decadence slightly lower. Understory browse, serviceberry and low sagebrush display stable trends with lighter use and improved decadency rates. Bitterbrush is heavily utilized but maintains good vigor and low decadence. Overall, the browse trend appears stable. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs have remained similar to 1990. Since annuals were not included in the previous

readings, we do not know for sure if they have increased. However, the 1984 report states that cheatgrass occurred only in isolated patches. Currently, cheatgrass and Japanese brome are abundant and well dispersed. In addition, while perennial grass and forb sum of nested frequency values remained unchanged since 1990, percent litter cover increased with percent bare ground declining. This may be the result of an increase in annual cheatgrass.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - stable but dominated by cheatgrass (3)

2001 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in bare ground and a decline in litter and vegetation cover. Since 1996, grass cover has declined from 31% to 18%. This decline is due entirely to a significant decline in the frequency and cover of cheatgrass which provided 66% of the grass cover in 1996, but only 13% in 2001. The change is likely due to the timing of precipitation this season. As a result of the decline in vegetation and litter cover, the ratio of protective ground cover to bare soil has dropped by 45%. Erosion is still minimal and the erosion condition class was determined as stable in 2001. Trend for browse is slightly down for the key species, curlleaf mountain mahogany. Utilization is heavy on available portions, vigor is poor on 18% of the plants sampled, and percent decadence has increased from 21% in 1996 to 36% in 2001. In addition, half of the 80 decadent plants/acre were classified as dying (>50% crown dead). Reproduction has been very poor since 1996 and the current number of young plants estimated in the population is not currently enough to maintain the population. However, these are long lived shrubs and a return to normal precipitation patterns may help reverse this trend. The secondary browse species, serviceberry, low sagebrush, and bitterbrush appear to have stable populations. Since the majority of the available browse forage comes from these understory shrubs, overall trend for browse is considered stable. Trend for the herbaceous understory is up slightly. Sum of nested frequency for the Sandberg bluegrass increased significantly whereas bluebunch wheatgrass remained stable. The most notable change was the significant decline in the nested frequency of cheatgrass. It also declined substantially in cover from 19% to only 2%. Perennial forbs are still uncommon and produce little forage.

TREND ASSESSMENT

soil - down slightly (2)

browse - slightly down for curlleaf mahogany but stable overall (3)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 16

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	157	167	165	176	61	60	64	62	7.06	8.40
G	Bromus japonicus (a)	-	-	_b 55	_a 24	-	-	17	11	1.23	.10
G	Bromus tectorum (a)	-	-	_b 341	_a 142	-	-	98	55	18.94	2.33
G	Koeleria cristata	7	-	-	3	4	-	-	1	-	.03
G	Poa fendleriana	3	-	-	-	1	-	-	-	-	-
G	Poa pratensis	25	-	-	-	12	-	-	-	-	-
G	Poa secunda	_a 44	_b 131	_b 137	_c 226	22	51	53	79	3.46	7.52
G	Sitanion hystrix	-	-	1	-	-	-	1	-	.03	-
G	Stipa lettermani	-	-	-	1	-	-	-	1	-	.03
Total for Annual Grasses		0	0	396	166	0	0	115	66	20.17	2.44
Total for Perennial Grasses		236	298	303	406	100	111	118	143	10.55	15.98
Total for Grasses		236	298	699	572	100	111	233	209	30.72	18.43
F	Agoseris glauca	4	1	4	13	2	1	1	5	.00	.07
F	Alyssum alyssoides (a)	-	-	122	150	-	-	43	56	.56	.67
F	Arabis spp.	-	3	4	4	-	1	3	2	.04	.01
F	Artemisia ludoviciana	1	-	-	-	1	-	-	-	-	-
F	Balsamorhiza sagittata	-	-	-	-	-	-	-	-	-	.03
F	Camelina microcarpa (a)	-	-	3	6	-	-	1	4	.00	.07
F	Calochortus nuttallii	-	6	-	-	-	2	-	-	-	-
F	Cirsium undulatum	7	7	11	5	4	4	5	4	.28	.36
F	Collomia linearis (a)	-	-	-	3	-	-	-	1	-	.03
F	Comandra pallida	19	24	24	24	9	10	10	14	.15	.33
F	Collinsia parviflora (a)	-	-	_a 4	_b 135	-	-	2	55	.01	.42
F	Crepis acuminata	_a -	_a 1	_{ab} 7	_b 18	-	1	3	8	.24	.72
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	3	-	.01
F	Draba verna (a)	-	-	_a -	_b 15	-	-	-	5	-	.07
F	Epilobium brachycarpum (a)	-	-	_b 48	_a 29	-	-	21	13	.28	.14
F	Erodium cicutarium (a)	-	-	-	8	-	-	-	3	-	.09
F	Erigeron divergens	-	1	-	-	-	1	-	-	-	-
F	Eriogonum umbellatum	-	-	-	-	-	-	-	-	-	.00
F	Gayophytum ramosissimum (a)	-	-	1	-	-	-	1	-	.00	-
F	Holosteum umbellatum (a)	-	-	-	1	-	-	-	1	-	.00
F	Lappula occidentalis (a)	-	-	2	1	-	-	1	1	.00	.00
F	Microsteris gracilis (a)	-	-	_a -	_b 64	-	-	-	26	-	.22

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Pellaea breweri</i>	5	-	-	-	3	-	-	-	-	-
F	<i>Penstemon</i> spp.	-	1	-	-	-	1	-	-	-	-
F	<i>Petradoria pumila</i>	-	-	1	-	-	-	1	-	.03	.03
F	<i>Phlox longifolia</i>	-	2	-	1	-	1	-	1	-	.00
F	<i>Polygonum douglasii</i> (a)	-	-	3	2	-	-	1	2	.00	.01
F	<i>Sisymbrium altissimum</i> (a)	-	-	3	-	-	-	1	-	.03	.03
F	<i>Tragopogon dubius</i>	_b 15	_a 4	_a 6	_{ab} 8	9	2	2	3	.01	.06
F	<i>Wyethia amplexicaulis</i>	1	3	3	-	1	1	1	-	.03	-
Total for Annual Forbs		0	0	186	417	0	0	71	170	0.89	1.80
Total for Perennial Forbs		52	53	60	73	29	25	26	37	0.78	1.65
Total for Forbs		52	53	246	490	29	25	97	207	1.68	3.46

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

BROWSE TRENDS --

Herd unit 02 , Study no: 16

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Amelanchier alnifolia</i>	11	8	.41	.30
B	<i>Artemisia arbuscula</i>	56	54	7.85	8.18
B	<i>Artemisia tridentata vaseyana</i>	0	4	-	1.16
B	<i>Cercocarpus ledifolius</i>	14	10	3.65	1.72
B	<i>Eriogonum heracleoides</i>	2	2	-	-
B	<i>Eriogonum microthecum</i>	1	0	-	.15
B	<i>Juniperus scopulorum</i>	0	0	.88	1.02
B	<i>Mahonia repens</i>	7	10	.03	.48
B	<i>Opuntia</i> spp.	3	3	.18	.38
B	<i>Pachistima myrsinites</i>	3	4	.18	.18
B	<i>Purshia tridentata</i>	6	6	.71	1.64
B	<i>Symphoricarpos oreophilus</i>	16	16	1.72	3.23
Total for Browse		119	117	15.64	18.46

CANOPY COVER --
Herd unit 02 , Study no: 16

Species	Percent Cover	
	'96	'01
Cercocarpus ledifolius	13	16
Juniperus scopulorum	1.2	.60

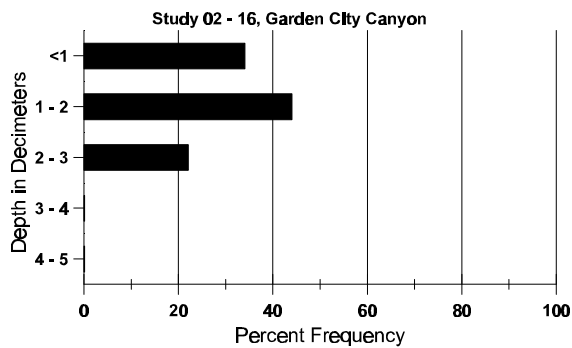
BASIC COVER --
Herd unit 02 , Study no: 16

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	377	334	2.25	10.25	50.30	37.32
Rock	260	250	33.75	28.00	20.68	22.32
Pavement	63	147	.50	.25	.58	3.29
Litter	387	373	58.75	55.00	56.87	44.82
Cryptogams	36	45	1.75	1.75	.48	.56
Bare Ground	85	144	3.00	4.75	2.30	8.35

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 16, Garden City Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.0	65.5 (9.0)	5.8	32.6	39.1	28.4	4.7	31.5	259.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 16

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	6	8	-	-
Elk	25	10	209	16 (40)
Deer	19	36	713	55 (136)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 16

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total									
		1	2	3	4		1	2										
<i>Amelanchier alnifolia</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	1	-	-	-	-	-	1	-	-	33			1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	84	7	-	-	-	-	-	-	-	7	-	-	-	233			7	
	90	1	1	-	1	-	-	-	-	-	3	-	-	100			3	
	96	2	-	-	-	-	-	-	-	1	1	-	-	40			2	
	01	1	3	-	1	-	-	-	-	5	-	-	-	100			5	
M	84	-	4	6	-	-	-	-	-	10	-	-	-	333	31	33	10	
	90	-	-	1	-	-	1	-	-	1	1	-	-	66	35	25	2	
	96	-	6	-	-	-	-	-	-	2	2	-	2	120	27	26	6	
	01	-	3	1	-	-	-	-	-	3	1	-	-	80	26	28	4	
D	84	-	2	1	-	-	-	-	-	3	-	-	-	100			3	
	90	2	3	4	-	1	-	-	-	2	5	-	3	333			10	
	96	2	1	-	-	-	-	-	-	-	1	-	2	60			3	
	01	-	-	1	-	-	-	-	-	1	-	-	-	20			1	
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		30%		35%		00%		-25%										
'90		33%		40%		20%		-56%										
'96		64%		00%		36%		-9%										
'01		60%		20%		00%												
Total Plants/Acre (excluding Dead & Seedlings)												'84	666	Dec:	15%			
												'90	499		67%			
												'96	220		27%			
												'01	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				
Artemisia arbuscula																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	2	-	-	-	-	-	-	-	3	-	-	-	100		3	
	90	3	1	-	1	-	-	-	-	-	5	-	-	-	166		5	
	96	6	1	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	24	7	-	-	-	-	-	-	24	-	7	-	1033	13 26	31	
	90	23	3	1	3	-	-	-	-	-	30	-	-	-	1000	17 16	30	
	96	89	20	-	-	-	-	-	-	-	109	-	-	-	2180	13 26	109	
	01	77	7	-	-	-	-	-	-	-	84	-	-	-	1680	13 29	84	
D	84	-	4	14	-	-	-	-	-	-	15	-	3	-	600		18	
	90	10	4	-	-	-	-	-	-	-	6	2	5	1	466		14	
	96	9	3	2	-	-	-	-	-	-	11	-	-	3	280		14	
	01	20	2	-	-	-	-	-	-	-	17	-	-	5	440		22	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	580		29	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		58%			40%			19%			- 6%							
'90		16%			02%			12%			+37%							
'96		18%			02%			02%			-17%							
'01		08%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1733	Dec:	35%			
												'90	1632		29%			
												'96	2600		11%			
												'01	2160		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																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	20	29	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%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	0		0%			
												'01	100		20%			

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches) Ht. Cr.		Total				
		1	2	3	4	5	6	7	8	9		1	2		3	4		
Cercocarpus ledifolius																		
S	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	2	2	1	-	-	-	-	5	-	-	-	166			5
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	1	-	-	-	-	9	2	12	-	-	-	400	68	74	12
	90	-	-	-	-	-	-	6	1	-	7	-	-	-	233	183	83	7
	96	-	-	-	-	1	-	1	8	-	10	-	-	-	200	-	-	10
	01	-	-	-	-	-	-	-	6	-	6	-	-	-	120	46	46	6
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	1	3	-	-	-	1	-	-	5	-	-	-	166			5
	96	-	-	1	1	-	1	-	-	-	3	-	-	-	60			3
	01	-	1	1	-	-	2	-	-	-	2	-	-	2	80			4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			23%			00%			+23%							
'90		12%			29%			00%			-50%							
'96		07%			14%			00%			-21%							
'01		09%			27%			18%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	433	Dec:	0%				
											'90	565		29%				
											'96	280		21%				
											'01	220		36%				
Eriogonum heracleoides																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	16	9	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:	-				
											'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				
Eriogonum microthecum																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	10	26	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	22	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		-			
Juniperus scopulorum																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	67	83	1
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33	118	98	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		50%			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		-			

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											
Mahonia repens																			
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	90	6	-	-	-	-	-	-	-	6	-	-	-	200		6			
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
Y	84	23	-	-	-	-	-	-	-	23	-	-	-	766		23			
	90	14	-	-	1	-	-	-	-	15	-	-	-	500		15			
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
M	84	51	-	-	-	-	-	-	-	51	-	-	-	1700	8	6	51		
	90	105	4	-	4	-	-	-	-	113	-	-	-	3766	7	4	113		
	96	39	-	-	-	-	-	1	-	40	-	-	-	800	4	6	40		
	01	106	-	-	1	-	-	-	-	107	-	-	-	2140	3	4	107		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'84		00%		00%		00%		+42%											
'90		03%		00%		00%		-81%											
'96		00%		00%		00%		+63%											
'01		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'84	2466	Dec:	-						
										'90	4266		-						
										'96	800		-						
										'01	2140		-						
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	5	-	-	-	-	-	-	-	5	-	-	-	100	6	29	5		
	01	7	-	-	-	-	-	-	-	7	-	-	-	140	5	15	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%		+38%											
'01		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	-						
										'90	0		-						
										'96	100		-						
										'01	160		-						

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4		1	2				
Pachistima myrsinites												
Y	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	60		3	
	01	1	-	-	-	-	2	-	60		3	
M	84	1	-	-	-	-	-	-	33	6	7	1
	90	-	-	-	-	-	-	-	0	-	-	0
	96	6	-	-	-	-	-	-	120	7	12	6
	01	-	-	-	4	-	-	-	80	5	7	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%		-22%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	33	Dec:	-			
						'90	0		-			
						'96	180		-			
						'01	140		-			
Purshia tridentata												
Y	84	-	-	-	-	-	-	-	0		0	
	90	1	-	-	1	-	-	-	66		2	
	96	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	1	-	-	-	-	33	24	33	1
	96	-	3	3	-	-	-	-	120	16	36	6
	01	2	2	1	-	1	-	-	120	18	40	6
D	84	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	33		1	
	96	-	-	1	-	-	-	-	20		1	
	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		00%		25%		00%		+ 6%				
'96		43%		57%		00%		-14%				
'01		50%		17%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%			
						'90	132		25%			
						'96	140		14%			
						'01	120		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				
Symphoricarpos oreophilus																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	5	-	-	-	-	-	-	-	-	4	-	1	-	100		5	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66	18	26	2
	90	3	-	-	2	-	-	-	-	-	5	-	-	-	166	15	28	5
	96	15	1	-	-	-	-	-	-	-	16	-	-	-	320	19	37	16
	01	17	-	-	-	-	-	2	-	-	18	-	1	-	380	27	52	19
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%			+50%							
'90		00%			00%			00%			+57%							
'96		04%			00%			04%			-13%							
'01		00%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	99	Dec:	0%			
												'90	199		0%			
												'96	460		9%			
												'01	400		5%			

Trend Study 2-17-01

Study site name: Meadowville.

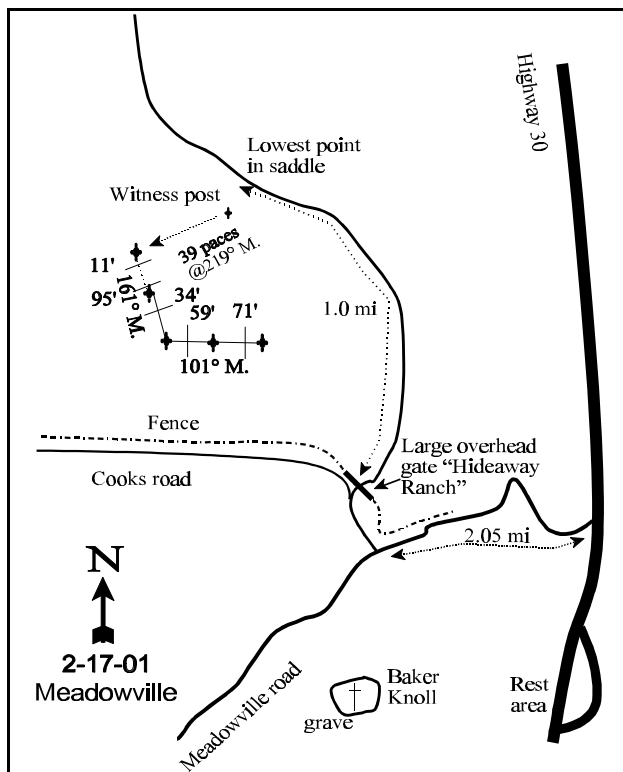
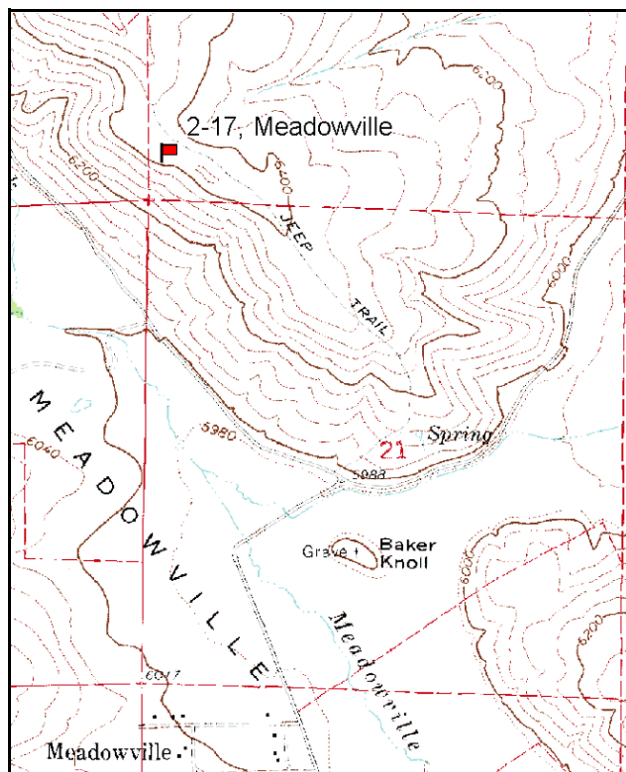
Vegetation type: Big Sagebrush.

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

At the intersection of Highway 30 and Meadowville Road, turn west on Meadowville Road and proceed 2.05 miles. Turn right (north) onto Cook's Road and turn immediately right through a large gate marked "Hideaway Ranch". Proceed 1.1 miles, passing a spring on the right and following the ridgetop, to the witness post in the low spot of a small saddle. Walk 39 paces at 219 degrees magnetic from the witness post to the 0-foot baseline stake. The 0-foot stake of the baseline is marked by browse tag # 7939. The 0-foot stake is also approximately 75 yards from a fence to the west. The baseline runs 161 degrees magnetic. Line three and four dogleg and run parallel to the fence at a bearing of 101 degrees magnetic.



Map Name: Meadowville

Diagrammatic Sketch

Township 13N, Range 5E, Section 16

UTM 4634407 N, 466814 E

DISCUSSION

Trend Study No. 2-17

The Meadowville trend study is located on a moderately steep (35%), southwest-facing slope overlooking the north end of Meadowville Valley. The site is on private land and part of the Hideaway Ranch. Elevation is approximately 6,360 feet. The vegetation type is mountain big sagebrush/grass. The area is considered critical deer winter range. More specifically, the study area appears to be a "key" wintering site. Two winter killed deer carcasses and five shed antlers were found on the site in 1984. Pellet groups were also reported to be abundant in 1984 and 1990. Pellet group transect data taken on the site in 2001 estimated 56 deer and 3 elk days use/acre (139 ddu/ha and 7 edu/ha). Deer use appeared to be from late winter. This area is also grazed by cattle and possibly sheep. Cattle use was estimated at 4 days use/acre (9 cdu/ha) in 2001. Cattle were seen in the area while driving to the site, but cattle pats found on site appeared to be from the previous fall.

Soil is classified as "Solak Gravelly Loam", a shallow sandstone-limestone-quartzite conglomerate, where bedrock is normally found 10 to 20 inches below the surface. Solak soil is moderately permeable to water but runoff is rapid and the erosion hazard is high. The principal limiting factors are low available water capacity and a limited root zone (Campbell and Lacey 1982). The soil on the site has a clay loam texture with a neutral soil reaction (pH of 7.1). Effective rooting depth (see methods) was estimated at nearly 16 inches. Rock and pavement are fairly common on the surface and within the profile. Protective ground cover is abundant and the erosion condition class was determined to be stable in 2001.

Mountain big sagebrush and antelope bitterbrush are the key species on the site. The sagebrush population was heavily hedged in 1984 and moderately browsed between 1990 and 2001. The population has a distinctly decadent appearance with reduced vigor. Density of mature plants has remained stable since 1990, while the decadent component of the population is slowly dying out. Percent decadency has slowly declined from 100% in 1984 to 46% in 2001. Density of decadent plants has declined from 1,466 plants/acre to 240 plants/acre. Vigor was reported to be poor on nearly half (48%) of the population in 1984. It has continued to be high in 1996 (58%) and 2001 (42%). A sagebrush die-off is further illustrated by the abundant dead plants estimated in 1996 (1,160 plants/acre). Dead plants were not included in the 1984 and 1990 sampling. Reproduction in the form of seedlings and young is poor with only 20 young plants/acre estimated in 2001.

Additional forage is available from a few scattered antelope bitterbrush. These shrubs currently ('01) number only 200 plants/acre. They display moderate to heavy use but have normal vigor. Density of mature plants has remained stable since 1990.

The dominant shrub is the increaser, stickyleaf low rabbitbrush. It accounted for 36% of the shrub cover in 1996 and 32% in 2001. Density was estimated at about 1,900 plants/acre in 1996 and 2001. Mature plants average 1 foot in height with a crown of about 2 feet. Age class structure would indicate a stable population with 80% of the shrubs classified as mature. Broom snakeweed is also abundant but has declined from a high of 11,932 plants/acre in 1990 to 820 plants/acre in 2001. The current population is mostly mature and appears to be stable.

Perennial grasses are represented by moderate amounts of bluebunch wheatgrass and Indian ricegrass, followed by lesser amounts of Sandberg bluegrass. All of these showed evidence of light to moderate utilization by cattle in 1984. Annual cheatgrass was dominant in 1996. It provided 62% of the grass cover and 53% of the herbaceous cover, but has since declined significantly. Forb growth is sparse and generally low in stature. The most numerous perennial forbs are Utah milkvetch, arrowleaf balsamroot, thistle, wayside gromwell, and yellow salsify.

1984 APPARENT TREND ASSESSMENT

In spite of a soil that potentially is highly erodible, this site seems relatively stable. The current rate of erosion is slow but could easily become greater, especially if vegetation cover were to be seriously reduced. Vegetatively, there are some problems which may indicate a declining trend. Most significant is the decadent age structure of mountain big sagebrush and abundant broom snakeweed, an undesirable increaser. The principal causative factor is probably heavy game and livestock use and the associated trampling damage. This is a rather fragile, low potential site that requires more careful management to maintain a stable trend.

1990 TREND ASSESSMENT

As in 1984, there is still a high and increasing population of undesirable increasers and a high percentage of decadent plants in the sagebrush population. However, where all the sagebrush were classified as decadent in 1984, now 20% of the population consist of seedlings and young plants. Sagebrush canopy cover is estimated at 6%. The sagebrush population has declined by 34%. Bitterbrush has conversely increased it's numbers by 62%. Despite heavy grazing, total grass frequency increased largely due to significant increases in bluebunch wheatgrass and Sandberg bluegrass. Cover value for bare ground increased because of litter losses. This could change after we get through the drought and receive "normal" precipitation.

TREND ASSESSMENT

soil - slightly downward (2)

browse - slightly down but improved for bitterbrush (2)

herbaceous understory - slight increase due to grasses (4)

1996 TREND ASSESSMENT

Soil trend is up with an increase in litter cover and a decline in percent bare ground from 17% to 4%. Trend for the key browse species, mountain big sagebrush, is down. Utilization is heavier than in 1990, but only 28% of the plants sampled display heavy use. Reproduction is limited and the proportion of shrubs displaying poor vigor has increased from 28% to 58%. Decadence is still high at 60%, but similar to 1990 estimates. The downward trend does not appear to be use related. Undesirable increasers, stickyleaf low rabbitbrush and broom snakeweed, are numerous but do not appear to be increasing further. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses declined slightly while frequency of forbs increased.

TREND ASSESSMENT

soil - up (5)

browse - down (1)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in bare ground and a decline in litter. Much of the change is due to the decline in frequency and cover of cheatgrass since 1996. As a result of the decline in vegetation and litter cover, the ratio of protective cover to bare ground declined 41%. There is some soil movement and pedestalling is apparent on the site, but overall, the erosion condition class was classified to be stable in 2001. Trend for browse is down due to a continual decline in sagebrush. The current population of just 520 plants/acre is moderately utilized and nearly half decadent (46%). In addition, 83% (199 plants/acre) of the decadent plants sampled were classified as dying. Since young recruitment is poor, there are not currently enough young plants to maintain the population. Mature sagebrush have poor leader growth, averaging only

1.2 inches in 2001. Density of the increaser, stickyleaf low rabbitbrush is stable at about 1,900 plants/acre while the density of broom snakeweed has declined. The small population of bitterbrush is stable with good vigor and no decadent plants. They appear to be better able to persist on this dry site than sagebrush. Utilization of bitterbrush was moderate to heavy but plants are healthy and vigorous and annual leader growth was estimated at 4.6 inches in 2001. Unfortunately bitterbrush is not abundant. Trend for the herbaceous understory is up slightly due primarily to an improvement in composition. Annual cheatgrass declined significantly in nested frequency and cover dropped from 20% to 7%. In addition, Sandberg bluegrass increased significantly. The most abundant perennial grasses, bluebunch wheatgrass and Indian ricegrass, remained stable. Forbs are diverse but not particularly abundant.

TREND ASSESSMENT

soil - down slightly (2)

browse - down (1)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 17

Type	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	a95	b120	b146	b156	42	53	58	58	6.50	7.13
G	Bromus tectorum (a)	-	-	b367	a294	-	-	98	91	19.65	6.85
G	Oryzopsis hymenoides	61	61	73	71	28	25	34	31	3.82	5.69
G	Poa pratensis	3	-	3	1	2	-	1	1	.03	.03
G	Poa secunda	a83	b152	a89	b138	31	63	38	61	1.50	1.41
G	Sitanion hystrix	5	3	4	-	3	1	1	-	.03	-
Total for Annual Grasses		0	0	367	294	0	0	98	91	19.65	6.85
Total for Perennial Grasses		252	336	315	366	108	142	132	151	11.90	14.27
Total for Grasses		252	336	682	660	108	142	230	242	31.56	21.13
F	Achillea millefolium	-	-	5	6	-	-	3	3	.04	.06
F	Agoseris glauca	-	4	-	-	-	3	-	-	-	-
F	Alyssum alyssoides (a)	-	-	292	293	-	-	88	94	2.44	2.25
F	Astragalus utahensis	b56	ab51	ab34	a17	30	22	19	10	.48	.17
F	Balsamorhiza sagittata	2	6	4	13	2	2	2	7	.39	.30
F	Castilleja chromosa	8	1	4	-	3	1	2	-	.01	-
F	Camelina microcarpa (a)	-	-	2	2	-	-	2	1	.01	.00
F	Chaenactis douglasii	1	8	5	-	1	4	3	-	.04	-
F	Cirsium undulatum	22	19	25	19	11	12	12	9	.39	.55
F	Collomia linearis (a)	-	-	-	10	-	-	-	4	-	.02
F	Comandra pallida	ab1	a-	a-	b10	1	-	-	5	-	.10
F	Collinsia parviflora (a)	-	-	a3	b9	-	-	1	4	.00	.04
F	Crepis acuminata	-	-	-	7	-	-	-	3	-	.21

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Descurainia pinnata (a)	-	-	15	14	-	-	6	6	.03	.03
F	Draba spp. (a)	-	-	-	1	-	-	-	1	-	.00
F	Lactuca serriola	-	-	-	2	-	-	-	1	-	.00
F	Linum lewisii	a-	a-	b10	ab5	-	-	5	2	.02	.06
F	Lithospermum ruderale	11	16	22	22	5	8	12	12	1.00	1.33
F	Microsteris gracilis (a)	-	-	-	3	-	-	-	2	-	.03
F	Navarretia intertexta (a)	-	-	3	-	-	-	1	-	.00	-
F	Oenothera spp.	-	-	-	-	-	-	-	-	-	.00
F	Phlox hoodii	8	4	16	18	3	2	7	8	.16	.28
F	Phlox longifolia	a-	a3	a11	b36	-	1	4	16	.02	.35
F	Polygonum douglasii (a)	-	-	3	3	-	-	1	1	.00	.00
F	Sisymbrium altissimum (a)	-	-	3	-	-	-	1	-	.03	-
F	Tragopogon dubius	a26	a19	b49	ab43	13	10	27	22	.54	.38
F	Unknown forb-perennial	-	3	-	-	-	2	-	-	-	-
Total for Annual Forbs		0	0	321	335	0	0	100	113	2.53	2.39
Total for Perennial Forbs		135	134	185	198	69	67	96	98	3.09	3.82
Total for Forbs		135	134	506	533	69	67	196	211	5.63	6.22

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

BROWSE TRENDS --

Herd unit 02 , Study no: 17

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	0	1	-	-
B	Artemisia tridentata vaseyana	35	18	4.47	2.40
B	Chrysothamnus viscidiflorus viscidiflorus	44	43	3.99	2.88
B	Eriogonum microthecum	3	1	.15	-
B	Gutierrezia sarothrae	24	20	.32	.36
B	Opuntia spp.	7	10	.27	.46
B	Purshia tridentata	9	9	1.14	1.93
B	Tetradymia canescens	21	18	.60	.97
Total for Browse		143	120	10.96	9.04

BASIC COVER --

Herd unit 02 , Study no: 17

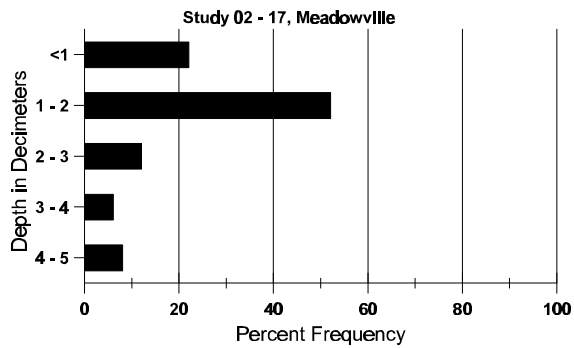
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	388	385	2.50	11.50	53.66	41.42
Rock	210	194	10.00	9.00	10.95	8.15
Pavement	191	306	13.75	16.25	3.86	17.51
Litter	395	371	66.25	45.00	52.17	38.69
Cryptogams	32	6	.25	1.75	.09	.18
Bare Ground	133	211	7.25	16.50	4.17	10.99

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 17, Meadowville

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.7	59.8 (14.8)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 17

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Rabbit	3	2	52	N/A
Elk	7	4	35	3 (7)
Deer	15	25	731	56 (139)
Cattle	2	1	44	4 (9)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 17

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	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	17	19
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%			00%			00%									
'90		00%			100%			00%									
'96		00%			00%			00%									
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%		
												'90	33		100%		
												'96	0		0%		
												'01	20		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			
Artemisia tridentata vaseyana																
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	3	-	-	-	-	-	-	-	-	-	-	-	100		3
	96	3	-	-	-	-	-	-	-	-	-	-	-	60		3
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	3	-	-	-	-	-	-	-	-	-	-	-	100		3
	96	3	1	-	-	-	-	-	-	-	-	-	-	80		4
	01	-	1	-	-	-	-	-	-	-	-	-	-	20		1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	90	5	1	-	-	-	-	-	-	-	-	-	-	200	24	22
	96	3	5	5	-	-	-	-	-	-	-	-	-	260	25	33
	01	10	-	-	-	3	-	-	-	-	-	-	-	260	21	34
D	84	-	4	40	-	-	-	-	-	-	-	-	-	1466		44
	90	11	6	2	1	-	-	-	-	-	-	-	-	666		20
	96	11	6	7	2	-	-	-	-	-	-	-	-	520		26
	01	5	4	1	-	2	-	-	-	-	-	-	-	240		12
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	1160		58
	01	-	-	-	-	-	-	-	-	-	-	-	-	820		41
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>		
'84		09%				91%				48%				-34%		
'90		24%				07%				28%				-11%		
'96		28%				28%				58%				-40%		
'01		38%				04%				42%						
Total Plants/Acre (excluding Dead & Seedlings)												'84	1466	Dec:	100%	
												'90	966		69%	
												'96	860		60%	
												'01	520		46%	

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	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	6	-	-	-	-	-	-	-	-	6	-	-	-	200	9	11	6
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	10	10	4
	96	84	-	-	6	-	-	-	-	-	90	-	-	-	1800	13	24	90
	01	77	-	-	1	-	-	-	-	-	78	-	-	-	1560	11	20	78
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	18	-	-	-	-	-	-	-	-	16	-	-	2	360		18	
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%			-43%							
'90		00%			00%			00%			+93%							
'96		00%			00%			00%			+ 3%							
'01		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	233	Dec:	0%			
												'90	133		0%			
												'96	1900		3%			
												'01	1960		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			
Eriogonum microthecum											
Y	84	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	0	-	0	
	96	4	-	-	-	-	-	80	12	11	4
	01	1	-	-	-	-	-	20	14	17	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%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:			
						'90	0				
						'96	100				
						'01	20				
Gutierrezia sarothrae											
S	84	-	-	-	-	-	-	0		0	
	90	42	-	-	-	-	-	1400		42	
	96	6	-	-	-	-	-	120		6	
	01	2	-	-	-	-	-	40		2	
Y	84	111	-	-	-	-	-	3700		111	
	90	272	6	-	-	-	-	9266		278	
	96	8	-	-	-	-	-	160		8	
	01	1	-	-	-	-	-	20		1	
M	84	112	-	-	-	-	-	3733	7	11	112
	90	72	-	-	-	-	-	2400	9	11	72
	96	60	-	-	-	-	-	1200	7	10	60
	01	40	-	-	-	-	-	800	5	8	40
D	84	5	-	-	-	-	-	166		5	
	90	8	-	-	-	-	-	266		8	
	96	2	-	-	-	-	-	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%		+36%			
'90		02%		00%		.27%		-88%			
'96		00%		00%		01%		-41%			
'01		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'84	7599	Dec:			
						'90	11932				
						'96	1400				
						'01	820				

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	
	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	4	-	-	1	-	-	-	-	-	5	-	-	-	100	5	12	5
	01	14	-	-	-	-	-	-	-	-	14	-	-	-	280	5	11	14
% 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	180		-			
												'01	300		-			

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	2	1	-	-	-	-	-	-	-	-	3	-	100			3	
	90	-	-	5	-	-	-	-	-	-	-	-	5	166			5	
	96	1	1	-	1	-	-	-	-	-	-	-	3	60			3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	84	-	1	1	-	-	-	-	-	-	-	1	-	66	11	49	2	
	90	1	1	3	1	-	-	-	-	-	-	-	6	200	13	21	6	
	96	1	2	3	-	-	-	-	-	-	-	-	6	120	14	44	6	
	01	-	5	5	-	-	-	-	-	-	-	-	10	200	21	48	10	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	2	-	-	-	-	-	-	-	-	-	2	66			2	
	96	-	-	-	-	-	1	-	-	-	-	-	-	20			1	
	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		40%			20%			20%			+62%							
'90		23%			62%			00%			-54%							
'96		30%			40%			10%			+ 0%							
'01		50%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	166	Dec:	0%			
												'90	432		15%			
												'96	200		10%			
												'01	200		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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100	7	12	3
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66	8	15	2
	96	16	3	2	1	-	-	-	-	-	22	-	-	-	440	11	17	22
	01	33	-	-	-	-	-	-	-	-	33	-	-	-	660	9	14	33
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	2	-	1	-	-	-	-	-	-	2	-	-	1	60			3
	01	4	1	-	-	-	-	-	-	-	4	-	-	1	100			5
% 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%			+84%							
'96		10%			10%			03%			+27%							
'01		02%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	25%			
												'90	99		33%			
												'96	600		10%			
												'01	820		12%			

Suspended

Trend Study 2-18-96

Study site name: Upper Hodges Canyon.

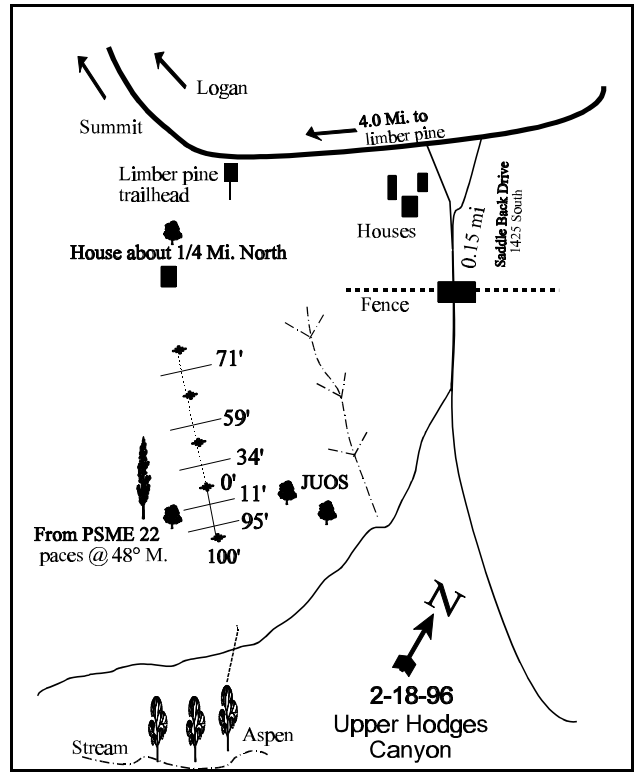
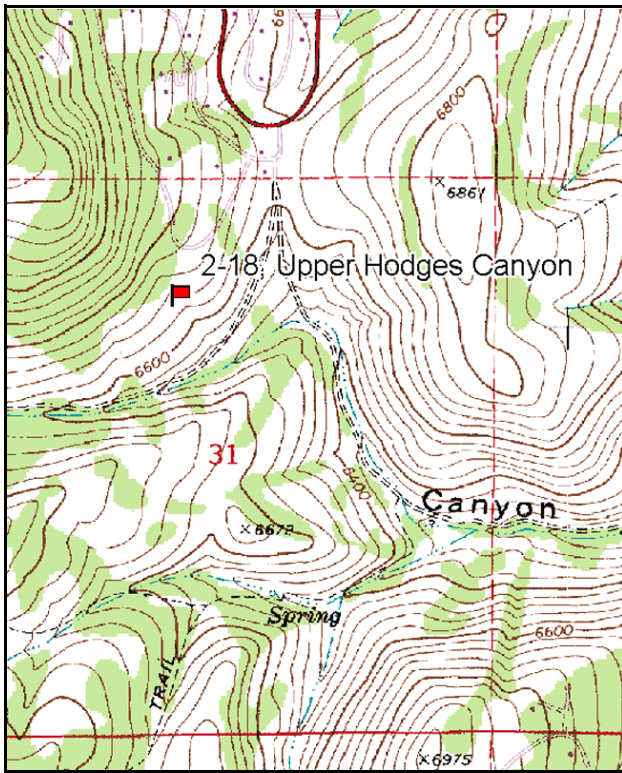
Vegetation type: Mountain Brush.

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 Bear Lake Summit in Logan Canyon proceed towards Garden City. Begin to note mileage just past the summit at the "Limber Pine" trailhead sign. Proceed 4.0 miles and turn right at the dirt road (Saddle Back Drive, 1435 So.). Proceed 0.15 miles to a gate, go through the gate and take the first road to the right. Travel 0.2 miles to the first aspen tree on the left and stop. Walk at 268 degrees true to a large juniper at the top of the first ridge. Walk west to a Douglas fir. On an azimuth of 48 degrees magnetic from the pine walk 22 paces to the 0-foot stake of the baseline marked by browse tag #7981. Baseline runs at 161 degrees magnetic. The rest of the baseline runs north off the 0-foot baseline at an azimuth of 343 degrees magnetic.



Map Name: Garden City

Diagrammatic Sketch

Township 14N, Range 5E, Section 31

UTM 4640459 N, 464283 E

DISCUSSION

Trend study No. 2-18

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006.

The Upper Hodges Canyon trend study is located approximately 1 mile further up Hodges Canyon than Study Number #2-15, a location that probably is above the upper limit of severe deer winter range. The primary big game user would be deer and elk, but pellet groups of either occur infrequently. Cattle use the area in summer. The study site is a mixed mountain brush type on a moderate (20%), southeast-facing slope at 6,640 feet in elevation.

Soil characteristics are identical to those described in the write-up for study 2-15, the Lower Hodges Canyon site. The "Yeates Hollow" soil is very deep, well drained and productive. Soil should not be limiting to plant growth. The erosion hazard is only moderate (Campbell and Lacey 1982). Soil at the site has a loam to a clay loam texture and soil reaction is moderately acidic (pH of 6.0). Organic matter is high at 5.8%. Effective rooting depth (see methods) was estimated at almost 13 inches. The study site has a diverse plant community that provides adequate ground cover to help prevent soil erosion.

The key browse species are mountain big sagebrush and antelope bitterbrush which account for 43% of the browse cover. Mountain big sagebrush density was estimated at 1,799 plants/acre in 1984. The population was moderate to heavily hedged, in good vigor, and had a decadency rate of 44%. No seedlings were encountered and young plants were infrequent. Density increased by 1990 due to an increase in young and mature plants. Utilization was light to moderate and percent decadency declined to 23%. Vigor was reduced in 44% of the decadent sagebrush however. The sagebrush has maintained a fairly stable mature population since 1990. The number of decadent plants has declined from 23% of the population in 1990 to 10% in 1996. However, the number of young have gone down from 15% to 1%. Dead plants, first counted in 1996, indicate that there is one dead plant to every three live plants. This high ratio would support the data which suggest a decline in population density since 1990. Utilization is light to moderate and vigor good on most plants. Recruitment is reduced with only one seedling and one young plant encountered in the density strips.

Bitterbrush has maintained a stable population density since 1984 at around 1,500 plants/acre. Utilization was very heavy in 1984 with 75% of the shrubs displaying heavy use (>60% of twigs browsed). Use was mostly light in 1990, then heavy again in 1996. Vigor continues to be normal and percent decadency low at 10%.

Serviceberry also produces some preferred forage on the site. Population density was estimated at 840 plants/acre in 1996. Mature plants averaged just over 3 feet in height with a crown of nearly 4 feet. Heavy use occurred on 67% of the shrubs in 1984. At the 1990 reading, use was moderate and vigor was good. However, decadency increased from zero to 67%. By 1996, use was again moderate to heavy and vigor reduced due to a rust infestation. Percent decadence declined to 7%. Other shrubs found on the site include mountain snowberry, chokecherry, woods rose, snowbrush ceanothus, and wyeth eriogonum.

The herbaceous understory is diverse and productive with both grasses and forbs making substantial contributions to total forage production. Among grasses, the important species are Kentucky bluegrass, bluebunch wheatgrass, and Sandberg bluegrass. Grasses showed evidence of light use by cattle in 1984, with no apparent preference for any particular species. Utilization by livestock was much heavier in 1990 and 1996 making identification difficult. Unutilized grasses included Kentucky bluegrass and subalpine needlegrass.

Forb composition includes a large number of species, yet only a few are important to monitor. The most abundant forb species are increasers that include mulesears wyethia, western yarrow, pacific aster, and Fremont geranium. Mulesears is the most abundant forb and an increaser with heavy grazing. It accounts for 70% of the forb cover and 33% of the herbaceous cover. This forb is used occasionally by deer and elk but not usually by livestock (Stubbendieck et al. 1986).

1984 APPARENT TREND ASSESSMENT

This site is ecologically stable in almost all respects. The soil surface has an almost complete cover of live vegetation and litter and shows few signs of erosion. In vegetational terms, any potential increase of mulesear wyethia should be closely monitored and checked against any decrease in the key species.

1990 TREND ASSESSMENT

This 6,640 foot elevation site receives year-round use by deer. There is also sign of elk and moose. Cattle were present on this private land when the study was read on July 25, 1990. Perennial grasses had been heavily grazed, making identification difficult. Density and diversity of herbaceous species is high and not significantly changed from 1984. Key browse species, most notably mountain big sagebrush and bitterbrush, show improvements in age class structure, reduced heavy use, and improved decadency rates. Sagebrush canopy cover averages 9%, while bitterbrush cover is 4%. The browse is lightly to moderately hedged.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - slightly improved (4)

1996 TREND ASSESSMENT

Soil trend is slightly up due to a decline in percent bare ground. Vegetation and litter cover are abundant and well dispersed. The browse trend is stable for the key species, mountain big sagebrush and antelope bitterbrush. However, mountain big sagebrush has declined in density since 1990. Sample size was increased in 1996 but the high proportion of dead plants on the site (480 plants/acre) would suggest a decline in sagebrush density has occurred. It should be kept in mind that sagebrush only makes up 20% of the browse cover. Utilization and vigor are similar to that reported in 1990, and percent decadency declined from 23% to 10%. Bitterbrush shows a stable trend with heavier use than was found in 1990. The herbaceous trend is stable for grasses and slightly up for forbs. Sum of nested frequency for perennial grasses remained stable since 1990. However, Kentucky bluegrass and Sandberg bluegrass have increased significantly in sum of nested frequency. Forbs increased in sum of nested frequency with western yarrow and pacific aster increasing significantly. Unfortunately all of these species are considered increasers under heavy livestock grazing. Overall, trend for the herbaceous understory is slightly up.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable for key species (3)

herbaceous understory - up slightly but dominated by mulesears wyethia (4)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 18

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	126	145	168	52	55	58	4.32
G	Agropyron trachycaulum	_b 72	_a -	_a -	32	-	-	-
G	Bromus japonicus (a)	-	-	15	-	-	6	.25
G	Bromus marginatus	28	29	28	14	15	14	.72
G	Bromus tectorum (a)	-	-	128	-	-	40	3.05
G	Carex spp.	_a -	_b 12	_{ab} 6	-	5	2	.03
G	Dactylis glomerata	-	-	3	-	-	1	.03
G	Elymus cinereus	3	2	3	1	1	1	.15
G	Koeleria cristata	_b 63	_a 23	_a 19	28	10	11	.33
G	Melica bulbosa	2	3	2	2	2	1	.00
G	Poa fendleriana	_a -	_c 90	_b 24	-	34	13	.41
G	Poa pratensis	_{ab} 90	_a 78	_b 129	34	35	45	6.44
G	Poa secunda	_a -	_b 11	_c 97	-	6	35	4.33
G	Stipa columbiana	_a 19	_b 113	_a 34	13	46	13	.60
G	Stipa lettermani	-	-	4	-	-	2	.01
Total for Annual Grasses		0	0	143	0	0	46	3.30
Total for Perennial Grasses		403	506	517	176	209	196	17.41
Total for Grasses		403	506	660	176	209	242	20.72
F	Achillea millefolium	_b 116	_a 49	_b 105	41	22	40	1.31
F	Agoseris glauca	5	5	-	2	3	-	-
F	Arabis spp.	_a -	_b 24	_a -	-	11	-	-
F	Aster chilensis	_a 27	_a 28	_b 91	11	12	33	1.36
F	Balsamorhiza hookeri	3	1	1	1	1	1	.15
F	Camelina microcarpa (a)	-	-	3	-	-	1	.00
F	Calochortus nuttallii	_b 14	_a 6	_a -	7	2	-	-
F	Cirsium spp.	1	1	-	1	1	-	-
F	Collomia linearis (a)	-	-	10	-	-	4	.02
F	Comandra pallida	21	16	20	9	8	8	.11
F	Collinsia parviflora (a)	-	-	43	-	-	20	.10
F	Crepis acuminata	-	6	5	-	2	2	.03
F	Epilobium brachycarpum (a)	-	-	5	-	-	3	.01
F	Eriogonum umbellatum	-	1	-	-	1	-	-
F	Geranium viscosissimum	24	14	26	13	9	17	1.81
F	Lappula occidentalis (a)	-	-	2	-	-	1	.00

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	<i>Lactuca serriola</i>	-	3	3	-	2	1	.00
F	<i>Linum lewisii</i>	3	1	-	1	1	-	.00
F	<i>Lupinus sericeus</i>	_b 20	_{ab} 9	_a -	10	4	-	.03
F	<i>Machaeranthera canescens</i>	-	1	-	-	1	-	-
F	<i>Navarretia</i> spp.	-	-	3	-	-	1	.00
F	<i>Penstemon humilis</i>	2	1	-	1	1	-	-
F	<i>Penstemon</i> spp.	-	3	5	-	1	2	.03
F	<i>Phlox longifolia</i>	_a -	_b 14	_b 22	-	8	10	.15
F	<i>Polygonum douglasii</i> (a)	-	-	18	-	-	7	.03
F	<i>Potentilla gracilis</i>	3	-	-	1	-	-	-
F	<i>Senecio multilobatus</i>	-	5	-	-	3	-	-
F	<i>Solidago missouriensis</i>	_a -	_a -	_b 12	-	-	5	.27
F	<i>Taraxacum officinale</i>	-	3	8	-	1	3	.01
F	<i>Tragopogon dubius</i>	14	24	20	7	11	8	.16
F	Unknown forb-perennial	_b 13	_a 3	_a -	6	1	-	-
F	<i>Veratrum californicum</i>	1	-	-	1	-	-	-
F	<i>Viguiera multiflora</i>	-	2	-	-	1	-	-
F	<i>Wyethia amplexicaulis</i>	105	101	124	53	44	54	12.93
Total for Annual Forbs		0	0	81	0	0	36	0.17
Total for Perennial Forbs		372	321	445	165	151	185	18.40
Total for Forbs		372	321	526	165	151	221	18.58

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

BROWSE TRENDS --

Herd unit 02 , Study no: 18

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier alnifolia	35	4.27
B	Artemisia tridentata vaseyana	46	6.62
B	Ceanothus velutinus	1	.15
B	Chrysothamnus viscidiflorus stenophyllus	2	-
B	Eriogonum heracleoides	17	.81
B	Mahonia repens	2	.04
B	Prunus virginiana	3	.21
B	Purshia tridentata	53	7.83
B	Rosa woodsii	5	.78
B	Symphoricarpos oreophilus	59	11.19
Total for Browse		223	31.92

BASIC COVER --

Herd unit 02 , Study no: 18

Cover Type	Nested Frequency	Average Cover %		
		'96	'84	'90
Vegetation	370	1.50	5.75	60.86
Rock	71	.25	1.00	2.48
Pavement	61	.50	.25	.30
Litter	397	89.50	80.75	68.50
Cryptogams	20	0	0	.28
Bare Ground	119	8.25	12.25	3.43

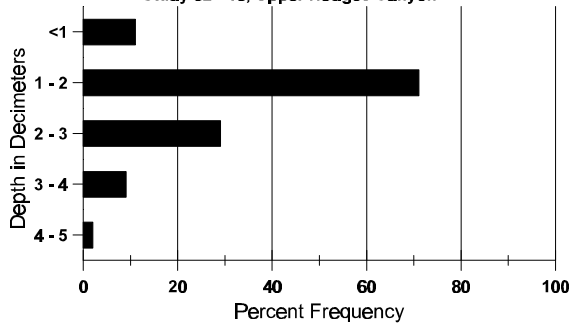
SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 18, Upper Hodges Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.5	53.8 (14.8)	6.0	38.9	34.1	27.0	5.8	45.8	243.2	.5

Stoniness Index

Study 02 - 18, Upper Hodges Canyon



PELLET GROUP FREQUENCY -- Herd unit 02 , Study no: 18

Type	Quadrat Frequency '96
Elk	1
Deer	8
Cattle	6

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 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				
Amelanchier alnifolia																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	84	-	1	2	-	-	-	-	-	-	3	-	-	-	200	40 32	3	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	23 20	1	
	96	-	26	12	-	-	-	-	-	-	3	15	20	-	760	38 46	38	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	-	2	1	-	-	-	-	4	-	-	-	266		4	
	96	-	1	1	-	1	-	-	-	-	2	-	1	-	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	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>							
'84		33%			67%			00%			+50%							
'90		50%			00%			00%			+53%							
'96		67%			31%			50%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	0%			
												'90	398		67%			
												'96	840		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 tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	5	-	-	-	-	-	1	-	-	6	-	-	-	400		6	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	9	5	-	-	-	-	-	-	14	-	-	-	933	26	19	14
	90	16	2	-	6	-	-	-	-	-	23	1	-	-	1600	28	42	24
	96	38	21	1	-	-	-	-	-	-	58	-	2	-	1200	27	36	60
D	84	-	7	5	-	-	-	-	-	-	11	1	-	-	800		12	
	90	8	-	1	-	-	-	-	-	-	5	-	1	3	600		9	
	96	1	5	1	-	-	-	-	-	-	3	-	-	4	140		7	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		63%			37%			00%			+31%							
'90		05%			03%			10%			-48%							
'96		40%			03%			09%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	1799	Dec:	44%				
											'90	2600		23%				
											'96	1360		10%				
<i>Ceanothus velutinus</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	4	13	1
D	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		50%			50%			50%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	66	Dec:	0%				
											'90	0		0%				
											'96	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		
Chrysothamnus viscidiflorus viscidiflorus																	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	-	-	-	60	23	31	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%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	0		-		
												'96	60		-		
Eriogonum heracleoides																	
S	84	2	-	-	-	-	-	-	-	-	-	-	2	-	-	2	
	90	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
Y	84	34	-	-	-	-	-	-	-	-	-	-	2266			34	
	90	2	-	-	1	-	-	-	-	-	-	-	200			3	
	96	3	-	-	-	-	-	-	-	-	-	-	60			3	
M	84	13	-	-	-	-	-	-	-	-	-	-	866	28	17	13	
	90	29	-	-	7	-	-	1	-	-	-	-	2466	7	12	37	
	96	20	-	-	-	-	-	-	-	-	-	-	400	6	12	20	
D	84	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	2	-	-	-	-	-	-	-	-	-	-	40			2	
X	84	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	80			4	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'84		00%				00%				00%				-15%			
'90		00%				00%				05%				-81%			
'96		00%				00%				04%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	3132	Dec:	0%		
												'90	2666		0%		
												'96	500		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				
Mahonia repens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	5	-	-	-	-	-	7	-	-	-	140	6	5	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		-			
Prunus virginiana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	3	-	-	-	-	-	-	-	3	-	-	-	60			3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40	45	49	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		80%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	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				
Purshia tridentata																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	2	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	1	1	-	-	40			2
M	84	1	1	11	-	-	-	-	-	-	13	-	-	-	866	23	19	13
	90	7	4	-	4	2	-	-	-	-	17	-	-	-	1133	25	36	17
	96	2	25	36	1	4	-	-	-	-	67	1	-	-	1360	22	35	68
D	84	-	1	7	-	-	-	-	-	-	8	-	-	-	533			8
	90	-	-	-	-	1	-	-	-	-	1	-	-	-	66			1
	96	-	3	5	-	-	-	-	-	-	7	-	-	1	160			8
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		17%			75%			00%			-25%							
'90		39%			00%			00%			+23%							
'96		41%			53%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1599	Dec:	33%			
												'90	1199		6%			
												'96	1560		10%			
Rosa woodsii																		
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	15	10	1
	96	2	-	-	6	-	-	-	-	-	8	-	-	-	160	15	8	8
% 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%			+59%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	-			
												'90	66		-			
												'96	160		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Symphoricarpos oreophilus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	18	-	1	-	-	-	-	-	-	19	-	-	-	1266		19	
	90	3	2	3	-	-	-	-	-	-	8	-	-	-	533		8	
	96	7	-	-	1	-	-	-	-	-	6	-	2	-	160		8	
M	84	6	1	1	-	-	-	-	-	-	8	-	-	-	533	32 25	8	
	90	1	4	-	4	2	-	3	-	-	14	-	-	-	933	28 40	14	
	96	52	11	2	32	-	-	-	-	-	83	-	14	-	1940	31 44	97	
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	1	-	-	-	-	-	-	-	-	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		04%			07%			00%			-21%							
'90		36%			14%			00%			+31%							
'96		11%			03%			17%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1865	Dec:	4%			
												'90	1466		0%			
												'96	2140		2%			

Trend Study 2-19-01

Study site name: Right Fork Logan Canyon.

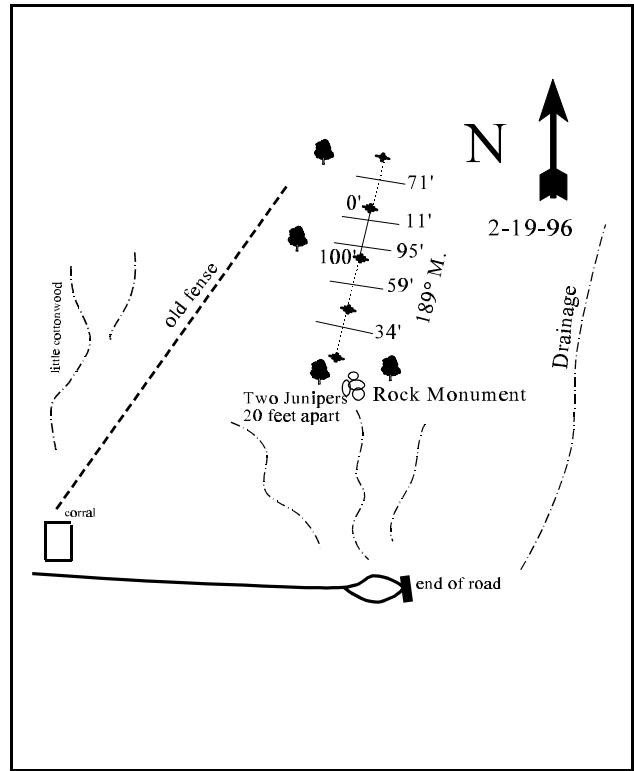
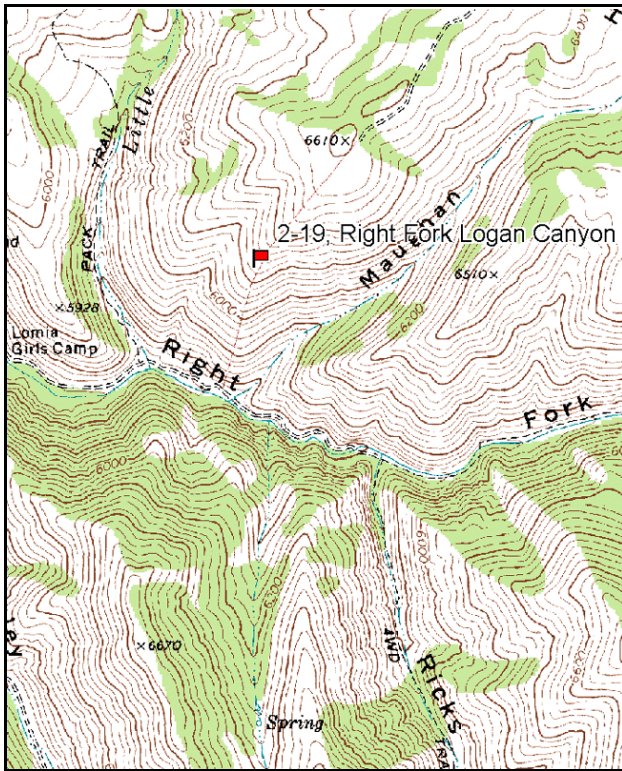
Vegetation type: Bitterbrush.

Compass bearing: frequency baseline 189 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft). Rebar: belt 1 on 8 ft, belt 3 on 1 ft, belt 5 on 8 ft.

LOCATION DESCRIPTION

Drive up the Right Fork of Logan Canyon. Bear left at the girls camp. Go 0.6 miles to the end of the road just past the corral. Hike up the ridge to the north, going about 3/4 mile towards the ridgeline. Look for a rock monument between two junipers that are 20 feet apart. The hike from the bottom to the study is about 600 feet in elevation gain. The baseline runs 189 degrees magnetic. Lines 2 and 3 continue south from the 100 foot baseline. Line 4 runs off the 0-foot baseline stake at 9 degrees magnetic.



Map Name: Temple Peak

Diagrammatic Sketch

Township 12N, Range 3E, Section 16

UTM 4625144 N, 449598 E

DISCUSSION

Trend study No. 2-19

The Right Fork Logan Canyon trend study, established in 1990, samples an area representative of important elk and deer winter range on the south-facing slopes from Cowley to Willow Canyon. The site is located on a south, southeast aspect with a 35% slope at an elevation of 6,100 feet. The land is administered by the U.S. Forest Service. Elk pellet groups were common in 1996 with a quadrat frequency of 47%, while deer sign was moderately abundant with a quadrat frequency of 22%. Cows were allowed into the Little Cottonwood drainage on the date of study establishment (6/25/90), but they did not appear to utilize the upper slopes that year. During the 1996 reading, cattle sign was noted on the study site. Pellet group transect data taken in 2001, estimated 17 deer and 83 elk days use/acre (41 ddu/ha and 205 ed/ha). Most of the elk use appears to be from late winter. Cattle use was light at an estimated 2 cow days use/acre (4 cdu/ha). In 2001, cows were seen near the top of the hill where the slope is more gentle. Two deer were also seen on the site.

The soil is moderately shallow and very rocky with a slightly alkaline soil reactivity (pH of 7.6). Texture is a clay loam. Effective rooting depth (see methods) was estimated at about 8 inches with a layer of rock encountered at that depth. The presence of deeper rooted shrubs on the site would suggest that this layer of rock has cracks and long fissures, allowing deeper rooted plants to become established. Rock and pavement comprise about one-third of the ground cover. Vegetative cover from grasses, forbs, and litter is good leaving 13% to 14% bare ground cover. Some soil movement occurs, although it is not excessive. The soil erosion condition class was determined to be slight in 2001.

Browse forage is limited on the site with all species combined producing less than 8% cover in 2001. The key browse species is bitterbrush. Density is low at only 232 plants/acre in 1990, increasing to 320 in 1996, and 380 by 2001. The increase in density between 1990 and 1996 is mostly the result of the larger sample used in 1996. All of the bitterbrush sampled in 1990 displayed heavy use and percent decadency was high at 72%. Use was more moderate in 1996 with heavy use reported on 44% of the population. Decadency declined to 19%. Vigor was normal with good leader growth. Density remained relatively stable in 2001 with similar moderate to heavy use and good vigor. Percent decadence declined to 11%. The population appears stable but an obvious small die-off occurred between 1990 and 1996, illustrated by the high proportion of dead plants in the population (1 dead to every 2 live) in 1996.

A few serviceberry and mountain big sagebrush offer additional preferred forage on the site but they occur in small numbers. Both species have displayed moderate to heavy use since 1990. Snowberry is abundant and mostly unutilized. The large decline in snowberry density is mostly the result of the much larger sample used in 1996 as there were no dead plants found in the population to explain the large decline. As explained in other site narratives, the larger sample design gives significantly better population estimates for species that characteristically are clumped or discontinuous in their respective distributions. Junipers are scattered across the slope. All have been highlined.

The site supports a vigorous stand of bluebunch wheatgrass, but bulbous bluegrass is the most abundant species making up 65% of the grass cover and 43% of the total herbaceous cover in 2001. Annual cheatgrass and rattlesnake brome are also present but not abundant. Forbs are diverse and moderately productive. Perennial forbs are primarily early season species, yet are numerous enough to provide some spring forage. By far the most abundant perennial forb is gray lomatium which makes up the majority of the forb cover (71% in '96 and 61% in '01). Arrowleaf balsam root, tapertip hawksbeard, and yellow salsify are also moderately abundant.

1990 APPARENT TREND ASSESSMENT

The persistent, long-lived bitterbrush can endure heavy use for several years. However, there appears to be no recruitment at this time and the dead plants are evidenced by numerous skeletons which have not been replaced. The long term trend appears to be down with the decline of the key browse species. The grasses remain valuable for elk winter forage. There is some soil movement on the steeper slopes, but the soil trend appears stable for this type of site.

1996 TREND ASSESSMENT

Trend for soil is up due to an increase in litter cover and a decline in percent bare ground. Trend for the key browse is up. It is clear that the population has declined in the past, but since 1990, heavy use has declined from 100% to 44%, vigor has improved, and percent decadence has declined from 72% to 19%. The increase in population density appears to be due in most part to the much larger sample used in 1996. Trend for the herbaceous understory is slightly up for grasses and slightly down for forbs. Trend is considered stable overall. Composition of the grasses could be better. Bulbous bluegrass is still dominant and has increased significantly in nested frequency.

TREND ASSESSMENT

soil - up (5)

browse - up, but low in number (5)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1996. There is evidence of some soil movement as most shrubs are pedestalled, but the erosion condition class was determined to be slight in 2001. Some erosion is inevitable due to the steep slopes on the site. Trend for browse is stable. The key species, antelope bitterbrush, displays a stable population density. It is moderate to heavily utilized yet has good vigor and low decadence (11%). There is no recruitment in the form of seedlings and young even though annual leader growth of mature bitterbrush averaged 3 inches in 2001. Secondary browse species, serviceberry and mountain big sagebrush, appear to have stable populations with moderate use, improved vigor, and declining decadence rates. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses and forbs have remained similar to 1996. Bulbous bluegrass still dominates the herbaceous understory by providing 65% of the grass cover and 43% of the total herbaceous cover. It has remained stable in frequency since 1996. Bluebunch wheatgrass, the second most abundant perennial grass, also remained stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 19

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron spicatum	_a 161	_b 229	_b 180	67	85	76	10.63	6.05
G	Bromus brizaeformis (a)	-	_a 14	_b 27	-	7	12	.23	.53
G	Bromus tectorum (a)	-	_b 148	_a 83	-	52	34	1.09	.92
G	Poa bulbosa	_a 208	_b 342	_b 340	75	99	98	17.93	14.90
G	Poa pratensis	2	-	3	1	-	1	-	.15
G	Poa secunda	_b 144	_a 10	_a 36	62	5	15	.07	.26
Total for Annual Grasses		0	162	110	0	59	46	1.33	1.45
Total for Perennial Grasses		515	581	559	205	189	190	28.64	21.38
Total for Grasses		515	743	669	205	248	236	29.97	22.83
F	Agoseris glauca	-	-	1	-	-	1	-	.00
F	Alyssum alyssoides (a)	-	_a 179	_b 253	-	67	88	.48	2.07
F	Allium spp.	5	-	-	2	-	-	-	-
F	Aster chilensis	-	3	-	-	1	-	.15	-
F	Astragalus utahensis	8	2	3	3	2	2	.06	.06
F	Balsamorhiza sagittata	-	1	-	-	1	-	.71	.42
F	Chaenactis douglasii	-	-	-	-	-	-	.00	-
F	Cirsium undulatum	-	1	1	-	1	1	.00	.00
F	Collomia linearis (a)	-	3	-	-	1	-	.00	-
F	Comandra pallida	2	5	8	1	3	4	.07	.19
F	Collinsia parviflora (a)	-	6	-	-	2	-	.03	-
F	Crepis acuminata	_b 89	_a 29	_a 45	42	15	24	.62	.76
F	Descurainia pinnata (a)	-	2	-	-	1	-	.00	-
F	Epilobium brachycarpum (a)	-	7	-	-	3	-	.01	-
F	Erodium cicutarium (a)	-	3	-	-	1	-	.00	-
F	Hackelia patens	2	-	2	1	-	2	-	.03
F	Lactuca serriola	_{ab} 15	_a 4	_b 15	6	3	11	.01	.13
F	Lomatium grayi	234	205	209	84	80	79	7.01	7.31
F	Machaeranthera canescens	-	2	3	-	1	1	.03	.03
F	Penstemon humilis	9	17	7	4	9	4	.12	.07
F	Phacelia spp.	-	2	-	-	1	-	.03	-
F	Phlox longifolia	-	-	1	-	-	1	-	.00
F	Sisymbrium altissimum (a)	_b 16	_a -	_b 15	6	-	7	-	.14
F	Tragopogon dubius	_a 7	_b 48	_b 41	4	27	21	.42	.63
F	Veronica biloba (a)	-	3	-	-	1	-	.00	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
	Total for Annual Forbs	16	203	268	6	76	95	0.55	2.22
	Total for Perennial Forbs	371	319	336	147	144	151	9.26	9.69
	Total for Forbs	387	522	604	153	220	246	9.81	11.91

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

BROWSE TRENDS --

Herd unit 02 , Study no: 19

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	3	2	.18	.03
B	Artemisia tridentata vaseyana	6	6	.03	.66
B	Chrysothamnus viscidiflorus viscidiflorus	15	17	.48	1.38
B	Mahonia repens	4	5	.21	.16
B	Purshia tridentata	12	15	2.35	2.59
B	Sambucus racemosa	2	1	.38	.63
B	Symphoricarpos oreophilus	8	6	2.04	2.04
	Total for Browse	50	52	5.68	7.52

BASIC COVER --

Herd unit 02 , Study no: 19

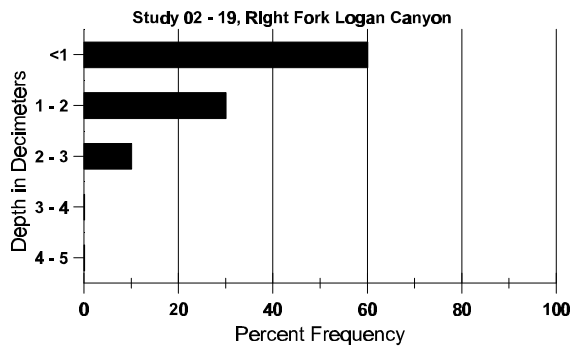
Cover Type	Nested Frequency		Average Cover %		
	'96	'01	'90	'96	'01
Vegetation	369	376	10.00	42.68	46.01
Rock	322	291	31.50	23.11	21.66
Pavement	255	277	12.50	3.64	5.80
Litter	392	331	26.25	30.87	20.84
Cryptogams	102	111	1.00	1.75	3.45
Bare Ground	248	254	18.75	13.05	14.32

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 19, Right Fork Logan Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.4	63.4 (10.3)	7.6	27.6	34.4	38.0	4.2	13.8	115.2	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 19

Type	Quadrat Frequency	
	'96	'01
Elk	47	53
Deer	22	22
Cattle	1	-
Rabbit	-	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
1079	83 (205)
218	17 (41)
17	2 (4)
9	N/A

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 19

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Amelanchier alnifolia</i>																		
S	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	-	1	1	-	-	-	-	-	-	1	1	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	1	-	-	1	-	-	-	-	-	-	2	-	40	25	28	
	01	-	2	-	-	-	-	-	-	-	2	-	-	-	40	29	33	
D	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>							
'90		50%			50%			00%			- 9%							
'96		67%			33%			100%			-33%							
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	66	Dec:	0%				
											'96	60		33%				
											'01	40		0%				
<i>Artemisia tridentata vaseyana</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	4	1	-	-	-	-	-	-	-	5	-	-	-	100	28	45	
	01	3	2	1	-	-	-	1	-	-	7	-	-	-	140	27	34	
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	-	-	1	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
	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		25%			00%			13%			-13%							
'01		29%			14%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	0%				
											'96	160		13%				
											'01	140		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	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	90	6	5	4	1	-	-	-	-	-	16	-	-	-	533	13 15	16	
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	15 26	15	
	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320	15 26	16	
D	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>							
'90		28%			22%			00%			-43%							
'96		00%			00%			00%			+15%							
'01		05%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	599	Dec:	0%				
											'96	340		0%				
											'01	400		10%				
Mahonia repens																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	24	-	-	-	-	-	-	-	-	24	-	-	-	480	3 4	24	
	01	35	-	-	-	-	-	-	-	-	35	-	-	-	700	3 6	35	
% 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%			+32%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	-				
											'96	520		-				
											'01	760		-				

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	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	90	-	-	2	-	-	-	-	-	-	2	-	-	-	66	29	56	2
	96	-	7	4	-	1	-	-	-	-	12	-	-	-	240	40	74	12
	01	4	7	5	-	-	1	-	-	-	17	-	-	-	340	43	72	17
D	90	-	-	5	-	-	-	-	-	-	4	-	1	-	166			5
	96	-	-	3	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	2	-	-	-	-	-	-	2	-	-	-	40			2
X	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>							
'90		00%			100%			14%			+28%							
'96		56%			44%			00%			+16%							
'01		37%			42%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	232	Dec:	72%			
												'96	320		19%			
												'01	380		11%			
Sambucus racemosa																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	29	44	2
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	37	77	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%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	40		-			
												'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				
Symphoricarpos oreophilus																		
Y	90	-	-	-	2	-	-	5	-	-	7	-	-	-	233		7	
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	90	31	5	-	-	-	-	-	-	33	-	3	-	1200	26	21	36	
	96	6	-	-	3	-	-	-	-	8	-	1	-	180	27	50	9	
	01	6	-	-	-	-	-	-	-	6	-	-	-	120	33	50	6	
D	90	2	-	1	-	-	-	-	-	3	-	-	-	100		3		
	96	-	-	-	-	-	-	-	-	-	-	-	0		0			
	01	-	-	-	-	-	-	-	-	-	-	-	0		0			
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		11%			02%			07%			-87%							
'96		00%			00%			10%			-40%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	1533	Dec:	7%			
												'96	200		0%			
												'01	120		0%			

Trend Study 2-20-01

Study site name: Richmond WMA.

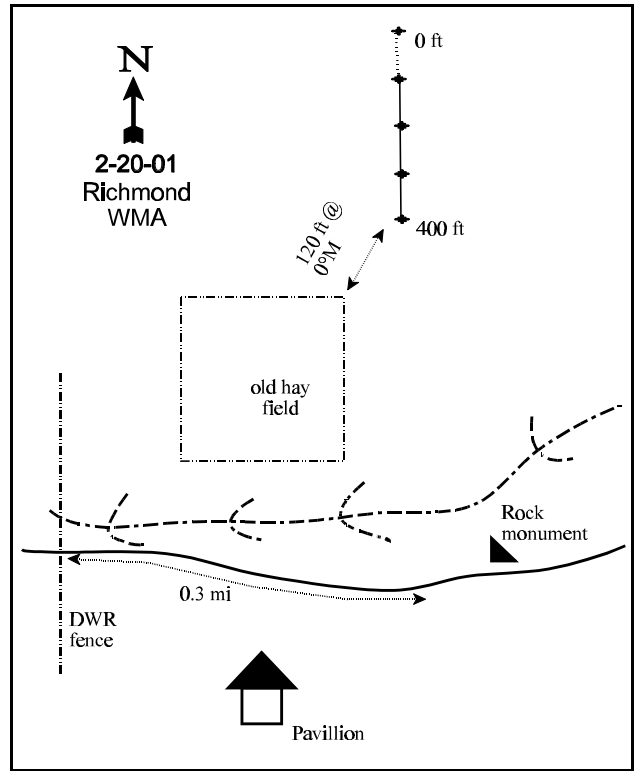
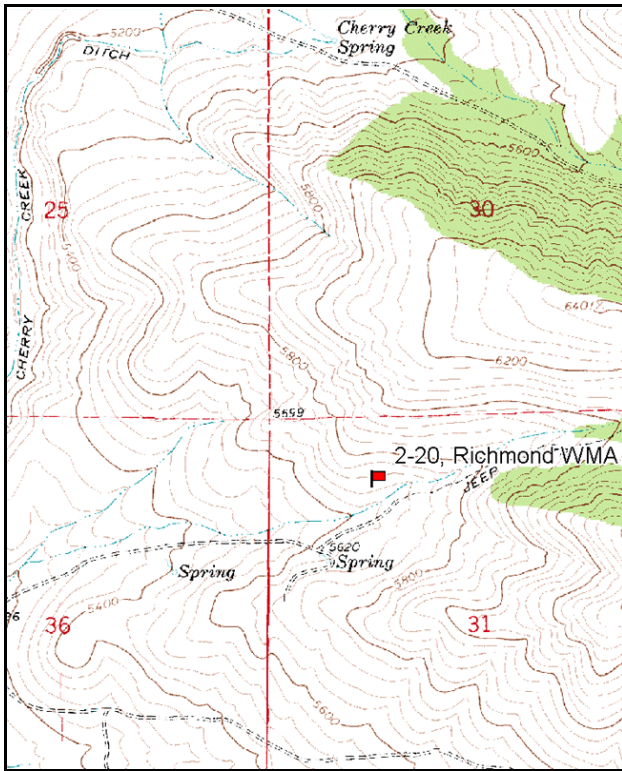
Vegetation type: Bitterbrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of 250 East and 400 South in Richmond, go 0.2 miles south on 250 East and turn left between a house and a hayfield. Go east 0.6 miles to a fork, keep left. Go 0.7 miles to a gate at the DWR property boundary. If the road is still passable, continue 0.3 miles up the drainage to the end of the road. There is an old fork, and a rock monument. From the rock pile, walk in a northwest direction to the hayfield. From the northeast corner of the fence surrounding the hayfield, walk 120 feet at 0 degrees magnetic to the 400-foot baseline stake. The study stakes run southerly at 180 degree magnetic from the 0-foot baseline stake. The site is on a bitterbrush transplant area.



Map Name: Richmond

Diagrammatic Sketch

Township 14N, Range 2E, Section 31

UTM 4640517 N, 435975 E

DISCUSSION

Trend study No. 2-20

The Richmond Wildlife Management Area trend study was established to monitor the success of a 1990 bitterbrush transplant on the Richmond WMA, and to replace a nearby study which was on private land. The site is located on a moderate (20-25%) slope that faces to the south. Elevation is about 6,000 feet. Five thousand bitterbrush seedlings were planted in March of 1990, shortly after the snow had melted from the site. Rains in April were beneficial to establishment. On June 26, 1990, a majority of the transplanted bitterbrush seedlings were classified as having good vigor. Dry and dead transplants were also encountered. Currently, the site is dominated by annual grasses and some perennial forbs and grass. The bitterbrush had not been utilized in 1990 or 1996. No deer sign was observed on the site. A pellet group transect read in 2001 estimated less than 1 deer and 3 elk days use/acre (2 ddu/ha and 8 edu/ha). There were no cattle on the site when it was monitored in 2001, but a few cattle pats were encountered.

The soil is moderately deep with an estimated effective rooting depth (see methods) of nearly 15 inches. Parent material is limestone and soil texture is a clay loam. There is little rock on the surface or in the profile, yet the soil temperature was still relatively high at 69° F at a depth of 16 inches. This high of a temperature would be due to the slope and aspect of the site. There is a high percentage of vegetation and litter cover, mostly because of the abundance of annual species, primarily annual bromes. Bare soil was estimated at 31% in 1990. This was mostly related to the disturbed spots where the bitterbrush had been planted. Percent bare ground was estimated at only 3% in 1996, increasing to 19% in 2001. The erosion condition class was determined to be stable in 2001. There is little erosion occurring on the site due to abundant vegetation and litter cover.

There was little browse on the site before the transplant took place, although a few mountain big sagebrush were present. Since 1996, sagebrush density increased from 20 plants/acre to 100 plants/acre in 2001. The density of transplanted bitterbrush was estimated to be 466 seedlings/acre in 1990. Vigor was normal. During the 1996 reading, only one mature bitterbrush plant was encountered in the shrub density strips. This is probably indicative of the dry conditions that have persisted since 1990, combined with the intense competition with annual grasses and forbs. Estimated density was only 20 plants/acre. Utilization was light and vigor good. During the 2001 reading, density remains at an estimated 20 plants/acre, represented by a single mature shrub. It was vigorous and had an average annual leader growth of 4 inches. Average height of the bitterbrush has increased from 19 inches to 41 inches.

The herbaceous understory is very dense, likely one of the reasons why the bitterbrush transplants were not successful. The grass component is dominated by Japanese brome and cheatgrass which accounted for 99% of the grass cover in 1996 and 85% in 2001. Perennial grasses are represented by small numbers of bluebunch wheatgrass, prairie Junegrass, Kentucky bluegrass, and Sandberg bluegrass.

Forbs are diverse and productive, although they include several annual and perennial weeds. These weeds include pacific aster, willow weed, curlycup gumweed, one-flower helianthella, prickly lettuce, and yellow salsify. Cutleaf balsamroot produces over 50% of the forb cover and is the dominant forb on the site. Grasshoppers are abundant and appear to be utilizing the balsamroot leaves.

1990 APPARENT TREND ASSESSMENT

The success of the transplant depends to a large extent on weather conditions and the degree of competition with herbaceous species, although these impacts could be modified by management intervention (watering and weeding). Utilization by big game is more difficult to manage. Browse forage is limited in the area and would be a valuable addition to the winter range. If successful, it could be a good example for future projects. At this early stage, success of the treatment is difficult to predict. Based only on the initial data, the trend for winter range value is upward. Soil movement is negligible and the trend appears stable.

1996 TREND ASSESSMENT

Soil trend is up with a decline in percent bare ground from 31% to 3% and an increase in litter cover from 46% to 75%. Unfortunately the increase in litter cover is primarily from annual and biennial weeds which provide intense competition with the transplanted bitterbrush. The browse trend is down after the transplant. The post treatment density of 466 seedling bitterbrush has declined to only 20 mature plants/acre. There is not enough browse on the site to support wintering deer. The herbaceous trend is also down. Sum of nested frequency for perennial grasses has declined by 82%. Annual grasses were not included in the 1990 sample, but they currently dominate the grass component by providing 99% of the grass cover. It appears that perennial grasses could soon be eliminated on the site due to competition with annuals. Sum of nested frequency for perennial forbs have increased slightly since 1990 due to significant increases in the sum of nested frequencies for prickly lettuce, pacific aster, and yellow salsify, all of which are weedy increasers. It will be practically impossible to get browse seedlings or transplants to become establish without controlling the abundant weedy herbaceous understory.

TREND ASSESSMENT

soil - up (5)

browse - down with few transplants surviving to become mature plants (1)

herbaceous understory - down and dominated by annuals (1)

2001 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in bare ground and a decline in litter cover. As a result, the proportion of protective cover to bare soil has declined by 52%. However, erosion is not a problem and the erosion condition class was determined to be stable. Trend for browse is up slightly, although the shrubs are still in very low numbers. Estimated population density of mountain big sagebrush has increased from 20 plants/acre in 1996 to 100 plants/acre in 2001. In addition, there are abundant sagebrush seedlings and young. Density of the transplanted bitterbrush has remained low at only 20 plants/acre. Use is mostly light and vigor good on all shrubs sampled. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency for perennial grasses. The grass composition is still dominated by Japanese brome and cheatgrass which account for 84% of the grass cover. However, nested frequency of bluebunch wheatgrass and Sandberg bluegrass increased significantly. Frequency of perennial forbs increased slightly but most of these are weeds. The draw to the south of the site is totally dominated by wyethia and tarweed.

TREND ASSESSMENT

soil - down slightly (2)

browse - up slightly but still depleted (4)

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

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 20

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron spicatum	ab20	a12	b33	9	4	15	.19	.84
G	Bromus brizaeformis (a)	-	a-	b28	-	-	12	-	.21
G	Bromus japonicus (a)	-	b364	a297	-	97	92	22.11	8.81
G	Bromus tectorum (a)	-	a108	b194	-	35	61	2.23	6.25
G	Koeleria cristata	-	-	-	-	-	-	.00	-
G	Melica bulbosa	b15	a-	b11	7	-	5	-	.02
G	Phleum pratense	-	-	2	-	-	1	-	.03
G	Poa bulbosa	-	-	8	-	-	3	-	.07
G	Poa pratensis	b74	a4	a22	35	1	9	.03	.39
G	Poa secunda	a-	a4	b77	-	2	36	.03	1.28
Total for Annual Grasses		0	472	519	0	132	165	24.34	15.27
Total for Perennial Grasses		109	20	153	51	7	69	0.26	2.65
Total for Grasses		109	492	672	51	139	234	24.60	17.93
F	Achillea millefolium	3	3	1	1	1	1	.00	.03
F	Agoseris glauca	13	18	12	6	8	7	.14	.08
F	Alyssum alyssoides (a)	-	a95	b184	-	39	70	.24	1.82
F	Artemisia ludoviciana	2	2	4	1	1	1	.15	.15
F	Aster chilensis	a-	b21	c51	-	8	19	.28	1.33
F	Astragalus spp.	6	-	-	3	-	-	-	-
F	Balsamorhiza macrophylla	b169	a123	ab145	75	59	59	15.10	17.61
F	Collomia linearis (a)	-	3	5	-	1	2	.03	.01
F	Crepis acuminata	8	-	5	4	-	2	-	.06
F	Epilobium brachycarpum (a)	-	b232	a147	-	83	50	7.38	1.62
F	Erodium cicutarium (a)	-	15	8	-	7	3	.13	.09
F	Eriogonum umbellatum	a-	a-	b59	-	-	19	-	.36
F	Grindelia squarrosa	a-	b20	c52	-	9	25	.71	4.46
F	Hackelia patens	-	1	-	-	1	-	.03	-
F	Helianthella uniflora	a-	b26	ab10	-	12	4	1.45	1.06
F	Lappula occidentalis (a)	-	7	-	-	4	-	.05	-
F	Lactuca serriola	a20	b98	a53	12	41	25	1.05	1.10
F	Lithospermum ruderales	b7	ab3	a-	5	1	-	.06	-
F	Lomatium grayi	b120	a10	a26	53	4	23	.16	.56
F	Lupinus argenteus	b19	a-	a-	11	-	-	-	-
F	Madia glomerata (a)	-	-	4	-	-	2	-	.01

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
F	Microsteris gracilis (a)	-	-	8	-	-	2	-	.01
F	Navarretia intertexta (a)	-	4	-	-	2	-	.01	-
F	Penstemon spp.	-	-	4	-	-	1	-	.03
F	Phlox longifolia	-	2	-	-	1	-	.00	-
F	Polygonum douglasii (a)	-	18	-	-	8	-	.04	-
F	Tragopogon dubius	_a 3	_b 104	_a 8	1	48	5	1.28	.02
F	Veronica biloba (a)	-	_a 28	_b 138	-	12	52	.08	.85
F	Viola spp.	_b 10	_a -	_a -	7	-	-	-	-
F	Wyethia amplexicaulis	_a -	_{ab} 12	_b 15	-	4	5	.59	1.43
F	Zigadenus paniculatus	-	-	-	-	-	-	-	.00
Total for Annual Forbs		0	402	494	0	156	181	7.98	4.43
Total for Perennial Forbs		380	443	471	179	198	196	21.04	28.33
Total for Forbs		380	845	965	179	354	377	29.02	32.77

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

BROWSE TRENDS --

Herd unit 02 , Study no: 20

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	1	4	-	-
B	Purshia tridentata	1	1	.03	.38
B	Rosa woodsii	0	1	-	-
Total for Browse		2	6	0.03	0.37

BASIC COVER --

Herd unit 02 , Study no: 20

Cover Type	Nested Frequency		Average Cover %		
	'96	'01	'90	'96	'01
Vegetation	391	390	14.00	56.94	54.62
Rock	133	151	7.00	5.10	7.98
Pavement	51	197	1.75	.43	1.87
Litter	400	381	46.25	75.11	37.63
Cryptogams	-	1	0	0	.00
Bare Ground	131	263	31.00	2.84	19.07

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 20, Richmond WMA

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.7	69.2 (16.1)	7.0	24.6	40.4	35.0	2.8	39.5	329.6	.6

PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 20

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	01	01
Horse	1	-	-	-
Elk	-	-	44	3 (8)
Deer	-	3	9	<1 (2)
Cattle	1	3	35	3 (7)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 20

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	24	1
	01	1	1	-	-	-	-	-	-	-	2	-	-	-	40	14	23	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%			+80%							
'01		20%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	-				
											'96	20		-				
											'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				
Purshia tridentata																		
S	90	13	-	-	1	-	-	-	-	-	13	-	-	1	466		14	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	19	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	41	41	
% 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%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			
												'01	20		-			
Rosa woodsii																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	20	21	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	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	20		-			

Trend Study 2-21-01

Study site name: Swan Creek.

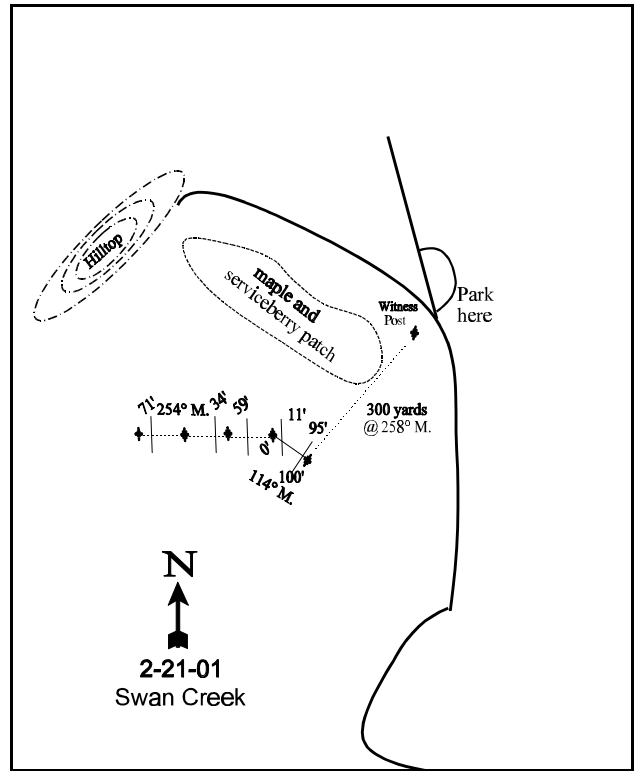
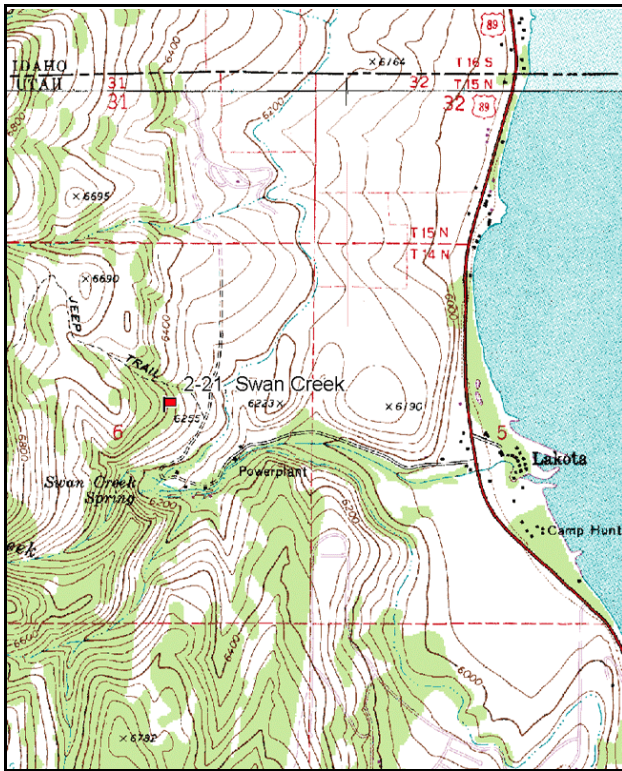
Vegetation type: Curlleaf Mahogany.

Compass bearing: frequency baseline 114 degrees magnetic.

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

LOCATION DESCRIPTION

Drive approximately 3.0 miles north of Garden City on US 89. Turn left on 2150 North in Lakota (1 mile south of Idaho border). Go approximately 1 mile on the narrow road up Swan Creek, staying right at one major fork. Just past the creek from the spring, before the pump house, turn right and go 0.2 miles up a jeep road to another fork. Park here, then walk up across the slope 300 yards at 258 degrees magnetic to the 100-foot baseline stake. The 0-foot baseline stake is 100 feet to the northwest. The rest of the baseline run 254 degrees magnetic off the 0-foot baseline stake. The study site is in the mahogany grove. The 0-foot baseline stake is marked by browse tag #97.



Map Name: Garden City

Diagrammatic Sketch

Township 14N, Range 5E, Section 6

UTM 4648259 N, 464700 E

DISCUSSION

Trend Study No. 2-21

The Swan Creek trend study was established on DWR property in the Swan Creek drainage. It contains areas that receive significant use by wintering elk, deer, and moose. The trend study is located on a curlleaf mountain mahogany hillside with an associated understory of bitterbrush, serviceberry, mountain snowberry, and mountain big sagebrush. The range type provides excellent cover and forage. The site has a southeast aspect with a 30% slope and an elevation of 6,400 feet. The DWR owns only a portion of the section with the remainder being privately owned and used for cabins, recreation, and limited agriculture. Deer and elk pellet groups were fairly abundant with quadrat frequencies of 32% and 27% respectively in 1996. A pellet group transect read on the site in 2001 estimated 47 deer and 36 elk days use/acre (116 ddu/ha and 89 edu/ha). Most of the pellet groups were from winter use, but about one-third appeared to be from spring.

The soil has a loam texture with a soil reaction that is slightly alkaline (pH of 7.5). It is relatively shallow with an estimated effective rooting depth (see methods) of only 10 inches. However, deeper rooted shrubs like curlleaf mountain mahogany are growing on the site. This would suggest that the rooting depth is not restricted in some places. The soil is rocky on the surface and throughout the profile with bedrock layers exposed on the slope. Rock cover is about 23%. The site has good litter and vegetative ground cover, leaving little exposed bare soil. The erosion condition class was determined as stable in 2001.

The site is dominated by a stand of relatively large curlleaf mountain mahogany which provided 22% overhead canopy cover in 2001. It's density was estimated at 166 plants/acre in 1990 and 220 plants/acre in 2001. Point-center quarter data from 1996 estimated 148 mahogany/acre with an average diameter of just over 4½ inches. Most of the mahogany sampled in 1990 and 1996 were large mature plants which were mostly unavailable to browsing. Use of the available portions was moderate to heavy but vigor was good. During the 2001 reading, the population density remained similar to 1996 estimates, but the composition of the stand is now about half young plants (45%). Due to the lack of dead plants, this would appear to be an age class identification problem in 1996 which classified young plants as mature. In any event, the population is moderate to heavily browsed where available. Vigor is normal and percent decadence is low.

Important understory shrubs include serviceberry, mountain big sagebrush, and bitterbrush. Serviceberry is moderately abundant with 840 plants/acre estimated in 1996, increasing to 1,060 by 2001. They have consistently displayed moderate to heavy use since 1990, but vigor is currently good. Poor vigor was noted on 10% of the plants sampled in 1996 due to an infestation of rust. Mountain big sagebrush and bitterbrush occur in small numbers yet they appear to have stable populations.

Bluebunch wheatgrass and Sandberg bluegrass are prominent in the understory. However, annual brome grasses (Japanese and cheatgrass brome) accounted for 62% of the grass cover in 1996. Annual grasses declined to only 10% of the grasses cover in 2001. Forbs are moderately diverse but only a few species are abundant. The most common perennial forbs include arrowleaf balsamroot and rock goldenrod which provided 75% of the forb cover in 1996 and 73% in 2001.

1990 APPARENT TREND ASSESSMENT

Big game winter range values on this diverse browse site are good. Vegetative trend appears stable. The soil condition is good, and there is little erosion occurring. The browse trend appears stable but the increaser species should be closely monitored. The herbaceous component is adequate but composition could be better.

1996 TREND ASSESSMENT

Trend for soil appears up due to a decline in bare ground from 15% to 5%. Vegetation and litter cover are abundant and erosion is not a problem on this site. The browse trend appears stable for the key species, curleaf mountain mahogany. Serviceberry, an important understory shrub, also has a stable trend. Trend for the herbaceous understory is stable for grasses but down for forbs. Sum of nested frequency of perennial forbs has declined 50% with most species declining in sum of nested frequency value. Overall, trend for the herbaceous understory is slightly down.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in percent cover of bare ground and a slight decline in vegetation and litter cover. As a result, the ratio of protective ground cover to bare soil declined 33%. The primary cause of the declining soil trend is the significant decline in cover and nested frequency of the annuals, Japanese brome and cheatgrass. Cover of these grasses has dropped from 14% in 1996 to only 1% in 2001. Even with this decrease, erosion is not a problem. The erosion condition class was determined to be stable. Trend for the key browse species, curleaf mountain mahogany, is stable. Population density has remained similar, utilization is moderate to heavy, and vigor is normal. The increase in young plants in 2001 appears to be a classification problem in 1996. Serviceberry, a key understory species, displays a slightly improving trend due to an increase in density, improved vigor, and a decline in percent decadence. In addition, young plants are more numerous and now account for 38% of the population. Mountain big sagebrush and bitterbrush occur in limited numbers yet appear to have stable populations. Overall, the browse trend is slightly up due to the improvement in serviceberry which provides a large proportion of the available browse forage. Trend for the herbaceous understory is up slightly. Sum of nested frequency values for perennial grasses and forbs have increased slightly. In addition, sum of nested frequency of the annuals, Japanese brome and cheatgrass declined significantly. Cover also declined from 14% in 1996 to only 1%. Annual forbs increased in nested frequency although cover remained low at 1% in 1996 and 2001.

TREND ASSESSMENT

soil - slightly down (2)

browse - up slightly (4)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 21

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron spicatum	_b 286	_a 222	_{ab} 241	95	76	81	6.91	9.72
G	Bromus japonicus (a)	-	_b 162	_a 44	-	51	19	5.26	.26
G	Bromus tectorum (a)	-	_b 168	_a 75	-	51	31	8.59	1.02
G	Oryzopsis hymenoides	-	4	1	-	2	1	.03	.06
G	Poa bulbosa	_a -	_a 3	_b 20	-	3	7	.09	.69
G	Poa pratensis	-	1	1	-	1	1	.03	.01
G	Poa secunda	_a 55	_b 105	_b 122	27	42	50	1.46	1.46
Total for Annual Grasses		0	330	119	0	102	50	13.85	1.29
Total for Perennial Grasses		341	335	385	122	124	140	8.53	11.94
Total for Grasses		341	665	504	122	226	190	22.39	13.24
F	Achillea millefolium	6	7	1	3	3	1	.16	.03
F	Agoseris glauca	25	26	23	12	14	12	.12	.06
F	Alyssum alyssoides (a)	-	183	198	-	70	73	.99	.76
F	Arabis spp.	_b 10	_a -	_a -	5	-	-	-	-
F	Balsamorhiza sagittata	_b 76	_{ab} 52	_a 40	34	27	21	3.67	4.35
F	Castilleja linariaefolia	4	-	2	2	-	1	-	.03
F	Camelina microcarpa (a)	-	_a 12	_b 43	-	8	19	.06	.12
F	Calochortus nuttallii	_b 19	_a -	_a 3	10	-	1	-	.00
F	Cirsium undulatum	7	4	2	4	3	1	.19	.15
F	Collomia linearis (a)	-	-	7	-	-	3	-	.01
F	Comandra pallida	_b 26	_a 4	_a 2	11	2	1	.01	.03
F	Collinsia parviflora (a)	-	_a 9	_b 99	-	3	38	.01	.19
F	Crepis acuminata	_b 106	_a 16	_a 33	56	8	18	.19	.54
F	Delphinium nuttallianum	-	-	2	-	-	2	-	.01
F	Descurainia pinnata (a)	-	_a -	_b 13	-	-	7	-	.03
F	Draba spp. (a)	-	-	3	-	-	1	-	.03
F	Epilobium brachycarpum (a)	-	2	-	-	2	-	.01	-
F	Eriogonum umbellatum	5	-	-	2	-	-	-	-
F	Gayophytum ramosissimum (a)	-	-	3	-	-	2	-	.01
F	Hackelia patens	7	16	18	3	9	8	.19	.19
F	Lappula occidentalis (a)	-	_a -	_b 25	-	-	11	-	.19
F	Lactuca serriola	3	-	3	1	-	1	-	.03
F	Lomatium spp.	5	-	1	2	-	1	-	.00
F	Machaeranthera canescens	-	-	-	-	-	-	-	.03

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
F	<i>Microsteris gracilis</i> (a)	-	a- 41	b	-	-	17	-	.08
F	<i>Penstemon humilis</i>	-	-	2	-	-	2	-	.04
F	<i>Penstemon</i> spp.	b25	ab13	a9	11	6	6	.13	.10
F	<i>Petradoria pumila</i>	58	58	50	22	27	21	3.01	3.36
F	<i>Phlox longifolia</i>	b28	a-	a7	14	-	4	-	.02
F	<i>Tragopogon dubius</i>	a7	ab9	b19	3	4	10	.02	.18
F	<i>Veronica biloba</i> (a)	-	10	5	-	4	2	.07	.01
F	<i>Zigadenus paniculatus</i>	b9	a-	ab5	5	-	3	-	.04
Total for Annual Forbs		0	216	437	0	87	173	1.15	1.44
Total for Perennial Forbs		426	205	222	200	103	114	7.72	9.22
Total for Forbs		426	421	659	200	190	287	8.87	10.67

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

BROWSE TRENDS --

Herd unit 02 , Study no: 21

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Amelanchier alnifolia</i>	26	23	2.77	2.39
B	<i>Artemisia tridentata vaseyana</i>	7	5	.30	.00
B	<i>Cercocarpus ledifolius</i>	11	11	2.38	1.84
B	<i>Cercocarpus montanus</i>	1	1	-	-
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	9	12	.86	1.38
B	<i>Echinocereus</i> spp.	0	1	-	-
B	<i>Eriogonum microthecum</i>	23	23	.87	.66
B	<i>Gutierrezia sarothrae</i>	32	44	.69	1.74
B	<i>Mahonia repens</i>	29	35	.40	.93
B	<i>Purshia tridentata</i>	4	6	.06	.03
B	<i>Symphoricarpos oreophilus</i>	22	19	.93	1.10
Total for Browse		164	180	9.30	10.11

CANOPY COVER --

Herd unit 02 , Study no: 21

Species	Percent Cover	
	'96	'01
Cercocarpus ledifolius	15	22

BASIC COVER --

Herd unit 02 , Study no: 21

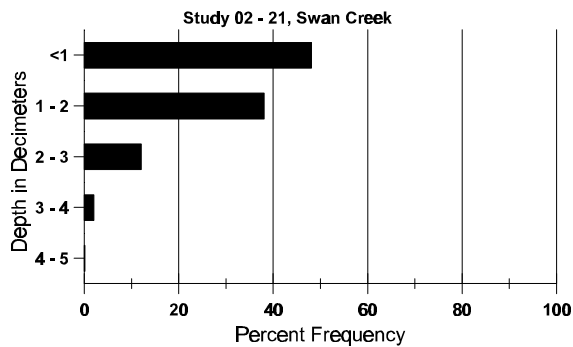
Cover Type	Nested Frequency		Average Cover %		
	'96	'01	'90	'96	'01
Vegetation	366	343	7.50	39.27	33.79
Rock	289	278	21.25	21.62	23.00
Pavement	99	159	3.00	1.18	2.80
Litter	392	364	53.25	48.38	45.56
Cryptogams	48	38	0	.50	.99
Bare Ground	126	172	15.00	5.15	9.51

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 21, Swan Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.3	58.0 (11.9)	7.5	34.6	38.1	27.4	6.6	9.6	230.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 21

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Rabbit	2	1	9	N/A
Elk	27	13	470	36 (89)
Deer	32	29	609	47 (116)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 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				
Amelanchier alnifolia																		
S	90	1	-	-	1	-	-	-	-	-	1	-	1	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	90	6	6	-	1	1	-	-	-	-	13	-	1	-	466		14	
	96	7	3	-	-	-	-	-	-	8	2	-	-	200		10		
	01	11	9	-	-	-	-	-	-	20	-	-	-	400		20		
M	90	1	8	1	-	-	-	-	-	7	3	-	-	333	28	17	10	
	96	4	16	5	-	-	-	-	-	15	10	-	-	500	18	31	25	
	01	6	17	10	-	-	-	-	-	33	-	-	-	660	18	28	33	
D	90	-	-	2	-	-	-	-	-	-	2	-	-	66		2		
	96	1	4	2	-	-	-	-	-	2	1	1	3	140		7		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
X	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>							
'90		58%			12%			04%			- 3%							
'96		55%			17%			10%			+21%							
'01		49%			19%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	865	Dec:	8%			
												'96	840		17%			
												'01	1060		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				
Artemisia tridentata vaseyana																		
S	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	26	17	1
	96	1	2	-	-	-	-	-	-	-	2	-	-	1	60	10	22	3
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	16	32	3
D	90	-	1	1	-	-	-	-	-	-	2	-	-	-	66		2	
	96	2	2	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		33%			33%			00%			+45%							
'96		44%			00%			11%			-44%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	99	Dec:	67%				
											'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				
Cercocarpus ledifolius																		
S	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	2	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	1	1	1	-	-	1	-	-	5	-	-	-	100		5	
M	90	-	-	-	-	-	-	4	-	-	4	-	-	-	133	157	152	4
	96	-	4	3	-	-	-	1	4	-	12	-	-	-	240	11	24	12
	01	-	-	1	-	1	-	-	3	-	5	-	-	-	100	20	22	5
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	1	-	-	-	1	-	-	-	20		1	
X	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>							
'90		00%			20%			00%			+41%							
'96		29%			36%			00%			-21%							
'01		18%			27%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	166	Dec:	0%				
											'96	280		0%				
											'01	220		9%				
Cercocarpus montanus																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	36	54	1
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20	32	59	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		00%			100%			00%			+ 0%							
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	-				
											'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				
Chrysothamnus viscidiflorus viscidiflorus																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	90	-	-	1	-	-	-	-	-	-	1	-	-	-	33	10	10	1
	96	11	1	-	2	-	-	-	-	-	14	-	-	-	280	14	24	14
	01	25	-	-	-	-	-	-	-	-	25	-	-	-	500	12	25	25
D	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>							
'90		00%			50%			00%			+78%							
'96		07%			00%			00%			+40%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	66	Dec:	50%				
											'96	300		0%				
											'01	500		0%				
Echinocereus spp.																		
M	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>							
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	-				
											'96	0		-				
											'01	20		-				

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 microthecum</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	21	1	-	1	-	-	-	-	-	23	-	-	-	460	14	19	23
	01	38	-	-	-	-	-	-	-	-	38	-	-	-	760	12	16	38
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	1	-	-	-	-	-	-	-	3	-	-	1	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
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		07%			00%			04%			+29%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	0%				
											'96	540		15%				
											'01	760		0%				
<i>Gutierrezia sarothrae</i>																		
S	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	90	10	-	-	-	-	-	-	-	-	10	-	-	-	333			10
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	90	54	-	-	-	-	-	-	-	-	54	-	-	-	1800	11	16	54
	96	49	-	-	1	-	-	-	-	-	50	-	-	-	1000	8	10	50
	01	77	-	-	-	-	-	-	-	-	76	1	-	-	1540	10	15	77
D	90	2	-	-	-	-	-	-	-	-	1	-	1	-	66			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	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>							
'90		00%			00%			02%			-50%							
'96		00%			00%			00%			+31%							
'01		00%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	2199	Dec:	3%				
											'96	1100		0%				
											'01	1600		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																		
Y	90	24	2	-	1	-	-	-	-	-	27	-	-	-	900		27	
	96	51	-	-	-	-	-	-	-	-	51	-	-	-	1020		51	
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	90	46	-	-	14	-	-	-	-	-	60	-	-	-	2000	4	4	60
	96	60	-	-	8	-	-	-	-	-	68	-	-	-	1360	5	6	68
	01	207	-	-	1	-	-	-	-	-	208	-	-	-	4160	3	5	208
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		02%			00%			00%			-18%							
'96		00%			00%			00%			+45%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	2900	Dec:	-			
												'96	2380		-			
												'01	4360		-			
Purshia tridentata																		
Y	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	90	2	1	-	-	-	-	-	-	-	3	-	-	-	100	11	12	3
	96	-	4	-	-	-	-	-	-	-	4	-	-	-	80	7	20	4
	01	1	2	2	-	-	-	-	-	-	5	-	-	-	100	19	41	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		25%			00%			00%			-40%							
'96		100%			00%			00%			+33%							
'01		33%			33%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	133	Dec:	-			
												'96	80		-			
												'01	120		-			

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	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	90	15	2	-	3	-	-	-	-	-	17	-	3	-	666	19 17	20	
	96	20	-	-	-	-	-	-	-	-	18	2	-	-	400	14 23	20	
	01	26	1	-	-	-	-	-	-	-	26	1	-	-	540	14 23	27	
D	90	3	-	-	-	-	-	-	-	-	2	-	1	-	100		3	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		07%			00%			14%			-36%							
'96		00%			00%			00%			+ 0%							
'01		03%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	932	Dec:	11%			
												'96	600		3%			
												'01	600		7%			

Suspended

Trend Study 2-22-96

Study site name: Box Elder Canyon.

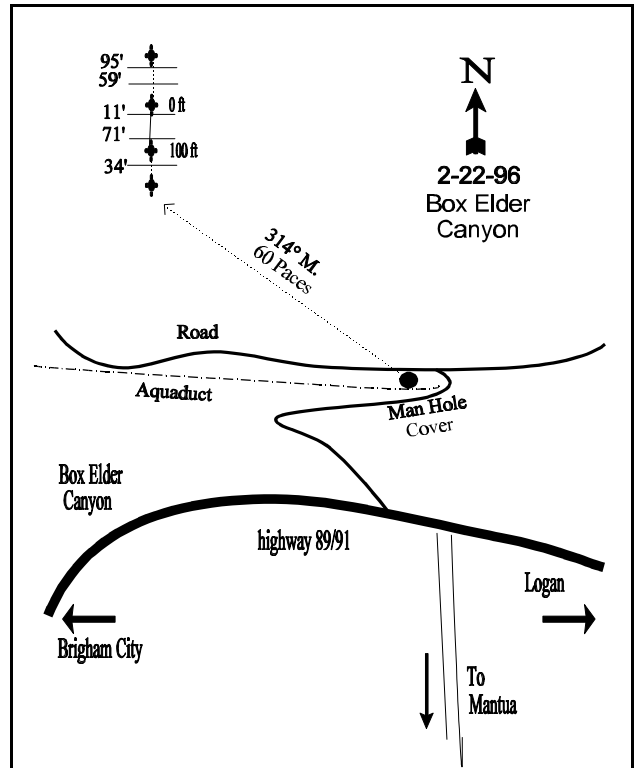
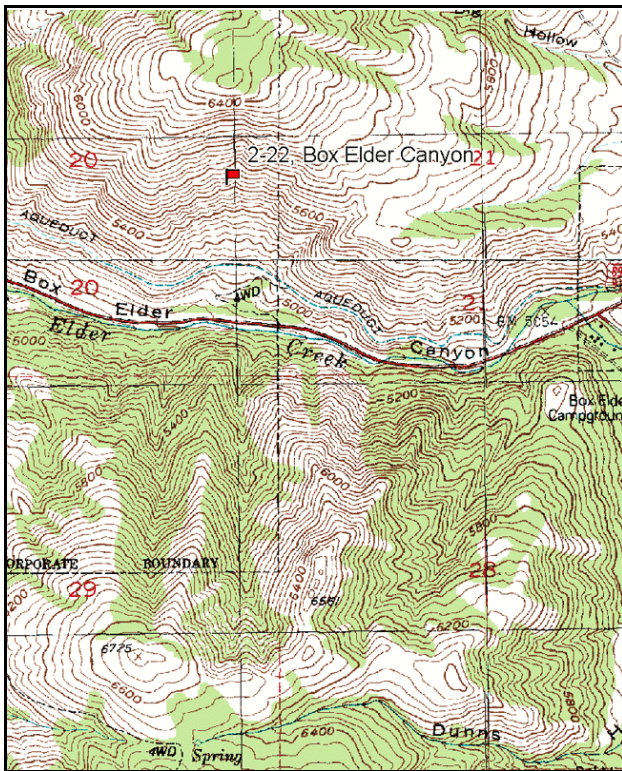
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the western most Mantua turnoff on U.S. 89 in Box Elder Canyon, travel east for 0.1 miles to a left-hand (i.e., north) turn. Proceed on this road for 1.2 miles in a generally westerly direction. Stop here. From the manhole cover on the left hand side of the road, walk 60 paces on an azimuth of 314 degrees magnetic to the 200-foot mark of the baseline. Walk 200 feet to the north to the 0-foot baseline stake. The baseline runs from the 0-foot post to the 100-foot mark on an azimuth of 180 degrees. The 0-foot end of the baseline consists of a green steel fencepost, 12"-18" high and marked by a red browse tag #7992. Line three runs off the 0-foot baseline stake at 345 degrees magnetic.



Map Name: Mount Pisgah, Utah

Diagrammatic Sketch

Township 9N, Range 1W, Section 20

UTM 4594803 N, 418970 E

DISCUSSION

Trend Study No. 2-22

*****SUSPENDED** - This site was suspended in 2001 and will be discontinued. This site was poorly placed and should be moved to a better, more representative location. There is little browse forage on the site and it appears that deer and elk primarily use the area as a travel corridor.

The Box Elder Canyon trend study samples a steep (65% to 70%), rocky, south-facing slope on the north side of Box Elder Canyon. Deer are known to use areas on the north side of the canyon throughout the winter. Elevation of the site, about midway up the canyon, is approximately 5,160 feet. The site supports a limited browse resource with deer and elk more likely to move through the area than spend much time on the steep talus covered slope. Some of the few preferred browse species were heavily hedged in the past, but currently browse appears unutilized. Pellet groups of deer and elk were noted in small numbers along trails. This is a poor site that should be moved to a better location with more desirable populations of browse.

The slopes in Box Elder Canyon are classified as "Foxol Rock Outcrop Complex," an excessively drained, shallow, and slightly acid soil. These soils have poor water holding capability and contain large quantities of quartzite rock (Chadwick et al. 1975). This study site is very steep and in most places resembles a "talus" slope because of high rock content. Plant cover is rather poor and the erosion rate appears to be high. Rock cover has ranged from 63% in 1984 to 53% in 1996. No bare ground is exposed. No soil sample was collected from the site in 1996 due to the lack of soil. No rock index measurements were taken because all rock is right on the surface. Surface soil temperatures are high.

Browse composition is considerably depleted from former times. Historically, this area supported mixed mountain brush and big sagebrush/grass communities. Preferred browse included mountain big sagebrush, bitterbrush, and serviceberry which have been replaced by Rocky Mountain smooth sumac, white rubber rabbitbrush, and Oregon hollygrape. Although these shrubs provide a fair amount of forage, it is not of the quality or quantity that mixed mountain brush is normally capable of producing. In future years, we can expect this trend to continue. Currently ('96), no mountain big sagebrush occurs on the site and only 60 serviceberry plants/acre were estimated. No reproduction is evident. Utilization of some of the preferred species was moderate to heavy in the past, but current use is light and it appears that deer and elk just pass through the area.

Oregon hollygrape is currently the most abundant browse with an incredible 52,240 plants/acre estimated in 1996. The increase in density from 1990 data is due to the much larger sample used in 1996. These plants are low growing and unutilized. Rocky Mountain smooth sumac is also abundant with 4,460 plants/acre estimated in 1996. Most plants are unutilized. Mature individuals average just over 2 feet in height. With the extended sample size used in 1996, poison ivy (*Rhus radicans*) was picked up in the sample. Due to classification errors in the field, it was not counted in the shrub density strips. It grew in isolated large clumps of a few hundred low growing plants.

The herbaceous understory is depleted. The only perennial grass on the site is bluebunch wheatgrass. Annual grasses are more abundant and accounted for 78% of the grass cover and 59% of all herbaceous cover in 1996. Forbs are depleted. Only three species are abundant. These include Louisiana sage, northern sweetvetch, and dyers woad. It was reported in 1984 that dyers woad was abundant and "in no other area does this plant appear so abundant or so competitive. Although more desirable forbs are present, their abundance will be limited by the continued dominance of dyers woad." For some reason, dyers woad was not included in the sample that year so no data is available. Seasonal personnel must have thought it was an annual and not counted it. Dyers woad was also abundant in 1990 with a quadrat frequency of 80%. Quadrat frequency

declined to 37% in 1996. The harsh conditions on the site combined with drought have likely had a negative effect on this herbaceous species.

1984 APPARENT TREND ASSESSMENT

Soil and vegetative conditions appear to be in a state of decline. Accelerated erosion is a fundamental problem that affects not only soil trend but also the reproduction and growth of plants. Another obvious problem is the prevalence of dyers woad.

1990 TREND ASSESSMENT

The very steep (65%), south-facing slope of Box Elder Canyon has very limited soil and low site potential for production of significant quantities of browse forage. Oregon grape is the most frequent species. Some sumac is utilized by deer. Nested frequency of the only valuable perennial herbaceous species, bluebunch wheatgrass, decreased significantly. Dyers woad dominates the herbaceous understory with a quadrat frequency of 80%. Weeds and other disturbed site species have a competitive advantage on the continually moving, talus-like rocks that make up the ground surface. If there ever was any topsoil on this slope, it is gone now.

TREND ASSESSMENT

soil - stable but in very poor condition (3)

browse - down and in very poor condition (1)

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

1996 TREND ASSESSMENT

Soil conditions are poor with rock covering most of the ground surface (53%). No bare ground is exposed. Trend is considered stable, yet in poor condition. The browse trend is down with only one preferred species, serviceberry, found on the site. The few shrubs encountered appear unutilized with no reproduction evident. Trend for the herbaceous understory is up slightly due to an increase in sum of nested frequency for bluebunch wheatgrass, combined with a 69% decline in nested frequency of dyers woad.

TREND ASSESSMENT

soil - stable but poor condition (3)

browse - down with few preferred species (1)

herbaceous understory - up slightly but depleted (5)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 22

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	_b 154	_a 48	_a 70	62	24	32	3.63
G	Bromus japonicus (a)	-	-	238	-	-	73	9.76
G	Bromus tectorum (a)	-	-	82	-	-	25	2.76
Total for Annual Grasses		0	0	320	0	0	98	12.52
Total for Perennial Grasses		154	48	70	62	24	32	3.63
Total for Grasses		154	48	390	62	24	130	16.15
F	Allium spp.	-	3	-	-	3	-	-
F	Artemisia ludoviciana	27	10	24	11	5	10	1.39
F	Astragalus convallarius	-	-	3	-	-	1	.03
F	Cirsium spp.	5	-	3	2	-	1	.38
F	Cymopterus longipes	-	-	-	-	-	-	.00
F	Epilobium brachycarpum (a)	-	-	-	-	-	-	.00
F	Erodium cicutarium (a)	-	-	4	-	-	2	.06
F	Galium aparine (a)	-	-	15	-	-	5	.05
F	Hedysarum boreale	_b 32	_a 6	_{ab} 19	16	3	11	1.20
F	Isatis tinctoria	_a -	_c 218	_b 68	-	80	37	1.40
F	Lactuca serriola	_a -	_b 14	_b 14	-	6	6	.08
F	Melilotus officinalis	-	-	2	-	-	1	.15
F	Phlox longifolia	_a -	_b 12	_{ab} 2	-	5	1	.00
F	Tragopogon dubius	_b 33	_a 14	_{ab} 17	17	6	7	.11
Total for Annual Forbs		0	0	19	0	0	7	0.11
Total for Perennial Forbs		97	277	152	46	108	75	4.77
Total for Forbs		97	277	171	46	108	82	4.88

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

BROWSE TRENDS --
Herd unit 02 , Study no: 22

Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier utahensis	2	.30
B	Chrysothamnus nauseosus consimilis	7	3.75
B	Gutierrezia sarothrae	1	-
B	Mahonia repens	54	10.33
B	Opuntia fragilis	16	.13
B	Prunus virginiana	3	.18
B	Rhus glabra cismontana	62	11.21
B	Rhus radicans	0	1.55
Total for Browse		145	27.47

BASIC COVER --
Herd unit 02 , Study no: 22

Cover Type	Nested Frequency	Average Cover %		
		'96	'84	'90
Vegetation	316	4.75	11.00	41.72
Rock	352	63.00	58.00	53.36
Pavement	37	3.50	5.00	.73
Litter	376	28.50	26.00	29.24
Cryptogams	4	0	0	.01
Bare Ground	-	.25	0	0

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 22

No soil data available

PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 22

Type	Quadrat Frequency
	'96
Elk	3
Deer	4

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 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			
Amelanchier utahensis																	
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40	-	2
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		00%			00%			00%			- 1%						
'90		00%			50%			00%			-55%						
'96		67%			00%			33%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%		
												'90	132		50%		
												'96	60		33%		
Artemisia tridentata vaseyana																	
D	84	-	-	3	-	-	-	-	-	-	3	-	-	-	200		3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	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>						
'84		00%			100%			00%									
'90		00%			00%			00%									
'96		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	100%		
												'90	0		0%		
												'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>Chrysothamnus nauseosus consimilis</i>																		
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	5	1	-	-	-	-	-	-	-	6	-	-	-	400	50	33	6
	90	9	-	-	-	-	-	-	-	-	9	-	-	-	600	36	64	9
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180	43	72	9
D	84	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	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		17%			00%			00%			- 8%							
'90		00%			00%			09%			-75%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	799	Dec:	17%				
											'90	732		9%				
											'96	180		0%				
<i>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	15	27	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		-				

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	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	294	-	-	-	-	-	-	-	-	294	-	-	-	19600		294	
	90	479	-	-	-	-	-	74	-	-	553	-	-	-	36866		553	
	96	291	-	-	-	-	-	-	-	-	291	-	-	-	5820		291	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	44	-	-	-	-	-	-	-	-	44	-	-	-	2933	6	7	
	96	2321	-	-	-	-	-	-	-	-	2321	-	-	-	46420	5	7	
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%			00%			00%			+51%							
'90		00%			00%			00%			+24%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	19600	Dec:	-			
												'90	39799		-			
												'96	52240		-			
Opuntia fragilis																		
Y	84	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	90	11	-	-	-	-	-	1	-	-	10	-	2	-	800		12	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	11	-	-	-	-	-	5	-	-	13	-	3	-	1066	4	5	
	96	22	-	-	1	-	-	-	-	-	23	-	-	-	460	3	5	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	8	-	-	-	-	-	-	-	-	4	-	3	1	533		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%			+78%							
'90		00%			00%			25%			-77%							
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	533	Dec:	0%			
												'90	2399		22%			
												'96	540		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				
Prunus virginiana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	11	
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%										
'96		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	0		0%				
											'96	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				
Rhus glabra cismontana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	10	6	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	90	26	1	1	1	-	-	-	-	-	28	-	1	-	1933		29	
	96	19	-	-	-	-	-	-	-	-	19	-	-	-	380		19	
M	84	1	13	13	-	-	-	-	-	-	27	-	-	-	1800	29	17	27
	90	6	1	1	-	-	-	-	-	-	5	2	1	-	533	31	20	8
	96	183	12	-	-	-	-	-	-	-	195	-	-	-	3900	26	27	195
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	4	-	-	-	-	-	-	-	7	-	-	2	180		9	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		44%			30%			00%			-14%							
'90		05%			05%			05%			+45%							
'96		07%			00%			.89%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2866	Dec:	0%			
												'90	2466		0%			
												'96	4460		4%			

Trend Study 2-23-01

Study site name: Flat Bottom Canyon.

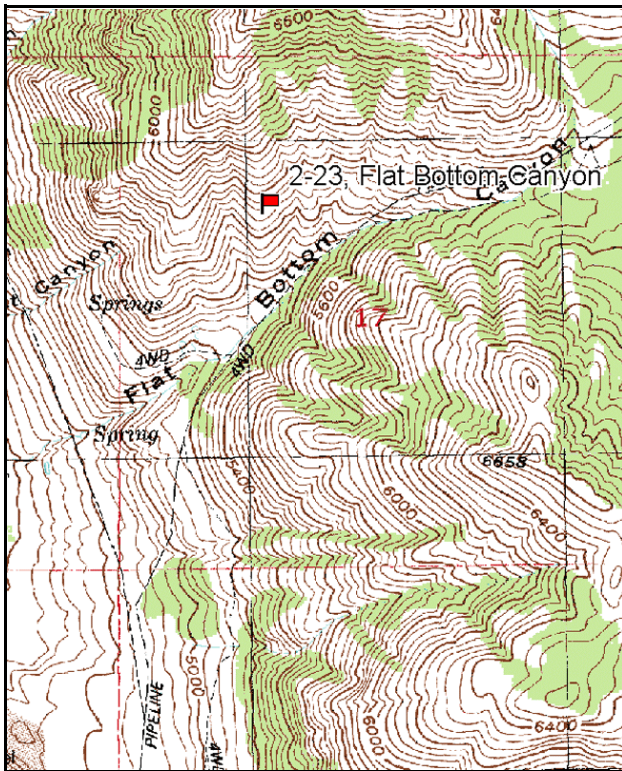
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 167 degrees magnetic.

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

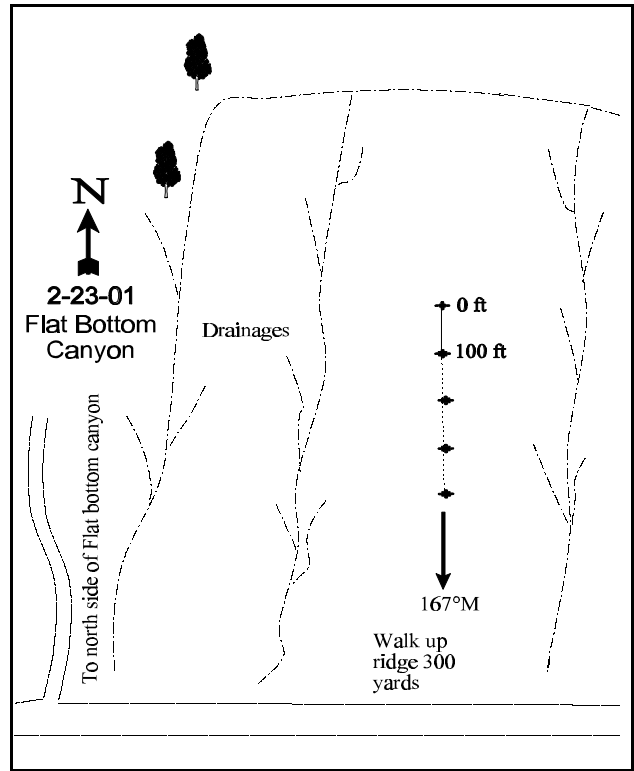
LOCATION DESCRIPTION

Ask for permission and directions to the mouth of the canyon at the Bingham sand and gravel pit. Four-wheel drive is needed. From mouth of canyon proceed to the ridge on north side of canyon where the site is located. Walk up the ridge about 300 yards to the 400-foot stake. The 0-foot baseline stake is further up the ridge. The 0-foot stake is marked with browse tag #7919. This site can be reached by following aqueduct road in Box Elder Canyon and around the bench to Flat Bottom Canyon.



Map Name: Mount Pisgah

Township 9N, Range 1W, Section 17



Diagrammatic Sketch

UTM 4596766 N, 418054 E

DISCUSSION

Trend Study No. 2-23

The Flat Bottom Canyon trend study site is located on a steep (50%), south-facing slope located east of Brigham City. Utilized by deer in winter, the study area produces relatively little forage. A very shallow soil almost certainly limits plant growth and plant densities on the steep south slopes of the canyon. A pellet group transect read in 2001 estimated 25 deer use days/acre (63 ddu/ha). Most of the pellet groups appeared to be from late spring use. There were more pellet groups near the bottom of the slope where the density of sagebrush was higher.

The soil is shallow and very rocky with a loam texture and a soil reaction that is moderately acidic (pH of 5.9). Effective rooting depth (see methods) was estimated at only 7 inches in 1996. Parent material is quartzite. Effective moisture on the site is limited by the convex steep and rocky slope. In addition, soil temperature is relatively high averaging 69° F at 9 inches. Soil erosion is inevitable, but is not currently serious due to the abundance of rock and herbaceous vegetation cover. There is little bare soil exposed and the erosion condition class was classified as stable in 2001.

This site is currently dominated by annual grasses and weedy forbs. Browse is a minor component, consisting chiefly of a low-growing population of mountain big sagebrush. Density was estimated at 2,232 plants/acre in 1984, nearly half of which were young plants. The average mature plant measured only 6 inches in height, obviously stunted by the harsh conditions of the site. By 1990, density was determined to be 566 plants/acre and by 1996, only 200 plants/acre were estimated. This most recent drop in density cannot be explained by heavy use as there were very few dead plants found on the site. Therefore, this last downward change in the population is mostly be due to the larger sample size giving a more accurate estimate for populations that are discontinuous and/or clumped. Utilization was moderate to heavy in 1984 and more moderate in 1990. The population continued to drop in 2001 due to a decline in young plants (140 plants/acre down to 0). Mature plants display moderate use but appear vigorous. They are not producing much seed, and annual leader growth averaged 2.6 inches in 2001. Mature plants are short and apparently stunted due to the poor site potential combined with continual use by deer and dry growing conditions. The upper south slopes of the canyon are all depleted of sagebrush. More sagebrush is found near the bottom of the canyon where the soil is deeper.

The only abundant browse species on the site consists of broom snakeweed which has increased in density from 1,065 plants/acre in 1984 to 3,240 in 1996, and 4,760 by 2001. The age class distribution suggested an expanding population in 1996 with 30% of the population consisting of young plants. The current ('01) population is mostly mature (93%) and the large number of young plants encountered in 1996 has declined to only 1% of the population.

Annual grasses and weedy forbs are very abundant, especially lower on the slope. Cheatgrass, rattlesnake brome, and rattail fescue dominate the herbaceous understory by producing 75% of the grass cover and 57% of the herbaceous cover in 1996. Cover of annuals declined somewhat in 2001 but they still provide 53% of the grass cover. Bluebunch wheatgrass, red three-awn, and Sandberg bluegrass are moderately abundant. Forbs are dominated by pale alyssum, ragweed, and storksbill. Dyers woad is also found on the site. It has persisted at a stable frequency since 1990.

1984 APPARENT TREND ASSESSMENT

The soil is in poor condition. The study area has a very shallow soil that has very low growth potential. Ongoing erosion creates a situation favorable to annuals and weeds that are able to complete their growth cycle early in the season. Vegetative trend appears to be declining. It appears that big sagebrush is slowly going out.

1990 TREND ASSESSMENT

The many heavily hedged sagebrush encountered in 1984 are now mostly dead. Density is significantly lower, down by 75%. The small remaining sagebrush are vigorous, showing light to moderate use. The population of big sagebrush appears to be stable now, but at much lower levels. However, this severe winter range can receive concentrated use, and considering the low amount of forage produced, the heavy ant and aphid infestation and aggressive potential invaders, there appears little chance for reversal of the downward trends. There is continuous soil loss, and the potential for severe soil erosion and gullies on the steep face is present. There is extensive rock and pavement cover values.

TREND ASSESSMENT

soil - down and in poor condition (1)

browse - down and in poor condition (1)

herbaceous understory - stable but in poor condition (3)

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground and an increase in litter cover. Unfortunately, the improvement in ground cover comes primarily from annual grasses and forbs. Some erosion is inevitable, but it currently does not appear excessive. Soil condition is poor however. The browse trend is down due to a 65% decline in the density of mountain big sagebrush. Currently, there are only 200 sagebrush plants/acre on the site. Mature plants number only 60 plants/acre. Drought combined with the low water holding capacity of the rocky soil, high surface temperatures, and competition with winter annuals are eliminating sagebrush from the site. Trend for the herbaceous understory is down slightly due to a significant decline in the sum of nested frequency for perennial grasses. Both bluebunch wheatgrass and Sandberg bluegrass declined in nested frequency. Sum of nested frequency for forbs increased primarily by a 12-fold increase in sum of nested frequency for ragweed. The site is in poor condition and supports a poor composition of perennial grasses and forbs.

TREND ASSESSMENT

soil - up but in poor condition (5)

browse - down with very few browse on the site (1)

herbaceous understory - down slightly and in poor condition (2)

2001 TREND ASSESSMENT

Trend for soil is slightly down due to a 53% decline in litter cover. Percent bare ground has increased slightly but it is still low at only 6%. There is some inevitable soil movement down slope but the high cover of rock and pavement help armor the soil. The current erosion condition class is classified as stable. Trend for browse continues to decline. Density of mountain big sagebrush has dropped 20% to only 160 plants/acre. Utilization is moderate and vigor normal. Density of rubber rabbitbrush has increased but these shrubs appear to be unutilized. Another negative trend indicator is the increase in broom snakeweed which is currently estimated at 4,760 plants/acre. Trend for the herbaceous understory is up slightly due to a significant increase

in several perennial grasses, combined with a decline in the frequency of cheatgrass and rattlesnake brome. Unfortunately, annual forbs also increased substantially with pale alyssum, storksbill and *Holosteum umbellatum* increasing significantly. The composition of the herbaceous understory is still poor and will most likely not improve.

TREND ASSESSMENT

soil - down slightly and in poor condition (2)

browse - down with very few browse on the site (1)

herbaceous understory - up slightly and in poor condition (4)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 23

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	<i>Agropyron spicatum</i>	c184	bc182	ab126	a117	68	75	59	52	4.07	4.67
G	<i>Aristida purpurea</i>	a9	b38	b48	c86	4	18	24	37	1.17	2.61
G	<i>Bromus brizaeformis</i> (a)	-	-	b152	a70	-	-	63	36	1.00	.20
G	<i>Bromus japonicus</i> (a)	-	-	-	4	-	-	-	2	-	.01
G	<i>Bromus tectorum</i> (a)	-	-	b387	a330	-	-	99	100	16.60	7.41
G	<i>Festuca myuros</i> (a)	-	-	a87	b278	-	-	32	83	.91	5.73
G	<i>Poa bulbosa</i>	a-	a-	a10	b46	-	-	4	21	.02	.75
G	<i>Poa secunda</i>	b162	c234	a70	b184	67	94	35	74	1.00	4.06
Total for Annual Grasses		0	0	626	682	0	0	194	221	18.51	13.36
Total for Perennial Grasses		355	454	254	433	139	187	122	184	6.28	12.11
Total for Grasses		355	454	880	1115	139	187	316	405	24.79	25.48
F	<i>Achillea millefolium</i>	-	-	2	11	-	-	1	4	.03	.19
F	<i>Agoseris glauca</i>	-	6	10	-	-	2	4	-	.05	-
F	<i>Alyssum alyssoides</i> (a)	-	-	a127	b296	-	-	52	95	.38	1.07
F	<i>Allium</i> spp.	-	-	-	-	-	-	-	-	-	.00
F	<i>Ambrosia psilostachya</i>	b83	a13	c152	b75	31	7	56	34	4.23	1.82
F	<i>Artemisia ludoviciana</i>	b39	a10	a9	a5	14	3	5	2	.22	.06
F	<i>Astragalus convallarius</i>	-	-	-	2	-	-	-	1	-	.00
F	<i>Astragalus utahensis</i>	a2	a1	b21	ab12	1	1	11	5	.49	.07
F	<i>Balsamorhiza hookeri</i>	-	4	-	-	-	1	-	-	-	-
F	<i>Cymopterus</i> spp.	a-	b33	b24	b21	-	19	12	13	.08	.14
F	<i>Draba</i> spp. (a)	-	-	a-	b37	-	-	-	11	-	.20
F	<i>Epilobium brachycarpum</i> (a)	-	-	6	-	-	-	3	-	.02	-
F	<i>Erodium cicutarium</i> (a)	-	-	a140	b217	-	-	55	72	1.21	4.96
F	<i>Erigeron</i> spp.	-	-	2	-	-	-	1	-	.15	-
F	<i>Eriogonum umbellatum</i>	-	-	4	2	-	-	3	1	.09	.03

Type	Species	Nestled Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Hackelia patens	-	-	-	3	-	-	-	1	-	.00
F	Helianthus annuus (a)	-	2	-	-	-	1	-	-	-	-
F	Holosteum umbellatum (a)	-	-	_a 21	_b 212	-	-	9	73	.04	.86
F	Isatis tinctoria	13	16	25	14	7	8	16	7	.13	.20
F	Lactuca serriola	-	-	3	-	-	-	1	-	.00	-
F	Tragopogon dubius	30	18	33	25	13	8	14	12	.36	.26
F	Unknown forb-perennial	1	-	-	-	1	-	-	-	-	-
Total for Annual Forbs		0	2	294	762	0	1	119	251	1.66	7.10
Total for Perennial Forbs		168	101	285	170	67	49	124	80	5.86	2.81
Total for Forbs		168	103	579	932	67	50	243	331	7.53	9.91

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

BROWSE TRENDS --

Herd unit 02 , Study no: 23

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	7	5	.18	.03
B	Chrysothamnus nauseosus hololeucus	3	5	.53	1.39
B	Gutierrezia sarothrae	54	69	1.46	4.40
B	Opuntia spp.	1	6	-	.01
Total for Browse		65	85	2.17	5.83

BASIC COVER --

Herd unit 02 , Study no: 23

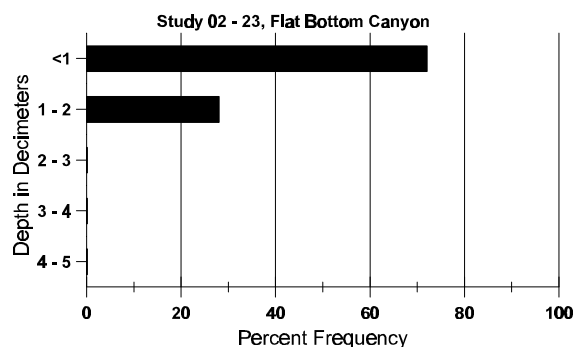
Cover Type	Nestled Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	397	391	2.25	9.50	42.44	47.72
Rock	311	315	16.50	18.00	18.50	17.84
Pavement	275	326	18.25	33.25	10.93	19.59
Litter	397	351	40.00	22.50	41.72	19.67
Cryptogams	147	127	6.00	4.25	1.90	2.01
Bare Ground	110	179	17.00	12.50	1.45	6.20

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 23, Flat Bottom Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
7.1	69.2 (9.0)	5.9	48.2	29.4	22.4	1.8	10.7	140.8	.3

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 23

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Deer	7	5	331	25 (63)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 23

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																								
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0					
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0					
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0					
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	43	56	0					
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>													
		'84			'90			'96			'01													
		00%			00%			00%			00%													
		00%			00%			00%			00%													
		00%			00%			00%			00%													
		00%			00%			00%			00%													
Total Plants/Acre (excluding Dead & Seedlings)												'84		0		Dec:		-						
												'90		0				-						
												'96		0				-						
												'01		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				
Artemisia tridentata vaseyana																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	20	9	3	-	-	-	-	-	-	28	2	2	-	1066		32	
	90	2	-	1	-	-	-	-	-	-	1	2	-	-	100		3	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	9	6	6	-	-	-	-	-	-	20	1	-	-	700	6	6	21
	90	5	4	1	-	-	-	-	-	-	4	6	-	-	333	8	10	10
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	13	22	3
	01	2	5	-	-	-	-	-	-	-	7	-	-	-	140	13	27	7
D	84	-	1	13	-	-	-	-	-	-	7	6	1	-	466		14	
	90	3	1	-	-	-	-	-	-	-	1	3	-	-	133		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		24%			33%			04%			-75%							
'90		29%			12%			00%			-65%							
'96		00%			00%			00%			-20%							
'01		63%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	2232	Dec:	21%			
												'90	566		23%			
												'96	200		0%			
												'01	160		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 nauseosus hololeucus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	32	54	1
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	31	51	4
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%			+50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	0		0%				
											'96	60		0%				
											'01	120		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>Gutierrezia sarothrae</i>																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	6	-	-	1	-	-	-	-	-	7	-	-	-	233		7	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	19	-	-	-	-	-	-	-	-	18	-	1	-	633		19	
	96	48	-	-	-	-	-	-	-	-	48	-	-	-	960		48	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	26	-	-	-	-	-	-	-	-	26	-	-	-	866	9 12	26	
	90	52	1	-	-	-	-	-	-	-	52	1	-	-	1766	7 8	53	
	96	100	-	-	1	-	-	-	-	-	101	-	-	-	2020	9 13	101	
	01	221	-	-	-	-	-	-	-	-	221	-	-	-	4420	8 16	221	
D	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
	01	15	-	-	-	-	-	-	-	-	3	-	-	12	300		15	
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%			+56%							
'90		01%			00%			01%			+25%							
'96		00%			00%			00%			+32%							
'01		00%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1065	Dec:	12%			
												'90	2432		1%			
												'96	3240		8%			
												'01	4760		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				
Opuntia spp.																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66	7	11	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	10	1
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100	2	8	5
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	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%			+33%							
'90		00%			00%			00%			-80%							
'96		00%			00%			00%			+88%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	99		33%			
												'96	20		0%			
												'01	160		13%			

Trend Study 2-24-01

Study site name: Calls Fort Canyon.

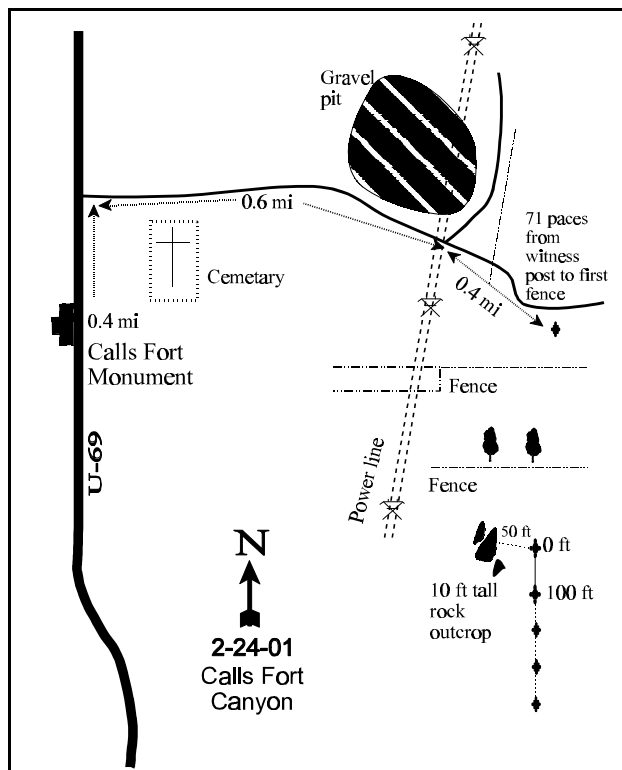
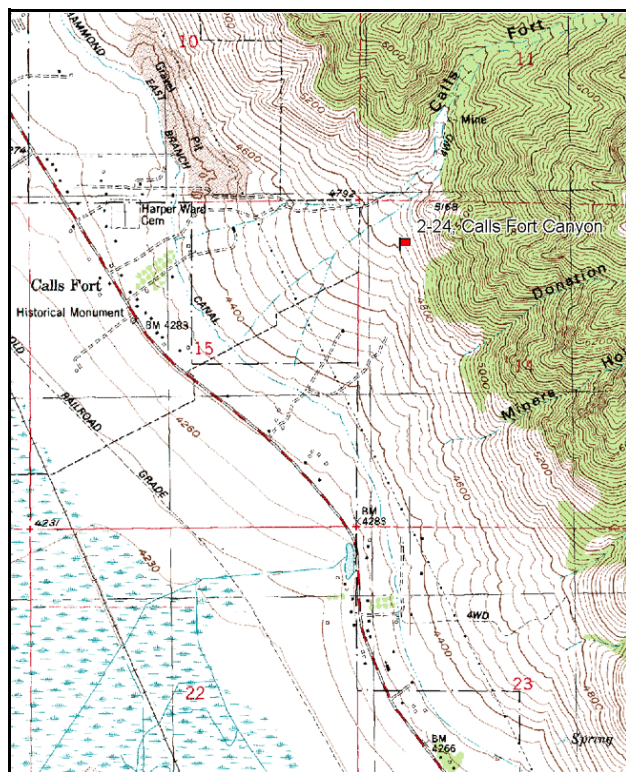
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 170 degrees magnetic

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

LOCATION DESCRIPTION

From Brigham City, proceed north to Calls Fort Monument near Honeyville. Go 0.4 miles north to a gravel pit road, 5615 North. From U-69 go east up the gravel pit road 0.6 miles to an old jeep road heading towards Calls Fort Canyon. The old jeep road crosses a laid down fence line which can be found at the base of a slightly talus slope. Bear right on the jeep road an additional 0.4 miles. From this point, walk south 195 paces across two old fences to an outcropping of large rocks. The 0-foot baseline stake is 50 feet southeast of the largest rock.



Map Name: Brigham City

Diagrammatic Sketch

Township 10N, Range 2W, Section 14

UTM 4606704 N, 413158 E

DISCUSSION

Trend Study No. 2-24

The Calls Fort Canyon trend study samples an extremely rocky, west facing bench located immediately south of Calls Fort Canyon on the west side of the Wellsville Mountains. Elevation of the site is 4,820 feet, which is well within severe deer winter range limits. Slope is moderate at 22%. The range type is a rather sparse and decadent mountain big sagebrush type with a dominant annual and weedy understory. Deer use was moderate to heavy in 1984, but currently there is little sign of wildlife use. Deer and elk pellet groups are infrequent and had quadrat frequencies of only 2% in 1996. A pellet group transect read on the site in 2001 estimated only 5 deer use days/acre (13 ddu/ha). No elk sign was encountered.

Soil is classified as "Sterling Gravelly Loam or Very Stony Loam." Both of these are exceptionally well drained calcareous soils derived from limestone, quartzite, and sandstone. Rate of water intake is very rapid, as is the rate of loss. As a result, complete soil drying in the upper 24 inches is common in summer which would be an advantage to annuals. Roots seldom penetrate below this depth because of a calcareous hardpan at about 16 inches and the extreme cobbly nature of the profile below 24 inches. This soil erodes very easily (Chadwick et al. 1975). The site is located just south of the mouth of Calls Fort Canyon. This location has been spared from the periodic and extremely heavy runoff originating from the canyon as evidenced by extensive spread of the alluvial fan. Nonetheless, erosion on the study site although not as serious, is still noticeable. Soil texture is a clay loam with a soil reaction that is slightly alkaline (pH of 7.7). Rocks are common on or just below the surface. Soil temperature is very high on this site averaging 78° F at 14 inches in depth.

The principal browse species is mountain big sagebrush. This species had a mostly decadent age structure (53%) and was subjected to heavy use in 1984. Reproductive success has been lacking due to strong competition for moisture from a dense understory dominated by common ragweed and annual grasses, and excessively high soil temperatures. Sagebrush density declined from 498 to 133 plants/acre by 1990, but the number of mature plants in the population remained comparable (166 to 133). Percent decadency declined from 53% to 0% as most all the decadent shrubs appear to have died. Utilization in 1990 was light. During the 1996 reading, total density of sagebrush was estimated at 740 plants/acre. Density of mature plants remained similar to 1990 estimates. However, the number of young plants increased from 0 to 560 plants/acre. Plants appear unutilized. Dead plants, included in the 1996 count, are as numerous as live plants at 740 plants/acre. Density of sagebrush increased to 980 plants/acre in 2001. Utilization is mostly light, vigor good, and percent decadence low at 8%.

The most numerous browse is broom snakeweed which has increased dramatically since 1990. Other browse species occur rarely. They include black chokecherry, woods rose, and Rocky Mountain smooth sumac. Sumac is extremely abundant on the alluvial fan north of the study site. Apparently, it responds positively to the type of erosion and sedimentation disturbance so prevalent in that area with its strongly rhizomatous habit.

The herbaceous understory is dominated by annual grasses, consisting mainly of Japanese brome and cheatgrass. Together they accounted for 70% of the grass cover and 51% of the herbaceous cover in 1996. It was noted in 1996 that much of the cheatgrass and Japanese brome was infested with a smut which effected seed production. During the 2001 reading, nested frequency and cover of Japanese brome declined, while that of cheatgrass increased. Combined they still dominate the site by providing 74% of the grass cover and 58% of the total herbaceous cover. Perennial grasses are represented by bluebunch wheatgrass, sand dropseed, purple three-awn, and Sandberg bluegrass. Forbs are dominated by ragweed and storksbill which currently ('01) account for 75% of the forb cover. Other common perennial forbs include Louisiana sage, thistle, and dyers woad. Overall, herbaceous composition is poor.

1984 APPARENT TREND ASSESSMENT

Overall trend from both soil and vegetative parameters appears to be in a state of decline. Erosion is unacceptably high and undesirable plants threaten to dominate the site. The key browse on the site, mountain big sagebrush, is extremely heavily hedged and half of the population is decadent. Reproduction is also poor.

1990 TREND ASSESSMENT

Changes in mountain big sagebrush growth form classification from heavily hedged in 1984 to lightly hedged in 1990, and the reduction in the percentage of decadent plants in the population are positive signs. However, no reproduction was found, perhaps due to the significant competition from the dense annual grass understory. Sagebrush canopy cover is estimated at about 2%. In addition, density declined 73% from 498 plants/acre to only 133. The frequency of bluebunch wheatgrass increased as did the frequency of dyers woad. Common ragweed is still very common with a quadrat frequency of 71%. The soil is rocky, but well protected by vegetative and litter cover.

TREND ASSESSMENT

soil - stable but poor condition (3)

browse - down (1)

herbaceous understory - stable but poor composition (3)

1996 TREND ASSESSMENT

Trend for soil has improved slightly due to an increase in litter cover and a decline in percent bare ground from 3% to <1%. Unfortunately, much of this increase is due to the thick stand of annual brome grasses which creates a substantial fire hazard. Erosion is not currently a problem. Preferred browse is limited on the site, but trend for the one key species, mountain big sagebrush, is up. Density of mature plants remained similar to 1990 estimates yet the proportion of young plants increased from 0 to 560 plants/acre. Utilization is light and vigor normal for most plants. Conversely, broom snakeweed increased 85% to a density of over 4,000 plants/acre. The herbaceous understory is dominated by annual grasses and weedy forbs. Sum of nested frequency for grasses declined slightly while frequency of perennial forbs increased. Sum of nested frequency for sand dropseed increased significantly, with the sum of nested frequency for Sandberg bluegrass declining significantly. Overall trend for the herbaceous understory is stable, but with a poor composition.

TREND ASSESSMENT

soil - improved slightly (4)

browse - up but still at a relatively low density (5)

herbaceous understory - stable but dominated by annuals and weedy species (3)

2001 TREND ASSESSMENT

Trend for soil is stable. There is abundant vegetation and litter cover to protect the soil and the erosion condition class was also determined to be stable. Trend for the key browse species, mountain big sagebrush, is up due to an 24% increase in density from 740 plants/acre to 980. The population has become increasingly mature, although young plants still account for 6% of the population. Use is light, vigor good, and percent decadence low at 8%. There has been little use of the sagebrush on this site since 1990 when heavy use was reported. Broom snakeweed has declined in density and the dry conditions have negatively effected the population which is now 40% decadent. Trend for the herbaceous understory is mixed. Sum of nested frequency for perennial grasses has increased slightly with a significant increase in the nested frequency of bluebunch wheatgrass. Sandberg bluegrass also increased significantly in nested frequency while sand

dropseed declined significantly. Sum of nested frequency for perennial forbs declined. However, ragweed and dyers woad declined significantly as well. Overall, trend for the herbaceous understory is considered slightly improved due to the increase in some of the more preferred species and reductions in some of the weedy forbs. The composition is still poor and dominated by cheatgrass, annual forbs, and weeds.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 24

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	a10	b66	b65	c110	4	25	26	42	3.67	5.74
G	Aristida purpurea	20	16	9	9	10	6	6	4	.78	.24
G	Bromus brizaeformis (a)	-	-	24	12	-	-	12	7	.28	.04
G	Bromus japonicus (a)	-	-	b307	a58	-	-	91	24	11.85	.39
G	Bromus tectorum (a)	-	-	a306	b328	-	-	89	89	11.59	24.25
G	Festuca myuros (a)	-	-	9	5	-	-	3	2	.01	.04
G	Oryzopsis hymenoides	-	-	-	2	-	-	-	1	-	.00
G	Poa pratensis	a-	b9	a-	ab6	-	5	-	2	-	.03
G	Poa secunda	a-	c74	b36	c66	-	33	17	31	.29	.54
G	Sporobolus cryptandrus	c114	ab81	bc107	a53	54	29	41	21	5.01	1.97
Total for Annual Grasses		0	0	646	403	0	0	195	122	23.73	24.72
Total for Perennial Grasses		144	246	217	246	68	98	90	101	9.77	8.54
Total for Grasses		144	246	863	649	68	98	285	223	33.51	33.27
F	Achillea millefolium	b32	b28	b34	a1	16	11	19	1	.85	.00
F	Alyssum alyssoides (a)	-	-	a14	b31	-	-	7	15	.03	.08
F	Allium spp.	-	-	-	8	-	-	-	5	-	.02
F	Ambrosia psilostachya	c214	b165	b160	a48	75	71	69	22	6.31	1.78
F	Artemisia ludoviciana	40	32	28	29	17	14	14	14	.77	.72
F	Asclepias asperula	-	-	-	1	-	-	-	1	-	.03
F	Calochortus nuttallii	a-	a-	ab6	b20	-	-	4	9	.02	.05
F	Cirsium undulatum	a-	a2	b21	a3	-	1	11	2	1.14	.03
F	Comandra pallida	-	2	-	-	-	1	-	-	-	-
F	Cryptantha spp.	-	-	4	-	-	-	2	-	.41	-
F	Descurainia pinnata (a)	-	-	-	2	-	-	-	1	-	.00
F	Epilobium brachycarpum (a)	-	-	b75	a6	-	-	36	3	.52	.01
F	Erodium cicutarium (a)	-	-	a32	b209	-	-	13	69	.36	5.21

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>	-	-	3	-	-	-	1	-	.00	-
F	<i>Euphorbia</i> spp.	_a -	_a -	_b 15	_a -	-	-	5	-	.46	-
F	<i>Helianthus annuus</i> (a)	-	-	5	4	-	-	3	1	.04	.41
F	<i>Heterotheca villosa</i>	-	-	2	5	-	-	1	2	.53	.24
F	<i>Holosteum umbellatum</i> (a)	-	-	-	144	-	-	-	55	-	.35
F	<i>Isatis tinctoria</i>	_a -	_b 41	_b 32	_a 3	-	16	14	3	.29	.16
F	<i>Lactuca serriola</i>	_a -	_a -	_b 14	_a 1	-	-	8	1	.09	.00
F	<i>Lithospermum ruderales</i>	_b 31	_a 2	_a 8	_a 11	16	1	4	4	.18	.09
F	<i>Machaeranthera canescens</i>	_a -	_b 14	_b 11	_a 1	-	8	6	1	.15	.03
F	<i>Machaeranthera grindelioides</i>	-	-	5	-	-	-	4	-	.07	-
F	<i>Plantago patagonica</i> (a)	-	-	3	4	-	-	2	2	.01	.01
F	<i>Solidago</i> spp.	3	4	-	-	1	1	-	-	-	-
F	<i>Tragopogon dubius</i>	1	-	9	2	1	-	4	1	.07	.00
Total for Annual Forbs		0	0	129	400	0	0	61	146	0.96	6.08
Total for Perennial Forbs		321	290	352	133	126	124	166	66	11.40	3.20
Total for Forbs		321	290	481	533	126	124	227	212	12.37	9.29

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

BROWSE TRENDS --

Herd unit 02 , Study no: 24

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Artemisia tridentata vaseyana</i>	24	35	.93	8.20
B	<i>Gutierrezia sarothrae</i>	50	44	3.23	6.83
B	<i>Rosa woodsii</i>	1	2	.38	.30
Total for Browse		75	81	4.55	15.33

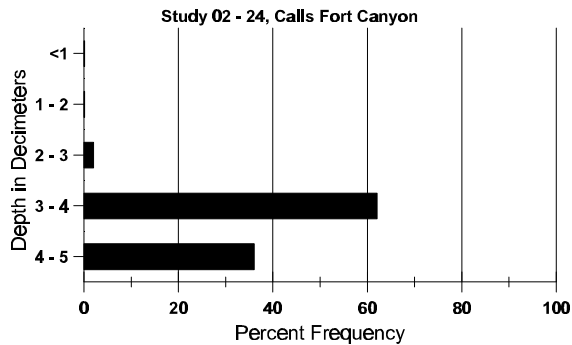
BASIC COVER --
Herd unit 02 , Study no: 24

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	382	369	1.50	16.00	54.32	60.32
Rock	176	152	14.25	16.75	9.64	12.16
Pavement	58	152	10.50	6.50	1.75	9.73
Litter	386	365	64.00	57.25	68.01	40.36
Cryptogams	3	5	0	.50	.00	.06
Bare Ground	35	15	9.75	3.00	.65	.10

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 24, Calls Fort Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.4	77.8 (13.9)	7.7	41.7	31.0	27.3	3.8	7.3	195.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 24

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Rabbit	1	-	01	01
Elk	2	-	26	N/A
Deer	2	3	-	-
			70	5 (13)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 24

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	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560		28	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	5	-	-	-	-	-	-	5	-	-	-	166	23 18	5	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	21 19	4	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140	28 38	7	
	01	40	2	-	-	-	-	-	-	-	42	-	-	-	840	29 36	42	
D	84	-	-	8	-	-	-	-	-	-	6	-	2	-	266		8	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
	01	3	1	-	-	-	-	-	-	-	4	-	-	-	80		4	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	740		37	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	320		16	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			100%			13%			-73%							
'90		00%			00%			00%			+82%							
'96		00%			00%			03%			+24%							
'01		06%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	498	Dec:	53%			
												'90	133		0%			
												'96	740		5%			
												'01	980		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		1	2					
<i>Chrysothamnus viscidiflorus viscidiflorus</i>													
M	84	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	0	-	-	0	
	01	-	-	-	-	-	-	-	0	12	17	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>Gutierrezia sarothrae</i>													
Y	84	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	-	-	-	-	-	5		5	
	96	21	-	-	-	-	-	-	-	21		21	
	01	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	0	-	-	0
	90	13	-	-	-	-	-	-	-	13	19	28	13
	96	181	-	-	-	-	-	-	-	181	16	19	181
	01	98	-	-	-	-	-	-	-	98	13	17	98
D	84	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	0			0
	01	66	-	-	-	-	-	-	-	61	-	5	66
X	84	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	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%		+85%			
	'96	00%			00%			00%		-19%			
	'01	00%			00%			03%					
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	0%
										'90	599		0%
										'96	4040		0%
										'01	3280		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				
Rosa woodsii																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	-	-	-	-	-	-	-	-	-	-	-	-	20	64	72	1
	'01	2	-	-	-	-	-	-	-	-	-	-	-	-	40	60	51	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%				+50%						
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	40		-			

Trend Study 2-25-01

Study site name: Mouth of Two Jump Canyon.

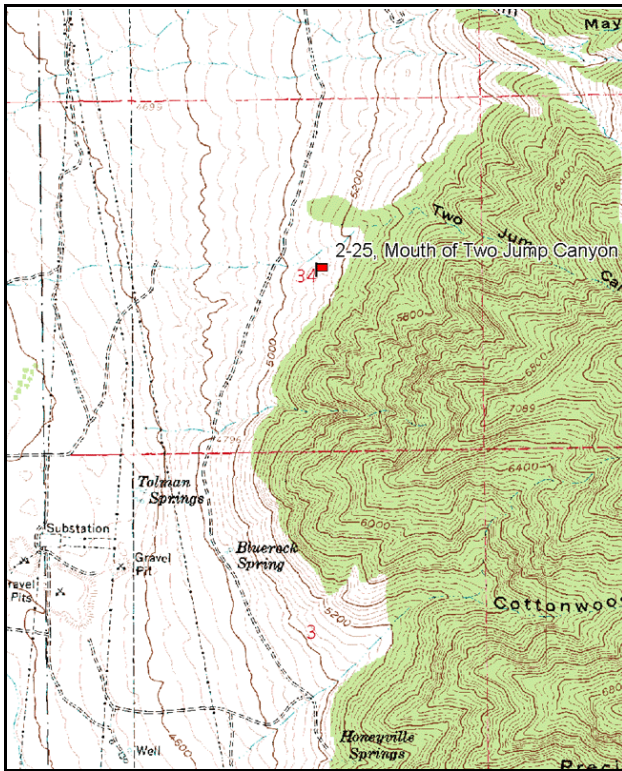
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

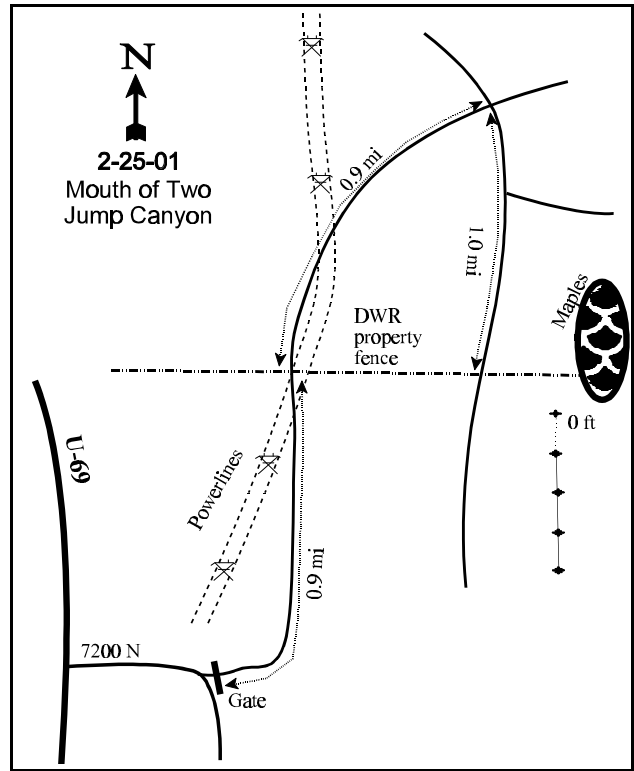
LOCATION DESCRIPTION

From the junction of 7200 North and U-69 in Honeyville, proceed east and north for 0.55 miles to a gate. Proceed 0.9 miles to the north to a fence. Continue another 0.9 miles and turn right (south) and travel 1.0 mile to a fence running east and west. Walk east along the fence (approximately 200 yards) past one maple stand, and stopping at the second which the fence passes through. From where the fence enters the maples walk 16 paces at 244 degrees magnetic to the 0-foot stake of the baseline marked with browse tag #7923.



Map Name: Honeyville

Township 11N, Range 2W, Section 34



Diagrammatic Sketch

UTM 4611016 N, 412202 E

DISCUSSION

Trend Study No. 2-25

The Mouth of Two Jump Canyon trend study samples one of the better mountain big sagebrush types in the unit. Located just south of Two Jump Canyon, the site slopes steeply (30%) to the west at 5,060 feet in elevation. The area received heavy winter use by deer in 1984 and 1990. Use was lighter in 1996 with pellet group quadrat frequency low at only 7% for deer. A pellet group transect read at the site in 2001 estimated 45 deer days use/acre (111 ddu/ha). The deer pellet groups appeared to be primarily from winter use. Cattle also utilize the area, but were not present at the time of study establishment in 1984. Cattle use was estimated at 3 cow days use/acre (7 cdu/ha) in 2001.

Soil is classified as "Sterling Gravelly Loam" (Chadwick et al. 1975) similar to that of the Calls Fort Canyon study (2-24). However, this area is less rocky and not nearly so eroded or depleted of perennial cover as Calls Fort Canyon. Overall soil condition is better and potential rooting depth appears greater. Effective rooting depth (see methods) was estimated at nearly 15 inches. The soil is extremely rocky throughout the profile with a strong calcareous layer at a depth of 6 to 8 inches. Parent material is limestone. Soil texture is a loam with a soil reaction that is moderately alkaline (pH of 7.9). Average soil temperature is high at 73° F at 15 inches in depth. Vegetation and litter cover are abundant and well dispersed effectively limiting erosion. The erosion condition class was determined to be stable in 2001.

Browse composition consists of a dominant population of mountain big sagebrush in association with a less conspicuous but more numerous population of broom snakeweed. Mountain big sagebrush had a population of 2,065 plants/acre in 1984. Seventy-one percent were categorized as large mature plants averaging 3½ feet in height. Most of these shrubs (77%) were heavily utilized, yet vigor was generally good. During the 1990 reading, utilization was mostly moderate with poor vigor classified on nearly half of the population (45%). Percent decadence rose from 26% to 73%, while 44% of the decadent shrubs appeared to be dying. Recruitment was poor with few seedling and young plants sampled. During the 1996 reading, population density increased to 1,860 plants/acre, and there were equal numbers of mature and decadent plants (760 plants/acre). Utilization was light to moderate. Some of the decadent plants sampled from 1990 appeared to have regained their vigor and were now healthy mature plants. Dead plants, first sampled in 1996, numbered 960 plants/acre. Recruitment improved with 200 seedling and 340 young plants/acre estimated. Density has declined slightly in 2001 to 1,460 plants/acre. Utilization is mostly light, but vigor is poor on 21% of the plants sampled with over half (52%) classified as decadent. In addition, 40% (300 plants/acre) of the decadent plants were classified as dying. Reproduction is good however, with 15% of the population consisting of young plants.

The most numerous shrub on the site is broom snakeweed which had an estimated density of 5,580 plants/acre in 1996. Age class analysis indicated an expanding population with a biotic potential (percent of seedlings to total density) of 68% with 25% classified as young plants. During the 2001 reading, density of broom snakeweed increased by 25% to 7,460 plants/acre. Most of the plants are mature (88%) indicating a stable population. A few other shrub species occur rarely in clumps or patches. They include blueberry elder, Rocky Mountain maple, Rocky Mountain smooth sumac, and a few Utah junipers.

The annual grasses, rattlesnake brome, Japanese brome, and cheatgrass dominate the herbaceous understory. They combined to produce nearly 30% cover in 1996, which accounted for 77% of the grass cover. Cover and sum of nested frequency for annual grasses declined in 2001, although they still account for 66% of the grass cover. Perennial grasses are represented by moderate amounts of bluebunch wheatgrass and Sandberg bluegrass. Forbs are diverse and contain some desirable species that include arrowleaf balsamroot, paintbrush, Utah sweetvetch, lomatium, and sulfur erigonum.

1984 APPARENT TREND ASSESSMENT

Soil at the site appears to be stable. Some erosion is apparent, yet is being controlled by a moderately good herbaceous cover. Erosion pavement and rock are important cover categories that tend to armor the soil surface. Vegetative trend is mainly characterized by an apparently stable big sagebrush population. Apart from big sagebrush, the most sensitive parameters to monitor in the future would be the composition of the herbaceous understory which contains several weeds.

1990 TREND ASSESSMENT

This study samples an area of suitable winter range, with an adequate amount of browse forage production. The mountain big sagebrush plants on the site are generally moderately hedged and have fair vigor. Seventy-three percent of the population was classified as decadent, and sagebrush decreased in density. Snakeweed is abundant in the understory with its density increasing 3-fold. The browse trend is considered down. Trend for the herbaceous understory is up with an increase in the sum of nested frequency of perennial grasses and forbs. Considering the shallow, rocky soil, sheet erosion is normal with generally adequate vegetative and litter cover.

TREND ASSESSMENT

soil - stable but poor condition (3)

browse - downward (1)

herbaceous understory - up (5)

1996 TREND ASSESSMENT

Trend for soil is up slightly with an increase in litter cover and a decline in percent bare ground from 7% to less than 1%. This improved soil protection comes primarily from cheatgrass which provides nearly half of the herbaceous cover (46%). Trend for the key browse, mountain big sagebrush, is up slightly. Utilization is lighter, vigor is improved, and percent decadency decreased from 73% to 41%. Total density has increased slightly and recruitment has improved. The high proportion of dead plants coupled with the decline in decadency suggests that the sagebrush population is in a process of changing from an old, over mature population to a younger more vigorous stand. If reproduction remains good in the future and utilization remains light to moderate, the sagebrush stand will be able to maintain itself. One negative aspect of the browse trend is the abundance and dynamic reproductive potential of broom snakeweed. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses increased slightly while that of forbs declined a little.

TREND ASSESSMENT

soil - up slightly (4)

browse - up slightly (4)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable. There is abundant vegetation and litter cover, which combined with rock and pavement cover, leaves very little unprotected bare ground (<1%). Consequently, there is little erosion occurring. Trend for the key browse species, mountain big sagebrush, is down slightly and appears to be suffering the effects of drought. Density has declined slightly while utilization is mostly light. Percent decadence has increased from 41% to 52%. Forty percent of the decadent plants sampled were classified as dying. Reproduction is still good with 15% of the population consisting of young plants. Seedlings are also moderately abundant. Drought conditions also appear to be effecting the broom snakeweed population. It's density has increased 25% since 1996 to 7,460 plants/acre, but 16% of the plants sampled are chlorotic or have partial crown death. The population is now mostly mature. Trend for the herbaceous understory is up due to an increase in the sum of nested frequency for perennial grasses and forbs. In addition, nested frequency of cheatgrass and rattlesnake brome declined significantly. The forb composition has remained unchanged. The dominant forb is still arrowleaf balsamroot which has had stable nested frequency values. Annual forbs increased substantially in sum of nested frequency. The largest increase occurred in pale alyssum.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - up (5)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 25

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	43	65	39	43	19	29	17	18	3.73	2.10
G	Bromus brizaeformis (a)	-	-	_b 267	_a 174	-	-	87	66	4.28	1.18
G	Bromus japonicus (a)	-	-	67	72	-	-	26	29	1.12	.83
G	Bromus tectorum (a)	-	-	_b 373	_a 334	-	-	100	95	20.85	15.16
G	Festuca myuros (a)	-	-	_b 47	_a -	-	-	16	-	1.13	-
G	Koeleria cristata	-	-	5	6	-	-	3	2	.09	.15
G	Poa bulbosa	_a -	_a -	_a 6	_b 26	-	-	3	11	.04	.24
G	Poa secunda	_a 24	_b 100	_b 136	_c 208	16	49	54	77	4.36	6.32
Total for Annual Grasses		0	0	754	580	0	0	229	190	27.40	17.17
Total for Perennial Grasses		67	165	186	283	35	78	77	108	8.22	8.83
Total for Grasses		67	165	940	863	35	78	306	298	35.63	26.00
F	Achillea millefolium	12	16	11	8	5	6	4	3	.33	.06
F	Alyssum alyssoides (a)	-	-	_a 152	_b 260	-	-	66	89	1.00	1.56
F	Allium spp.	_a -	_a 2	_a 7	_b 73	-	2	4	35	.07	.20
F	Ambrosia psilostachya	27	39	31	33	10	19	15	13	.62	.38
F	Apocynum androsaemifolium pumilum	_a -	_b 10	_a -	_b 15	-	8	-	7	-	.18

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Arabis spp.	-	1	1	-	-	1	1	-	.00	-
F	Arenaria fendleri	-	-	-	2	-	-	-	1	-	.03
F	Artemisia ludoviciana	22	24	16	29	9	12	6	12	.52	.38
F	Astragalus spp.	1	-	5	3	1	-	3	1	.04	.03
F	Astragalus utahensis	-	-	5	6	-	-	2	3	.18	.45
F	Balsamorhiza sagittata	_a 33	_b 73	_b 64	_b 67	16	38	35	29	5.22	4.31
F	Castilleja linariaefolia	-	-	3	-	-	-	1	-	.03	-
F	Calochortus nuttallii	-	-	-	5	-	-	-	2	-	.01
F	Cirsium undulatum	-	1	1	4	-	1	1	2	.04	.06
F	Comandra pallida	-	2	6	6	-	2	3	3	.09	.04
F	Cryptantha spp.	-	5	3	3	-	3	1	1	.03	.00
F	Draba spp. (a)	-	-	_a -	_b 48	-	-	-	19	-	.14
F	Epilobium brachycarpum (a)	-	-	1	3	-	-	1	1	.00	.00
F	Erodium cicutarium (a)	-	-	2	-	-	-	2	-	.06	-
F	Eriogonum umbellatum	_a 5	_a 6	_{ab} 16	_b 25	2	3	6	11	.40	.15
F	Gilia spp. (a)	-	-	-	4	-	-	-	1	-	.00
F	Hackelia patens	_a -	_b 18	_{ab} 11	_a 3	-	8	6	1	.25	.00
F	Hedysarum boreale	_a -	_b 12	_a -	_a 1	-	6	-	1	.06	.15
F	Holosteum umbellatum (a)	-	-	_a 17	_b 113	-	-	7	40	.03	.22
F	Lactuca serriola	-	-	1	-	-	-	1	-	.00	-
F	Lithospermum ruderales	4	4	19	22	3	4	10	9	.64	.70
F	Lomatium grayi	_a -	_c 64	_{ab} 8	_b 21	-	31	4	10	.07	.58
F	Machaeranthera canescens	-	-	-	2	-	-	-	1	-	.00
F	Machaeranthera grindelioides	-	-	-	2	-	-	-	1	-	.00
F	Microsteris gracilis (a)	-	-	-	12	-	-	-	8	-	.04
F	Penstemon spp.	_b 7	_{ab} 1	_a -	_{ab} 3	5	1	-	1	.00	.00
F	Phacelia spp.	_c 32	_{ab} 3	_b 7	_a -	17	2	5	-	.12	-
F	Phlox longifolia	-	6	2	4	-	3	1	2	.03	.06
F	Polygonum douglasii (a)	-	-	2	-	-	-	1	-	.00	-
F	Ranunculus testiculatus (a)	-	-	-	2	-	-	-	1	-	.00
F	Tragopogon dubius	_a 1	_a 7	_a 7	_b 34	1	3	4	18	.10	.49
Total for Annual Forbs		0	0	174	442	0	0	77	159	1.10	1.99
Total for Perennial Forbs		144	294	224	371	69	153	113	167	8.90	8.33
Total for Forbs		144	294	398	813	69	153	190	326	10.01	10.32

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

BROWSE TRENDS --

Herd unit 02 , Study no: 25

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	63	55	12.42	7.53
B	Eriogonum microthecum	1	0	-	-
B	Gutierrezia sarothrae	75	83	3.33	4.02
B	Rhus glabra cismontana	0	0	1.37	-
Total for Browse		139	138	17.13	11.56

BASIC COVER --

Herd unit 02 , Study no: 25

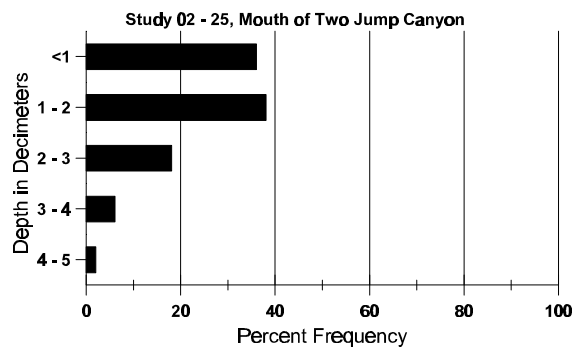
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	387	378	1.50	7.00	56.31	56.03
Rock	210	185	18.00	16.75	14.04	12.02
Pavement	90	131	21.25	13.75	3.66	3.74
Litter	392	384	57.50	55.75	65.69	49.71
Cryptogams	68	51	.50	.25	.70	.48
Bare Ground	26	37	1.25	6.50	.44	.28

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 25, Mouth of Two Jump Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.8	73.4 (14.7)	7.9	43.4	33.4	23.3	3.5	13.3	70.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 25

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	1	6	35	N/A
Elk	-	-	17	1 (3)
Deer	7	14	583	45 (111)
Cattle	2	-	35	3 (7)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 25

A Y 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	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	1	-	-	-	-	-	-	-	1	-	-	-	66		1		
	96	10	-	-	-	-	-	-	-	10	-	-	-	200		10		
	01	5	-	-	-	-	-	-	-	5	-	-	-	100		5		
Y	84	-	1	-	-	-	-	-	-	1	-	-	-	66		1		
	90	1	-	-	-	-	-	-	-	1	-	-	-	66		1		
	96	14	3	-	-	-	-	-	-	17	-	-	-	340		17		
	01	11	-	-	-	-	-	-	-	11	-	-	-	220		11		
M	84	-	5	17	-	-	-	-	-	22	-	-	-	1466	42 43	22		
	90	2	3	-	-	-	-	-	-	4	-	1	-	333	27 33	5		
	96	27	10	1	-	-	-	-	-	36	-	1	1	760	27 41	38		
	01	22	2	-	-	-	-	-	-	24	-	-	-	480	26 35	24		
D	84	-	1	7	-	-	-	-	-	6	-	1	1	533		8		
	90	5	6	5	-	-	-	-	-	7	-	2	7	1066		16		
	96	18	17	1	2	-	-	-	-	25	1	-	12	760		38		
	01	31	7	-	-	-	-	-	-	23	-	-	15	760		38		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	960		48		
	01	-	-	-	-	-	-	-	-	-	-	-	-	940		47		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		23%			77%			06%			-29%							
'90		41%			23%			45%			+21%							
'96		32%			02%			15%			-22%							
'01		12%			00%			21%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	2065	Dec:	26%				
											'90	1465		73%				
											'96	1860		41%				
											'01	1460		52%				

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 microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	18	22	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	0	Dec:	-			
												'90	0		-			
												'96	40		-			
												'01	0		-			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	191	-	-	-	-	-	-	-	-	191	-	-	-	3820			191
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	80	-	-	-	-	-	-	-	-	80	-	-	-	5333			80
	96	67	-	-	2	-	-	-	-	-	69	-	-	-	1380			69
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	46	-	-	-	-	-	-	-	-	46	-	-	-	3066	13	10	46
	90	56	-	-	2	-	-	-	-	-	58	-	-	-	3866	11	12	58
	96	210	-	-	-	-	-	-	-	-	210	-	-	-	4200	11	14	210
	01	329	-	-	-	-	-	-	-	-	278	-	51	-	6580	11	13	329
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	7	-	-	-	-	-	-	-	-	4	-	-	3	466			7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	42	-	-	-	-	-	-	-	-	32	-	5	5	840			42
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
% 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%			02%			-42%							
	'96	00%			00%			00%			+25%							
	'01	00%			00%			16%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3066	Dec:	0%			
												'90	9665		5%			
												'96	5580		0%			
												'01	7460		11%			

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 glabra cismontana																		
S	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	70	107	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 2-26-01

Study site name: Wellsville Canyon.

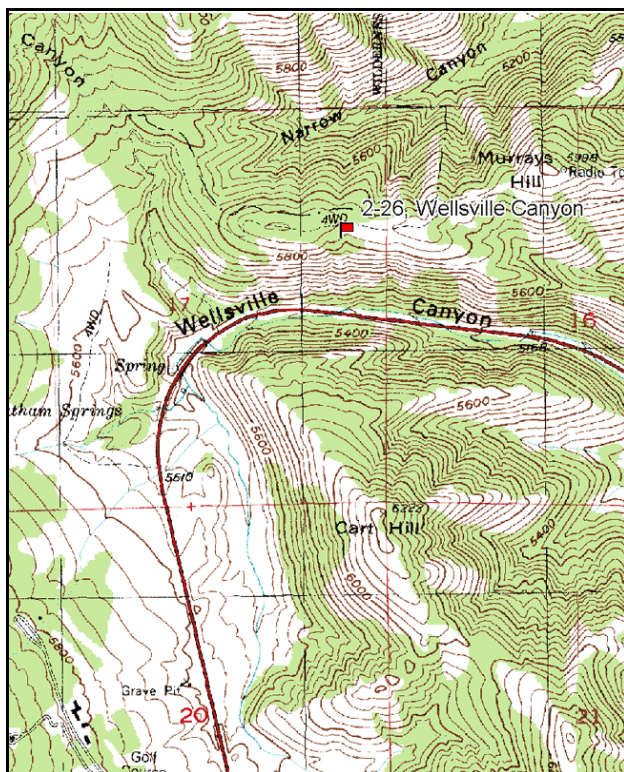
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 170 degrees magnetic.

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

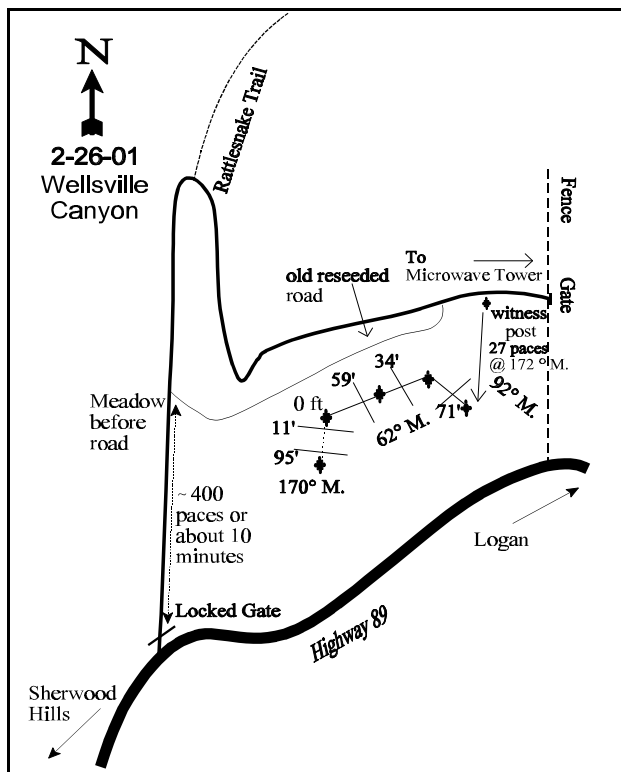
LOCATION DESCRIPTION

From the Sherwood Hills turnoff on U-89, proceed north towards Wellsville Canyon for 1.4 miles to a dirt road and locked gate to Rattlesnake Canyon. Walk up the road approximately 400 paces to a small meadow where an old road (no longer open to vehicle traffic and difficult to tell that it was a road) turns off to the east. Follow the old road approximately ½ mile to near the top of the mountain. Look for another old road coming in from the right. The witness post is just off the fork. The 400-foot baseline stake is located 27 paces away bearing 172 degrees magnetic. The 0-foot baseline stake is 300 feet to the west. The 100-foot baseline runs 170 degrees magnetic. The rest of the baseline runs off the 0-foot baseline stake. Line 2 and 3 run 62 degrees magnetic. Line 4 runs 92 degrees magnetic. The 0-foot baseline stake is marked by browse tag #421.



Map Name: Mount Pisgah

Township 10N, Range 1W, Section 17



Diagrammatic Sketch

UTM 4606465 N, 419171 E

DISCUSSION

Trend Study No. 2-26

The Wellsville Canyon trend study was established in 1990 on an upper south-facing slope to sample a mixed community of sagebrush and mountain brush. The slope is dominated by scattered large clumps of maple, with openings of sagebrush and grass. The study is on a 45% south-facing slope at an elevation of 5,800 feet. It is on Forest Service lands with limited vehicular access. The road to the site is used for maintaining a microwave tower. This slope reportedly receives a large amount of deer winter use. However, sign of deer or elk have been rare with pellet group quadrat frequencies of only 1% in 1996. A pellet group transect read on site in 2001 encountered no pellet groups. A few pellet groups were seen in the area along trails and near a bedding site. It appears that the only use this area receives is during the summer by a few resident deer.

The soil is a shallow, stony clay loam with an effective rooting depth (see methods) estimated at almost 9 inches. Parent material is limestone. The soil reaction is slightly acidic (pH of 6.1). The surface has 14% rock cover along with a high percentage of vegetation and litter cover. Erosion is not a concern for this site and the erosion condition class was determined to be stable in 2001.

Mountain big sagebrush occurs in low densities across the whole south face of the ridge. On the study site, density may be slightly higher. Density was estimated at 1,466 plants/acre in 1990. The population was 68% mature with 23% determined as decadent and 9% classified as young. Utilization was light and vigor normal. Sagebrush density remained similar in 1996, but with a noticeable increase in the proportion of young plants (9% to 25%) and a decline in percent decadence (22% to 5%). Utilization continued to be light. In 2001, density was estimated at 2,220 plants/acre. Utilization was light to moderate, vigor generally good, and percent decadence low at 10%.

Other preferred browse include small numbers of snowbrush ceanothus and widely scattered bitterbrush. A few bitterbrush seen near the site were heavily hedged, but this is expected when they occur in such low numbers. The most numerous browse species include Oregon hollygrape and woods rose. Both species have shown large declines in density after 1990, likely due to the much larger sample size used in 1996 and 2001.

There is a very abundant herbaceous understory comprised of a large diversity of grass and forb species. Introduced grasses have spread from where they were seeded on the old road, down the slope and onto the site. Grasses are dominated by bluebunch and intermediate wheatgrass, tall oatgrass, and Kentucky bluegrass. Annual grasses, Japanese brome and cheatgrass, are also found on the site. Japanese brome is more abundant and accounted for 25% of the grass cover in 1996. It declined significantly in 2001 and now provides only 3% of the grass cover.

The forb composition is very diverse, yet contains several weedy species including ragweed, dog bane, pacific aster, hounds tongue, curly cup gumweed, dyers woad, prickly lettuce, tarweed, curly dock, and yellow salsify.

1990 APPARENT TREND ASSESSMENT

The diverse, vigorous, and productive vegetation on the study site illustrates a stable trend. Other sites on the slope, especially the steeper areas, are in worse condition and have a limited browse component. This site is representative of the more productive areas. The soil trend appears stable as a result of adequate protection by vegetation and litter.

1996 TREND ASSESSMENT

Ground cover characteristics have improved slightly due to an increase in litter cover and a decline in percent bare ground. Vegetation and litter cover are abundant and erosion is not a problem on this site. The browse trend appears stable for the key browse species, mountain big sagebrush. The herbaceous understory is abundant and diverse. Sum of nested frequency for perennial grasses has increased by 33% with sum of nested frequency for Kentucky bluegrass increasing significantly. Perennial forbs declined in their sum of nested frequency value. Overall, trend for the herbaceous understory is considered stable.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil continues to be stable with abundant vegetation and litter cover to protect the soil. Trend for the key browse species, mountain big sagebrush, is stable. Use is heavier than in 1996, but vigor is still normal on most plants and percent decadence has remained low at 10%. The number of young plants has declined but it is still adequate to maintain the stand. Trend for the herbaceous understory is up for perennial grasses and stable for forbs. Sum of nested frequency for perennial grasses has increased 21%. The composition has changed with bluebunch wheatgrass declining significantly in nested frequency while intermediate wheatgrass, tall oatgrass, and Kentucky bluegrass increased significantly. Another positive change in the grass composition is the significant decline in nested frequency of the annuals, Japanese brome and cheatgrass. In 1996, these annual grasses provided 29% of the grass cover. They now produce only 3% of the grass cover. The forb composition is diverse and abundant. There are some useful species found on the site, although several weedy forbs like ragweed, spreading dogbane, and pacific aster provide most of the cover. Overall the herbaceous trend is considered up slightly.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 26

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron intermedium	a-	b24	c72	-	8	22	1.66	5.77
G	Agropyron spicatum	b124	b177	a63	48	58	23	10.84	3.92
G	Arrhenatherum elatius	a-	b25	c89	-	12	34	.92	7.09
G	Bromus carinatus	-	-	2	-	-	2	-	.06
G	Bromus japonicus (a)	-	b263	a82	-	78	30	7.65	.80
G	Bromus tectorum (a)	-	b36	a10	-	14	4	1.24	.07
G	Elymus spp.	-	-	8	-	-	4	-	.09
G	Poa pratensis	a120	a171	b274	44	59	84	7.84	15.52

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	<i>Poa secunda</i>	_b 25	_a 3	_a -	11	2	-	.06	-
Total for Annual Grasses		0	299	92	0	92	34	8.89	0.87
Total for Perennial Grasses		269	400	508	103	139	169	21.34	32.47
Total for Grasses		269	699	600	103	231	203	30.23	33.35
F	<i>Achillea millefolium</i>	31	34	28	13	14	13	.65	1.06
F	<i>Agoseris glauca</i>	_b 15	_a -	_a -	7	-	-	-	-
F	<i>Allium</i> spp.	_a 6	_a -	_b 24	3	-	12	-	.08
F	<i>Ambrosia psilostachya</i>	_a 61	_b 101	_b 103	28	44	41	2.56	1.84
F	<i>Apocynum androsaemifolium pumilum</i>	_b 107	_a 49	_a 30	46	22	12	2.58	1.13
F	<i>Artemisia ludoviciana</i>	36	33	22	14	13	10	.93	.32
F	<i>Aster chilensis</i>	_a 85	_b 121	_{ab} 118	37	44	44	3.41	3.84
F	<i>Camelina microcarpa</i> (a)	-	-	2	-	-	1	-	.00
F	<i>Calochortus nuttallii</i>	-	-	2	-	-	2	-	.01
F	<i>Cirsium undulatum</i>	5	2	-	3	2	-	.09	-
F	<i>Convolvulus arvensis</i>	_a -	_b 12	_c 21	-	6	8	.15	.21
F	<i>Collomia linearis</i> (a)	-	4	4	-	2	2	.01	.01
F	<i>Crepis acuminata</i>	2	-	-	1	-	-	-	-
F	<i>Cynoglossum officinale</i>	13	3	1	5	1	1	.03	.03
F	<i>Dipsacus sylvestris</i>	_a -	_b 20	_b 26	-	9	14	.81	.47
F	<i>Epilobium brachycarpum</i> (a)	-	_b 115	_a 19	-	44	11	2.33	.08
F	<i>Eriogonum umbellatum</i>	3	3	-	1	1	-	.15	-
F	<i>Galium aparine</i> (a)	-	_b 12	_a -	-	5	-	.10	-
F	<i>Gilia</i> spp. (a)	-	-	3	-	-	2	-	.01
F	<i>Grindelia squarrosa</i>	-	1	3	-	1	2	.03	.06
F	<i>Hackelia patens</i>	-	2	6	-	2	2	.03	.01
F	<i>Holosteum umbellatum</i> (a)	-	-	1	-	-	1	-	.00
F	<i>Isatis tinctoria</i>	_c 44	_b 25	_a -	20	12	-	.66	-
F	<i>Lappula occidentalis</i> (a)	-	3	1	-	1	1	.00	.00
F	<i>Lactuca serriola</i>	_b 80	_a 27	_a 32	37	13	19	.14	.19
F	<i>Lithospermum ruderales</i>	-	3	-	-	1	-	.00	-
F	<i>Lomatium grayi</i>	6	2	3	3	1	1	.15	.03
F	<i>Lupinus argenteus</i>	5	1	-	3	1	-	.03	-
F	<i>Madia glomerata</i> (a)	-	2	-	-	1	-	.03	-
F	<i>Melilotus alba</i>	7	3	-	5	1	-	.03	-
F	<i>Melilotus officinalis</i>	8	3	-	3	1	-	.00	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
F	Phacelia spp.	_b 21	_a 3	_{ab} 3	7	2	2	.18	.18
F	Polygonum douglasii (a)	-	3	-	-	1	-	.03	-
F	Rumex crispus	-	6	1	-	2	1	.18	.03
F	Taraxacum officinale	-	1	-	-	1	-	.00	-
F	Tragopogon dubius	_b 225	_a 64	_a 89	83	26	42	.61	1.76
F	Trifolium gymnocarpon	-	2	-	-	1	-	.03	-
F	Zigadenus paniculatus	_a 3	_{ab} 9	_b 20	1	5	7	.15	.14
Total for Annual Forbs		0	139	30	0	54	18	2.51	0.11
Total for Perennial Forbs		763	530	532	320	226	233	13.65	11.47
Total for Forbs		763	669	562	320	280	251	16.17	11.58

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

BROWSE TRENDS --

Herd unit 02 , Study no: 26

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Acer grandidentatum	1	5	.00	.56
B	Artemisia tridentata vaseyana	62	65	7.13	11.04
B	Ceanothus velutinus	2	3	2.22	1.86
B	Gutierrezia sarothrae	0	1	-	.03
B	Mahonia repens	21	20	2.38	2.79
B	Opuntia spp.	0	0	-	.15
B	Rosa woodsii	24	27	.93	.87
B	Symphoricarpos oreophilus	0	1	-	.00
Total for Browse		110	122	12.68	17.32

CANOPY COVER --

Herd unit 02 , Study no: 26

Species	Percent Cover	
	'96	'01
Acer grandidentatum	-	2

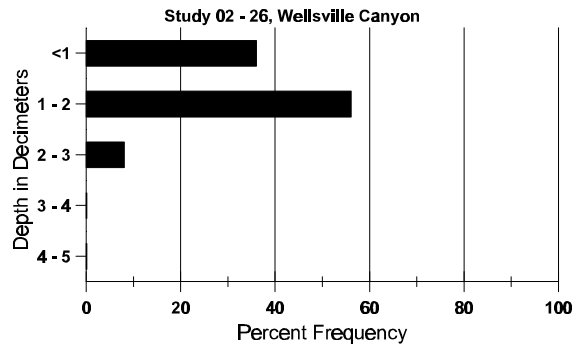
BASIC COVER --
Herd unit 02 , Study no: 26

Cover Type	Nested Frequency		Average Cover %		
	'96	'01	'90	'96	'01
Vegetation	386	385	21.25	60.94	59.15
Rock	230	203	18.50	14.07	13.55
Pavement	45	70	3.75	.23	1.29
Litter	394	382	51.50	60.87	50.37
Cryptogams	-	1	0	0	.03
Bare Ground	49	53	5.00	.75	1.20

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 26, Wellsville Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
8.6	60.6 (10.1)	6.1	32.6	36.1	31.4	6.2	10.7	390.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 26

Type	Quadrat Frequency	
	'96	'01
Elk	1	-
Deer	1	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
-	-
-	-

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 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				
<i>Acer grandidentatum</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	2	-	-	1	-	-	-	-	-	2	-	1	-	60		3	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	30	29	
% 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%			+80%							
'01		00%			00%			20%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			
												'01	100		-			
<i>Artemisia tridentata vaseyana</i>																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500		25	
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	90	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	32	30	
	96	58	10	-	-	-	-	2	-	-	69	-	1	-	1400	24	46	
	01	59	31	4	-	-	-	-	-	-	89	3	2	-	1880	25	37	
D	90	3	1	-	1	-	-	-	-	-	5	-	-	-	333		5	
	96	3	2	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	7	4	-	-	-	-	-	-	-	9	-	-	2	220		11	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		09%			00%			00%			+27%							
'96		12%			00%			01%			+10%							
'01		32%			04%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	1466	Dec:	23%			
												'96	2000		5%			
												'01	2220		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>Ceanothus velutinus</i>																		
M	90	-	3	-	-	-	-	-	-	-	3	-	-	-	200	30	20	3
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40	45	164	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	54	119	0
D	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>							
'90		100%			00%			00%			-80%							
'96		00%			00%			00%			+33%							
'01		100%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	200	Dec:	0%				
											'96	40		0%				
											'01	60		100%				
<i>Gutierrezia sarothrae</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	28	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	4	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%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	-				
											'96	0		-				
											'01	20		-				
<i>Mahonia repens</i>																		
Y	90	460	-	-	55	-	-	-	-	-	515	-	-	-	34333			515
	96	52	-	-	4	-	-	-	-	-	56	-	-	-	1120			56
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	90	153	-	-	40	-	-	-	-	-	193	-	-	-	12866	6	6	193
	96	210	-	-	10	-	-	-	-	-	220	-	-	-	4400	7	8	220
	01	359	-	-	27	-	-	-	-	-	361	25	-	-	7720	4	6	386
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			-88%							
'96		00%			00%			00%			+28%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	47199	Dec:	-				
											'96	5520		-				
											'01	7720		-				

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				
Purshia tridentata																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	38	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	30	50	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		-			
Rosa woodsii																		
S	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	90	140	-	-	47	-	-	-	-	-	187	-	-	-	12466			187
	96	29	-	-	-	-	-	-	-	-	29	-	-	-	580			29
	01	11	-	-	-	-	-	1	-	-	12	-	-	-	240			12
M	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	2	1
	96	24	-	-	11	-	-	-	-	-	35	-	-	-	700	17	12	35
	01	38	2	-	6	-	-	9	-	-	55	-	-	-	1100	15	8	55
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			-90%							
'96		00%			00%			00%			+ 4%							
'01		03%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	12532	Dec:	-			
												'96	1280		-			
												'01	1340		-			
Symphoricarpos oreophilus																		
Y	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>							
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	0		-			
												'01	20		-			

Trend Study 2-27-01

Study site name: Laketown Canyon.

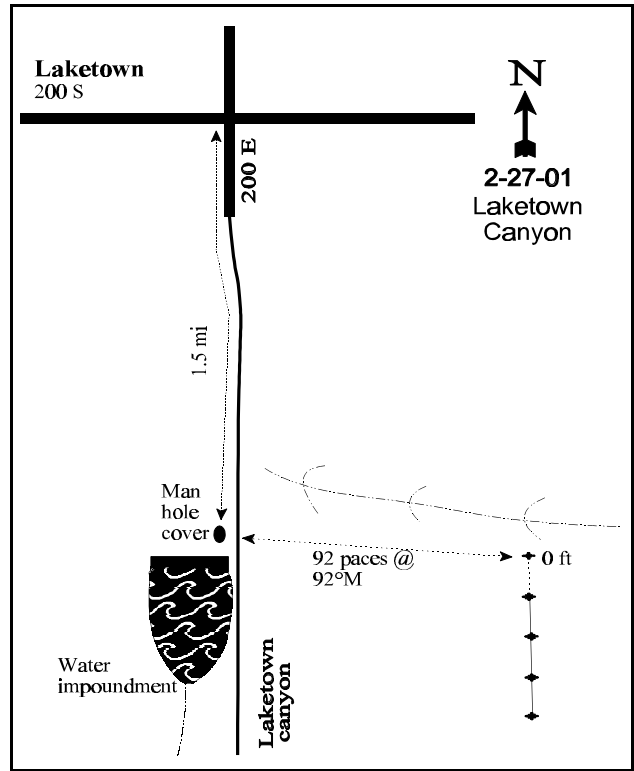
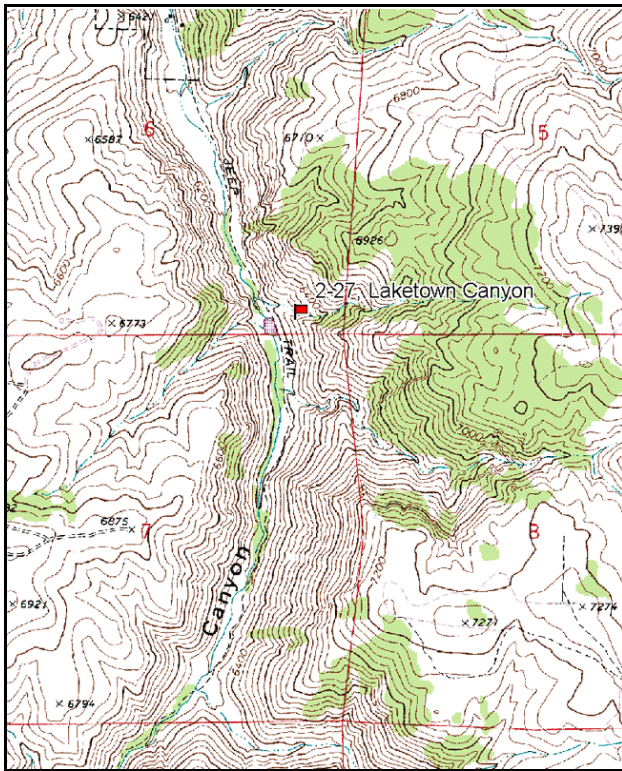
Vegetation type: Mountain Mahogany.

Compass bearing: frequency baseline 162 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). No rebar marking belt placement.

LOCATION DESCRIPTION

From 200 East 200 South in Laketown, proceed south into Laketown Canyon 1.5 miles stopping at a stockpond dam. Walk to the manhole cover on the northeast corner of the dam. Take an azimuth of 92 degrees magnetic and walk 92 paces up the ridge to the 0-foot baseline stake. The 0-foot stake is marked with browse tag #7937.



Map Name: Laketown

Diagrammatic Sketch

Township 12N, Range 6E, Section 7

UTM 4627657 N, 474653 E

DISCUSSION

Trend Study No. 2-27

The Laketown Canyon study samples a mountain mahogany winter range located on a steep (55%), west-facing slope. The range type is mixed mountain brush. At 6,300 feet elevation, the study site is within critical deer winter range limits. Although elk are known to inhabit this general area, there is little elk sign on this particular site. In contrast, deer and domestic sheep pellet groups, tracks, and other signs were very common and the more preferred browse species heavily hedged in 1984. Deer pellet groups were not very abundant in 1996 with a quadrat frequency of only 9%. A pellet group transect read on the site in 2001 estimated 42 deer days use/acre (103 ddu/ha). About 90% of the deer pellet groups encountered appear to be from winter use with approximately 10% from late winter/early spring. A few moose pellet groups were seen near the site but not encountered within the pellet group transect. Cattle sign occurs at the bottom of the slope around a nearby stock pond, but not on the steep slopes of the site itself.

Soil is within a mapping unit known as the "Lundy Dry-Rock Outcrop Complex". Soils in this unit are all very gravelly loams that are excessively drained and moderately permeable to water. Formed residually or colluvially from limestone, these soils normally possess only a 16 inch profile before fractured limestone bedrock is encountered. Strongly calcareous and moderately alkaline, the Lundy soil usually dries completely in mid-summer. Erosion is moderate to high (Campbell and Lacey 1982). Soil at the site has a loam texture with a slightly alkaline (pH of 7.6) soil reaction. Effective rooting depth (see methods) is estimated at just under 12 inches. Some bare ground is exposed on the site mainly along trails which follow the contour. Soil movement is evident and consists primarily of pedestalled soil on the uphill side of shrubs. There are no active gullies. The erosion condition class was determined to be slight in 2001.

Browse composition includes several co-dominant shrubs of which the most important are black sagebrush, true mountain mahogany, and mountain big sagebrush. Black sagebrush is the most abundant preferred species with a density of 1,160 plants/acre in 2001. Utilization is mostly light and percent decadence is low at 19%. Mountain big sagebrush occurs in scattered clumps where the soil is significantly deeper. These shrubs were moderately hedged with 80% showing poor vigor in 1996. Percent decadency was high in 1984, 1990 and 1996, ranging from 70% to 100%. No reproduction was noted in past readings and dead plants outnumbered live ones by a ratio of 3 to 1 in 2001. True mountain mahogany numbered only 240 plants/acre in 2001. The average mature shrub measured just over 4 feet in height, but some plants on the site are tall enough to be partly unavailable. Utilization was extremely heavy in 1984, when 92% of the mahogany was heavily hedged (>60% of twigs browsed). Use since then has been mostly moderate.

Less desirable shrubs found on the site include green rubber rabbitbrush, stickyleaf low rabbitbrush, broom snakeweed, gray horsebrush, snowberry, and Utah juniper. Point-center quarter data from 1996 estimated 40 juniper trees/acre with an average diameter of 6 inches. Broom snakeweed is the most abundant shrub with a density of 3,180 plants/acre in 2001.

Herbaceous understory plants are limited to a moderately dense stand of cheatgrass intermixed with Sandberg bluegrass, bluebunch wheatgrass, and Indian ricegrass. Cheatgrass accounted for 34% of the grass cover in 1996 and 25% in 2001. Forbs occur infrequently and combine to produce about 2% total cover.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be declining because of moderately high erosion resulting from a lack of perennial herbaceous cover. An improvement in this cover category would do much to stabilize this soil. The vegetative trend also appears to be declining due to the extremely heavy use, poor vigor, and high percent decadence of black sagebrush and mountain big sagebrush.

1990 TREND ASSESSMENT

The key browse species, black sagebrush and mountain big sagebrush, display downward trends in lack of reproduction and severely hedged growth forms. However, on the plants sampled in the transect and classified, recent hedging has been more moderate and growth and vigor normal on most plants. The number of true mountain mahogany remains low. The mahogany population declined 31%, while 44% of the population was classified as decadent. Broom snakeweed remains the most common species, although it did decrease by 58%. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency for perennial grasses. Sandberg bluegrass increased significantly in nested frequency as it forms a dense understory. However, the cover value for bare soil increased to 13% with signs of slight soil movement.

TREND ASSESSMENT

soil - slightly downward (2)

browse - down (1)

herbaceous understory - up slightly (4)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in bare ground from 13% to 7% and an increase in litter cover from 25% to 31%. Some soil movement is inevitable due to the steep slope, although current erosion is minimal. Trend for browse is stable for true mountain mahogany and black sagebrush, but declining for mountain big sagebrush. This site is obviously harsh for many shrubs. Mountain big sagebrush has no reproduction and only moderate use, yet shows poor vigor and high decadency. Without some recruitment, mountain big sagebrush will eventually die out. However, it is only a minor component in the browse composition as it only makes up 2% of the browse cover. Black sagebrush is lightly utilized with similar vigor as noted in 1990, yet percent decadence has declined from 94% to 34%. The density change between 1990 and 1996 may be partly due to the much larger sample used in 1996 which effectively tripled the sample size. There are high numbers of dead plants for both sagebrush species. Overall browse trend is considered stable. Trend for the herbaceous understory is up with an increase in the sum of nested frequency for both perennial grasses and forbs. Sum of nested frequency for bluebunch wheatgrass doubled since 1990. Forbs are still limited even with sum of nested frequency for perennial species increasing by 70%.

TREND ASSESSMENT

soil - up (5)

browse - stable for black sagebrush and mahogany (3)

herbaceous understory - up (5)

2001 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in percent bare ground from 7% to 14%. Percent cover of vegetation and litter also declined slightly. There is some erosion occurring due to the steep slope, but it does not appear to be excessive and the erosion condition class was determined to be slight. Trend for the key browse species, black sagebrush and true mountain mahogany, appear to be stable. Density of both species has remained similar to 1996 estimates. Utilization is somewhat heavier on black sagebrush but lighter on mahogany. Average vigor has improved on black sagebrush while percent decadence has declined from 34% to 19%. Vigor of true mountain mahogany remains normal and there are no decadent plants. Annual leader growth averaged only 2.2 inches in 2001. Mountain big sagebrush offers some additional preferred winter forage, however, it occurs in relatively low densities (100 plants/acre). Density has declined 50% since 1996. The drop in density comes entirely from the decadent age class. The remaining population is lightly browsed,

shows improved vigor, while percent decadence has declined from 70% in 1996 to 20% in 2001. This is obviously a marginal site for mountain big sagebrush, especially during a drought year. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency for perennial grasses and forbs. The most abundant grass, Sandberg bluegrass, has declined significantly in nested frequency. The two other common perennial species, bluebunch wheatgrass and Indian ricegrass, increased slightly, although not significantly. Cheatgrass declined significantly and declined in percent cover from 9% to 5%. Perennial forbs are still lacking.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - down slightly (2)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 27

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 30	_a 37	_b 80	_b 111	15	15	35	41	6.01	7.86
G	Bromus brizaeformis (a)	-	-	_a 9	_b 32	-	-	3	10	.04	.67
G	Bromus japonicus (a)	-	-	3	4	-	-	1	1	.00	.00
G	Bromus tectorum (a)	-	-	_b 315	_a 163	-	-	95	65	8.50	5.09
G	Carex spp.	-	-	-	4	-	-	-	1	-	.03
G	Koeleria cristata	-	-	2	4	-	-	2	2	.06	.03
G	Oryzopsis hymenoides	37	40	40	56	20	17	20	21	2.66	3.91
G	Poa secunda	_a 136	_c 270	_c 276	_b 182	55	92	89	71	6.79	1.93
G	Stipa comata	_a 13	_a 3	_{ab} 21	_b 30	5	3	9	13	.85	1.02
Total for Annual Grasses		0	0	327	199	0	0	99	76	8.54	5.77
Total for Perennial Grasses		216	350	419	387	95	127	155	149	16.38	14.81
Total for Grasses		216	350	746	586	95	127	254	225	24.93	20.58
F	Alyssum alyssoides (a)	-	-	_a 28	_b 49	-	-	11	22	.10	.11
F	Arabis spp.	4	-	4	6	2	-	2	2	.01	.01
F	Astragalus convallarius	-	-	3	-	-	-	2	-	.01	-
F	Camelina microcarpa (a)	-	-	1	4	-	-	1	3	.00	.07
F	Calochortus nuttallii	-	-	-	1	-	-	-	1	-	.00
F	Chaenactis douglasii	3	3	4	-	1	2	3	-	.01	-
F	Cirsium undulatum	_c 19	_{bc} 5	_{ab} 4	_a -	8	4	2	-	.06	-
F	Crepis acuminata	-	-	-	6	-	-	-	2	-	.06
F	Cryptantha spp.	_a 4	_{ab} 15	_c 44	_{bc} 49	2	8	24	17	.93	1.55
F	Descurainia pinnata (a)	-	-	_a -	_b 8	-	-	-	5	-	.02
F	Draba spp. (a)	-	-	-	3	-	-	-	1	-	.01
F	Epilobium brachycarpum (a)	-	-	8	-	-	-	4	-	.02	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Eriogonum umbellatum</i>	-	-	-	2	-	-	-	1	-	.00
F	<i>Hackelia patens</i>	_a -	_b 17	_b 12	_b 10	-	7	7	5	.14	.02
F	<i>Lappula occidentalis</i> (a)	-	-	-	9	-	-	-	3	-	.04
F	<i>Machaeranthera grindelioides</i>	-	-	3	3	-	-	1	1	.03	.03
F	<i>Microsteris gracilis</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Penstemon humilis</i>	_a -	_a -	_b 15	_{ab} 8	-	-	6	3	.27	.01
F	<i>Phlox hoodii</i>	-	-	4	7	-	-	3	3	.04	.06
F	<i>Senecio multilobatus</i>	_b 12	_a -	_b 28	_a -	8	-	13	-	.18	-
F	<i>Tragopogon dubius</i>	_b 14	_a -	_a 1	_a -	6	-	1	-	.00	-
F	<i>Verbascum thapsus</i>	_{ab} 8	_a -	_b 10	_a 1	4	-	5	1	.10	.03
Total for Annual Forbs		0	0	37	74	0	0	16	35	0.12	0.26
Total for Perennial Forbs		64	40	132	93	31	21	69	36	1.81	1.80
Total for Forbs		64	40	169	167	31	21	85	71	1.94	2.06

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

BROWSE TRENDS --

Herd unit 02 , Study no: 27

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	<i>Artemisia nova</i>	30	28	3.37	2.23
B	<i>Artemisia tridentata vaseyana</i>	9	5	.18	-
B	<i>Cercocarpus montanus</i>	8	8	1.20	1.36
B	<i>Chrysothamnus nauseosus consimilis</i>	19	14	3.09	3.56
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	12	12	.72	.49
B	<i>Eriogonum microthecum</i>	0	1	.00	-
B	<i>Gutierrezia sarothrae</i>	57	53	1.58	2.03
B	<i>Juniperus osteosperma</i>	0	0	.00	-
B	<i>Juniperus scopulorum</i>	1	1	-	-
B	<i>Symphoricarpos oreophilus</i>	2	2	-	.06
B	<i>Tetradymia canescens</i>	10	8	.39	.48
Total for Browse		148	132	10.56	10.23

BASIC COVER --

Herd unit 02 , Study no: 27

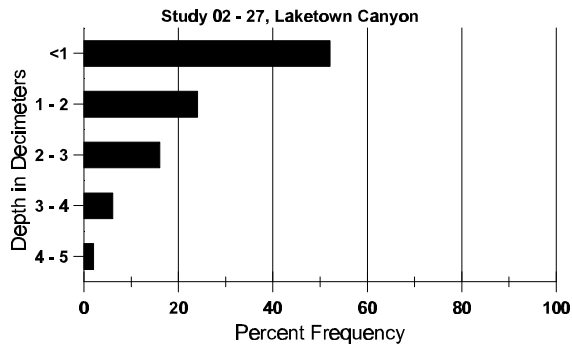
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	364	330	2.75	9.50	37.45	34.99
Rock	309	258	33.25	30.75	26.56	24.75
Pavement	229	283	7.00	11.25	6.03	8.76
Litter	384	355	38.00	25.25	30.82	32.23
Cryptogams	164	92	13.75	10.75	2.84	2.50
Bare Ground	200	218	5.25	12.50	7.39	14.36

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 27, Laketown Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.8	58.0 (11.9)	7.6	39.2	37.4	23.4	2.4	5.6	153.6	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 27

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Rabbit	6	-	17	N/A
Elk	1	-	-	-
Deer	9	5	539	42 (103)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 27

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																		
S	84	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	2	1	-	-	-	-	-	-	3	-	-	-	100		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	10	-	-	-	-	-	-	10	-	-	-	333	7	8	10
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	10	16	1
	96	44	1	-	1	-	-	-	-	-	45	-	1	-	920	15	28	46
	01	37	7	-	-	-	-	-	-	-	44	-	-	-	880	11	19	44
D	84	-	-	26	-	-	-	-	-	-	26	-	-	-	866		26	
	90	9	8	-	-	-	-	-	-	-	14	-	-	3	566		17	
	96	24	1	-	-	-	-	-	-	-	14	-	1	10	500		25	
	01	7	2	1	1	-	-	-	-	-	8	-	-	3	220		11	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	360		18	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	320		16	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		05%			95%			00%			-54%							
'90		44%			00%			17%			+59%							
'96		03%			00%			16%			-21%							
'01		16%			02%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1299	Dec:	67%			
												'90	599		94%			
												'96	1460		34%			
												'01	1160		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				
<i>Artemisia tridentata vaseyana</i>												
Y	84	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	20		1	
M	84	-	-	1	-	-	-	-	33	16	18	1
	90	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	1	-	-	-	-	60	18	31	3
	01	3	-	-	-	-	-	-	60	31	37	3
D	84	-	2	6	-	-	-	-	266			8
	90	1	-	-	-	-	-	-	33			1
	96	1	5	1	-	-	-	-	140			7
	01	1	-	-	-	-	-	-	20			1
X	84	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	480			24
	01	-	-	-	-	-	-	-	300			15
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'84		22%		78%		33%		-89%				
'90		00%		00%		00%		+84%				
'96		50%		20%		80%		-50%				
'01		00%		00%		20%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	299	Dec:	89%			
						'90	33		100%			
						'96	200		70%			
						'01	100		20%			
<i>Cercocarpus ledifolius</i>												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	0	40	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%		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								
Cercocarpus montanus																
S	84	9	1	-	-	-	-	-	-	10	-	-	-	333		10
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	1	2	-	-	-	-	-	3	-	-	-	100		3
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	2	-	-	-	2	-	-	-	40		2
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	-	10	-	-	-	-	-	10	-	-	-	333	48 59	10
	90	2	3	-	-	-	-	-	-	5	-	-	-	166	40 45	5
	96	-	4	2	-	2	-	-	-	6	2	-	-	160	38 56	8
	01	4	8	-	-	-	-	-	-	12	-	-	-	240	51 72	12
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	2	-	-	-	-	-	-	2	-	-	-	133		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		08%			92%			00%			-31%					
'90		71%			00%			00%			-33%					
'96		80%			20%			00%			+17%					
'01		67%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'84	433	Dec:	0%			
										'90	299		44%			
										'96	200		0%			
										'01	240		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 consimilis																		
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	5	-	-	-	-	-	-	-	-	4	1	-	-	333	32	26	5
	96	25	-	-	-	-	-	-	-	-	22	-	3	-	500	26	41	25
	01	13	-	-	-	-	-	-	-	-	13	-	-	-	260	30	48	13
D	84	3	5	-	-	-	-	-	-	-	8	-	-	-	266		8	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	5	-	-	-	-	-	-	-	-	1	-	4	-	100		5	
	01	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		70%			00%			00%			+17%							
'90		00%			00%			00%			+36%							
'96		00%			00%			23%			-32%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	80%			
												'90	399		17%			
												'96	620		16%			
												'01	420		38%			

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								
Y	84	6	-	-	-	-	-	6
	90	-	-	-	-	-	-	0
	96	1	-	-	-	-	-	1
	01	-	-	-	-	-	-	0
M	84	9	-	-	-	-	-	9
	90	6	-	-	-	-	-	6
	96	14	-	2	-	-	-	16
	01	10	-	-	-	-	-	10
D	84	-	-	-	-	-	-	0
	90	-	-	-	-	-	-	0
	96	3	-	-	-	-	-	3
	01	6	1	-	-	-	-	7
X	84	-	-	-	-	-	-	0
	90	-	-	-	-	-	-	0
	96	-	-	-	-	-	-	1
	01	-	-	-	-	-	-	1
% 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%		00%		+50%
	'96	00%		00%		15%		-15%
	'01	06%		00%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'84	500	Dec: 0%
						'90	200	0%
						'96	400	15%
						'01	340	41%
Eriogonum microthecum								
D	84	-	-	-	-	-	-	0
	90	-	-	-	-	-	-	0
	96	-	-	-	-	-	-	0
	01	1	-	-	-	-	-	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: 0%
						'90	0	0%
						'96	0	0%
						'01	20	100%

A Y 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	11	-	-	-	-	-	-	733		11
	96	5	-	-	-	-	-	-	100		5
	01	-	-	-	-	-	-	-	0		0
Y	84	63	-	-	-	-	-	-	2100		63
	90	35	-	-	-	-	-	-	1166		35
	96	34	-	-	-	-	-	-	680		34
	01	1	-	-	-	-	-	-	20		1
M	84	80	-	-	-	-	-	-	2666	8 9	80
	90	15	-	-	-	-	-	-	500	13 12	15
	96	137	-	-	-	-	-	-	2740	10 11	137
	01	157	-	-	-	-	-	-	3140	8 12	157
D	84	-	-	-	-	-	-	-	0		0
	90	5	-	-	-	-	-	-	333		5
	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%		-58%			
'90		00%		00%		04%		+42%			
'96		00%		00%		00%		- 7%			
'01		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'84	4766	Dec:	0%		
						'90	1999		17%		
						'96	3420		0%		
						'01	3180		1%		
<i>Juniperus scopulorum</i>											
Y	84	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	0		0
	96	1	-	-	-	-	-	-	20		1
	01	-	-	-	-	-	-	-	0		0
M	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		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)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4		1	2	
Leptodactylon pungens									
M	84	2	-	-	-	66	4	4	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	00%		00%		00%			
	'90	00%		00%		00%			
	'96	00%		00%		00%			
	'01	00%		00%		00%			
Total Plants/Acre (excluding Dead & Seedlings)						'84	66	Dec:	-
						'90	0		-
						'96	0		-
						'01	0		-
Symphoricarpos oreophilus									
Y	84	-	-	-	-	0			0
	90	-	-	-	-	0			0
	96	2	-	-	-	40			2
	01	-	-	-	-	0			0
M	84	-	-	-	-	0	-	-	0
	90	-	-	-	-	0	-	-	0
	96	-	2	-	-	40	17	28	2
	01	1	-	-	-	20	11	13	1
D	84	-	-	-	-	0			0
	90	-	-	-	-	0			0
	96	-	-	-	-	0			0
	01	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	50%		00%		100%		-50%	
	'01	00%		00%		00%			
Total Plants/Acre (excluding Dead & Seedlings)						'84	0	Dec:	0%
						'90	0		0%
						'96	80		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				
Tetradymia canescens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	9	10	1
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100	7	7	3
	96	11	-	-	-	-	-	-	-	-	6	-	5	-	220	11	20	11
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100	10	17	5
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	-	-	2	-	40		2	
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+34%							
'90		00%			00%			00%			+64%							
'96		00%			00%			50%			+ 7%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	100		0%			
												'96	280		14%			
												'01	300		67%			

Trend Study 2-28-01

Study site name: North Eden.

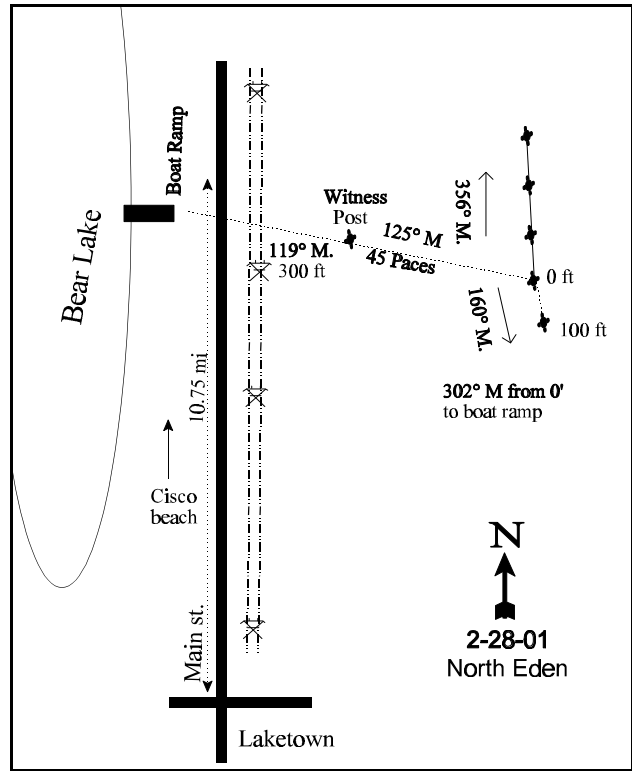
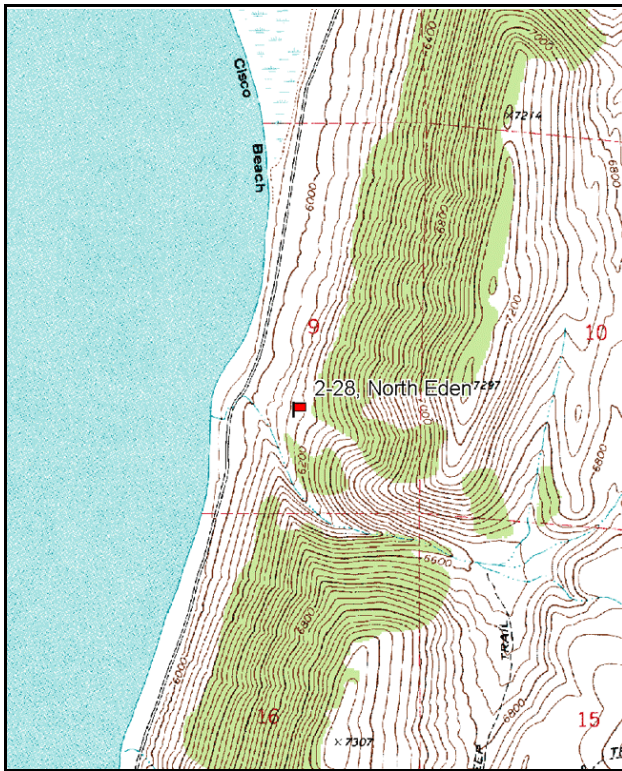
Vegetation type: Big Sagebrush.

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 Bear Lake road and Main Street in Laketown, proceed north on Main Street 10.75 miles along the east shore. Turn right onto a dirt road proceeding to a power line. From the power line, walk up the slope on a bearing of 119 degrees magnetic for 300 feet to a witness post. From the witness post, walk 45 paces at 119 degrees magnetic to the 0-foot stake of the baseline, marked with browse tag #7979. The first 100 feet of the baseline runs 160 degrees magnetic. The rest of the baseline runs off the 0-foot baseline stake and runs in a direction of 356 degrees magnetic.



Map Name: Bear Lake South

Diagrammatic Sketch

Township 14N, Range 6E, Section 9

UTM 4645840 N, 477747 E

DISCUSSION

Trend Study No. 2-28

The North Eden trend study is located on the east side of Bear Lake between north and South Eden Canyons. This area mostly faces west and is characterized by steep slopes that gradually level off as they get to the lake. The study site is on a moderate sloping (25%) bench at 6,160 feet in elevation. The vegetation type is a mixture of mountain big sagebrush/black sagebrush/grass interrupted by scattered Utah juniper. Animal use is moderate to heavy and divided between deer, cattle and possibly sheep in the past. Quadrat frequency for deer pellet groups was moderately high at 39% in 1996. Quadrat frequency remained similar in 2001 at 36%. A pellet group transect read on the site in 2001 estimated 108 deer days use/acre (266 ddu/ha). Cattle use was estimated at 3 cow days use/acre (7 cdu/ha). The cattle pats encountered appear to be from last year, while nearly all of the deer pellet groups appeared to be from winter use. Rabbit sign was also fairly abundant.

According to SCS maps, soil at the site is "Dagan Gravelly Silt Loam," a moderately deep, well drained soil derived from quartzite-sandstone conglomerate. This is a moderately calcareous, mildly alkaline soil with low water holding capability. Potential rooting depth is not significantly impaired even though there is sometimes a slight calcium carbonate accumulation at about 28 inches in depth. All the Dagan soils are subject to rapid runoff and have high erosion hazards (Campbell and Lacey 1982). Soil analysis of the site shows it has a clay loam texture, a neutral pH, and an estimated effective rooting depth (see methods) of nearly 12 inches. There is little rock on the surface or within the profile and no evidence of a hardpan. Bare ground isn't abundant, but where protective vegetation and litter cover are limited, erosion is occurring. The erosion condition class was determined to be slight in 2001.

The key browse species are Wyoming big sagebrush and black sagebrush. Density of black sagebrush declined from 2,065 to 440 plants/acre between 1990 and 1996. Due to the low number of dead plants and low decadency rate in 1996, this change in density is mostly the result of the much larger sample used in 1996 which lengthened the baseline from 100 feet to 400 feet. This new estimate would be more representative of the whole area. In contrast, Wyoming big sagebrush shows a continually declining density from 5,332 plants/acre in 1984 to 2,800 by 1996 and 2,560 in 2001. Dead plants were nearly as numerous as live ones in 1996 (1,900 plants/acre), indicating a die-off. The ratio of dead to live plants was 1 dead plant to 1.5 live plants. Utilization of both sagebrush species has been intense in the past (1984), but use of black sagebrush was moderate in 1996 and mostly light in 2001. Wyoming big sagebrush has displayed consistently moderate to heavy use over the years. Percent decadence has remained consistently high, ranging from 60% in 1990 to 46% in 1996. In 1996 and 2001, about one-third of the decadent sagebrush were classified as dying. Reproduction has been inadequate to maintain the population since 1990 due to poor numbers of seedlings and young.

Other shrub species include stickyleaf low rabbitbrush, white rubber rabbitbrush, prickly pear, and Utah juniper. None occur very frequently or sustain much browsing use. They will likely remain secondary in importance. Point-center quarter data from 2001 estimated 72 juniper trees/acre with an average diameter of just over 3 inches. Overhead canopy cover was estimated at 9%.

Herbaceous cover consists mainly of perennial grasses. Annual cheatgrass is also abundant and accounted for 21% of the grass cover in 1996, declining to 10% in 2001. Perennial grasses are best represented by bluebunch wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. Forbs are uncommon and produce only 2% cover.

1984 APPARENT TREND ASSESSMENT

The soil is in poor condition. Pedestalling, rills, and flow patterns indicate active erosion is occurring. Cover is irregular in nature and the many areas of bare soil provide ready erosion pathways. Vegetative trend appears stable or slightly down. In the future it will be important to monitor the relative abundance of the two key browse species, black sagebrush and Wyoming big sagebrush.

1990 TREND ASSESSMENT

Trend for browse is down. Wyoming big sagebrush and black sagebrush have both declined and many dead and decadent sagebrush are evident. The Wyoming big sagebrush population is 60% decadent, while the black sagebrush population improved from 70% to 32% decadency. As opposed to the heavily hedged growth forms recorded in 1984, the sagebrush appear to be only moderately hedged. Trend for the herbaceous understory is up due to an increase in the sum of nested frequency of perennial grasses and forbs. Although the grasses have been heavily grazed, the frequency of bluebunch wheatgrass has increased significantly. The soil trend is down slightly. Cover of cryptograms and litter decreased, leading to an increase in the amount of bare soil. However, this would be expected with the many years of drought. Sheet and gully erosion are noticeable.

TREND ASSESSMENT

soil - down slightly (2)

browse - down (1)

herbaceous understory - up (5)

1996 TREND ASSESSMENT

Trend for soil is up with a 57% decline in percent bare ground and a slight increase in litter cover. Erosion is still occurring but it is localized and not severe. The larger sample used in 1996 estimates cover of black sagebrush at only about 2%, while that of Wyoming big sagebrush at 14% cover. This new, much larger sample estimated only 440 black sagebrush plants/acre instead of 2,065 estimated in 1990. The larger sample better estimates shrub populations which sometimes have aggregated and/or discontinuous distributions. The lack of significant numbers of dead black sagebrush plants encountered in 1996 (40 plants/acre) would present evidence that no significant die-off of black sagebrush has occurred. Black sagebrush displays a stable trend with light to moderate use, generally good vigor, and a low decadency rate. Wyoming big sagebrush appears to have a slightly downward trend. Total density declined 19% since 1990. Use is more moderate, yet vigor is still poor on 26% of the population. Percent decadency has declined, but it is still high at 46%. Recruitment is down with 28% of the decadent shrubs classified as dying. The extremely high proportion of dead plants (1,900 plants/acre) indicates that the population has declined. Taking all these factors into consideration, the Wyoming big sagebrush population will likely decline further in the future and the remaining plants will be younger and more vigorous. The herbaceous understory trend is slightly down. The sum of nested frequency for perennial grasses declined slightly since 1990, while the nested frequency for bluebunch wheatgrass declined significantly. Sum of nested frequency for perennial forbs also declined by 64%.

TREND ASSESSMENT

soil - up (5)

browse - slightly down (2)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1996. There is some erosion occurring in the form of pedestalling, flow patterns, rills, and soil movement. The erosion condition class was determined to be slight. However, there is adequate vegetation and litter cover on the site. Trend for browse is down slightly for both black sagebrush and Wyoming big sagebrush. Both sagebrush have declined in density, increased in decadence, and display poor reproduction. Wyoming big sagebrush accounts for 53% of the browse cover. It shows similar moderate to heavy use that was reported in 1996. Percent decadence has increased from 46% to 56% with one-third (420 plants/acre) of the decadent plants sampled classified as dying. Reproduction is poor and not nearly enough to maintain the population. The population will further decline unless normal precipitation patterns return. Trend for the herbaceous understory is considered stable. Sum of nested frequency for perennial grasses and forbs has declined slightly, yet the dominant species, bluebunch wheatgrass, has increased slightly. Sandberg bluegrass has declined significantly in nested frequency, but cover is similar to 1996 estimates. Forbs are still lacking as all species combined produce only 2% cover.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 28

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 161	_b 210	_a 137	_a 155	71	83	54	56	7.19	10.05
G	Bromus tectorum (a)	-	-	152	173	-	-	52	60	4.32	2.15
G	Oryzopsis hymenoides	3	-	-	14	2	-	-	4	.03	.86
G	Poa secunda	_a 210	_c 303	_c 284	_b 239	85	95	89	79	8.09	7.41
G	Sitanion hystrix	_{bc} 26	_a 5	_b 47	_{ab} 20	13	2	18	8	1.29	.75
Total for Annual Grasses		0	0	152	173	0	0	52	60	4.32	2.15
Total for Perennial Grasses		400	518	468	428	171	180	161	147	16.61	19.08
Total for Grasses		400	518	620	601	171	180	213	207	20.94	21.24
F	Arabis spp.	-	-	-	1	-	-	-	1	-	.00
F	Astragalus convallarius	_b 9	_a -	_a -	_b 9	6	-	-	5	-	.02
F	Astragalus spp.	2	-	-	-	1	-	-	-	-	-
F	Balsamorhiza sagittata	-	-	1	4	-	-	1	2	.30	.21
F	Calochortus nuttallii	-	3	-	-	-	1	-	-	-	-
F	Chaenactis douglasii	-	-	3	-	-	-	1	-	.00	-
F	Collinsia parviflora (a)	-	-	7	5	-	-	2	3	.18	.01
F	Cordylanthus ramosus (a)	-	-	30	55	-	-	14	16	.48	7.51
F	Crepis acuminata	_a 9	_b 33	_{ab} 16	_b 25	4	17	8	13	.14	.56

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Cryptantha spp.	1	2	-	-	1	2	-	-	-	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	1	-	.00
F	Erigeron spp.	-	5	6	11	-	2	2	4	.09	.48
F	Hackelia patens	-	-	-	1	-	-	-	1	-	.00
F	Holosteum umbellatum (a)	-	-	1	-	-	-	1	-	.00	-
F	Penstemon spp.	-	-	-	5	-	-	-	2	-	.01
F	Phlox hoodii	_a 6	_b 26	_a -	_a 6	3	12	-	2	-	.03
F	Phlox longifolia	_a -	_c 149	_b 53	_a 1	-	58	22	1	.19	.00
F	Sphaeralcea grossulariaefolia	-	-	3	-	-	-	1	-	.15	-
F	Tragopogon dubius	_b 10	_a -	_a -	_a -	6	-	-	-	-	-
F	Unknown forb-perennial	_a -	_b 12	_a -	_a -	-	6	-	-	-	-
Total for Annual Forbs		0	0	38	63	0	0	17	20	0.67	7.53
Total for Perennial Forbs		37	230	82	63	21	98	35	31	0.88	1.34
Total for Forbs		37	230	120	126	21	98	52	51	1.55	8.88

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

BROWSE TRENDS --

Herd unit 02 , Study no: 28

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	10	8	1.60	1.92
B	Artemisia tridentata wyomingensis	80	72	14.01	11.19
B	Atriplex canescens	0	0	-	.38
B	Chrysothamnus viscidiflorus viscidiflorus	13	17	1.30	2.28
B	Eriogonum microthecum	2	0	-	-
B	Gutierrezia sarothrae	0	1	-	-
B	Juniperus osteosperma	3	3	3.94	5.14
B	Opuntia polyacantha	3	3	.03	-
Total for Browse		111	104	20.89	20.92

CANOPY COVER --

Herd unit 02 , Study no: 28

Point-Quarter Tree Data

Species	Percent Cover		Trees per Acre		Average diameter (in)	
	'96	'01	'96	'01	'96	'01
Juniperus osteosperma	7	9	39	72	4.1	3.1

BASIC COVER --

Herd unit 02 , Study no: 28

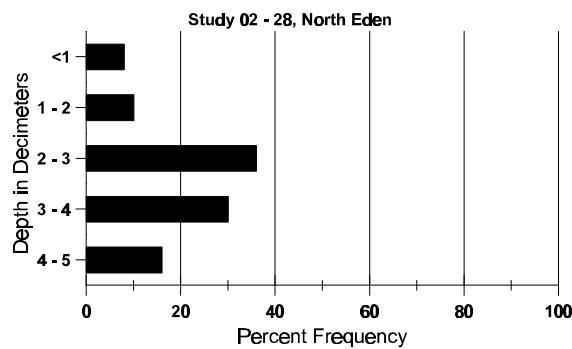
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	366	337	2.25	10.00	43.52	45.41
Rock	59	24	1.00	1.00	.74	.28
Pavement	68	92	0	0	.75	1.60
Litter	392	390	54.25	43.25	44.15	61.11
Cryptogams	211	145	20.50	16.00	11.19	6.84
Bare Ground	195	164	22.00	29.75	12.75	12.17

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 28, North Eden

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.8	62.6 (12.7)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 28

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Rabbit	25	41	713	N/A
Deer	39	36	1401	108 (266)
Cattle	7	1	35	3 (7)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 28

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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	90	5	-	-	-	-	-	-	-	-	-	-	-	-	333			5
	96	-	1	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	-	-	-	-	20			1
M	84	-	4	10	-	-	-	-	-	-	-	-	-	-	933	13	14	14
	90	16	-	-	-	-	-	-	-	-	-	-	-	-	1066	15	19	16
	96	4	14	-	-	-	-	-	-	-	-	-	-	-	360	13	21	18
	01	7	1	-	-	-	-	-	-	-	-	-	-	-	160	15	29	8
D	84	-	15	20	-	-	-	-	-	-	-	-	-	-	2333			35
	90	10	-	-	-	-	-	-	-	-	-	-	-	-	666			10
	96	-	3	-	-	-	-	-	-	-	-	-	-	-	60			3
	01	2	1	-	-	-	-	-	-	-	-	-	-	-	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		40%			60%			12%			-38%							
'90		00%			00%			03%			-79%							
'96		82%			00%			09%			-45%							
'01		17%			00%			17%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	3332	Dec:	70%			
												'90	2065		32%			
												'96	440		14%			
												'01	240		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				
Artemisia tridentata wyomingensis																		
S	84	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	3	1	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	4	-	1	-	-	-	-	-	-	5	-	-	-	333		5	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	11	23	-	-	-	-	-	-	33	-	1	-	2266	24 25	34	
	90	11	4	1	-	-	-	-	-	-	16	-	-	-	1066	22 20	16	
	96	38	26	7	-	-	-	-	-	-	60	-	11	-	1420	29 38	71	
	01	28	22	2	-	-	1	-	-	-	53	-	-	-	1060	27 39	53	
D	84	1	12	29	-	-	-	-	-	-	35	-	7	-	2800		42	
	90	16	8	7	-	-	-	-	-	-	11	3	11	6	2066		31	
	96	26	30	7	2	-	-	-	-	-	39	-	8	18	1300		65	
	01	24	32	12	3	1	-	-	-	-	51	-	-	21	1440		72	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1900		95	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1640		82	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		30%			65%			10%			-35%							
'90		23%			17%			33%			-19%							
'96		40%			10%			26%			-9%							
'01		43%			12%			16%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	5332	Dec:	53%			
												'90	3465		60%			
												'96	2800		46%			
												'01	2560		56%			

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	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	20		1	
	01	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	66	21	11	1
	90	-	-	1	-	-	-	-	66	6	7	1
	96	14	3	-	-	-	-	-	340	15	23	17
	01	10	-	-	1	-	-	-	220	15	26	11
D	84	2	-	-	-	-	-	-	133			2
	90	-	1	-	1	-	-	-	133			2
	96	1	1	-	-	-	-	-	40			2
	01	7	-	-	-	-	-	-	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		00%		00%		67%		+ 0%				
'90		33%		33%		33%		+50%				
'96		20%		00%		45%		-10%				
'01		00%		00%		11%						
Total Plants/Acre (excluding Dead & Seedlings)						'84	199	Dec:	67%			
						'90	199		67%			
						'96	400		10%			
						'01	360		39%			
Eriogonum microthecum												
M	84	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	40	8	9	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	0	Dec:	-			
						'90	0		-			
						'96	40		-			
						'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				
Gutierrezia sarothrae																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	4	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		-			
Juniperus osteosperma																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	1	-	-	1	-	-	-	-	-	2	-	-	-	133	69	49	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	93	63	1
	96	-	-	-	-	-	-	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>							
'84		00%			00%			00%			- 1%							
'90		00%			00%			00%			-55%							
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	-			
												'90	132		-			
												'96	60		-			
												'01	60		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia polyacantha																		
S	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	6	7	3
	'90	6	-	-	-	-	-	-	-	-	6	-	-	-	400	4	7	6
	'96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	6	20	4
	'01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	6	15	3
% 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%			-80%							
'96		00%			00%			00%			-25%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	-			
												'90	400		-			
												'96	80		-			
												'01	60		-			

Trend Study 2-29-01

Study site name: Woodruff Creek.

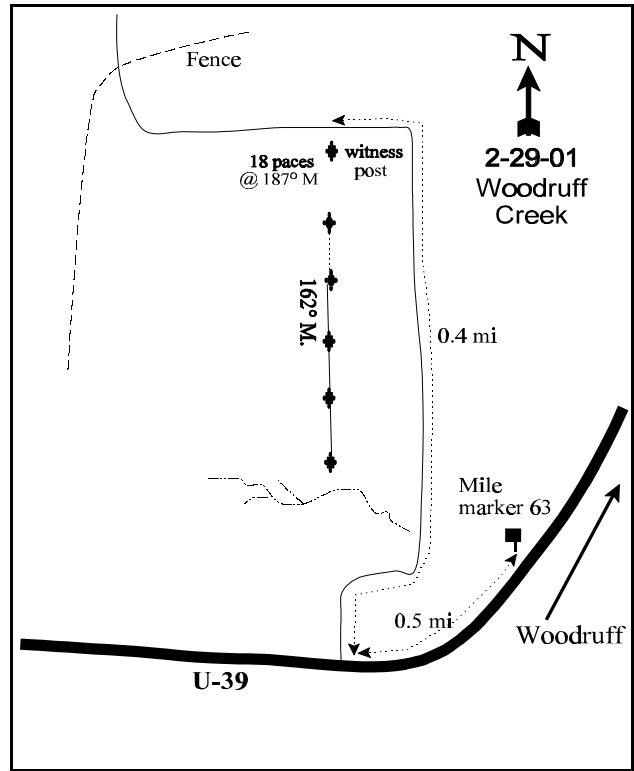
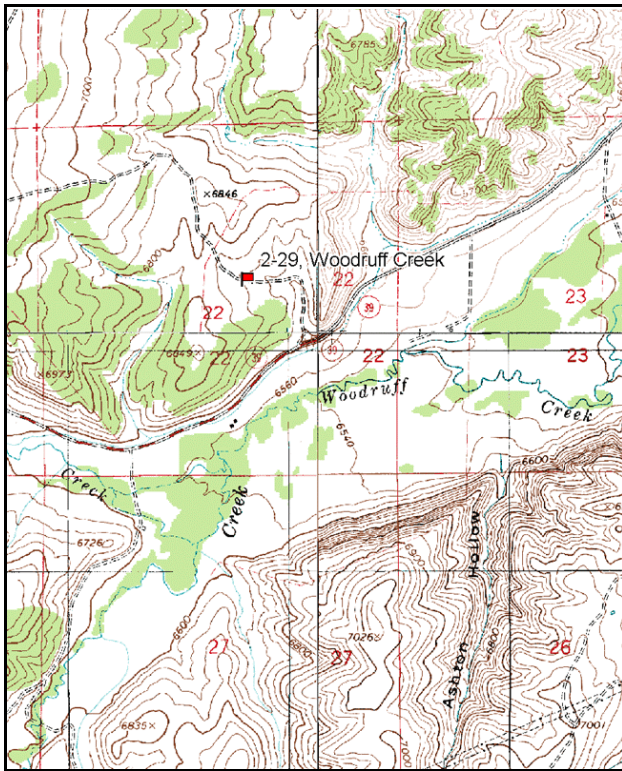
Vegetation type: Big Sagebrush.

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 the junction of U-39 and U-16 in Woodruff, proceed west on U-39 for 5.05 miles, and turn right onto a dirt road. This road should be 0.05 miles past marker 63. Proceed north on this road stopping after 0.4 miles at a witness post on the left (south). From the witness post, walk 18 paces at 187 degrees magnetic to the 0-foot stake of the baseline marked by browse tag #7989.



Map Name: Birch Creek Reservoirs

Diagrammatic Sketch

Township 9N, Range 6E, Section 22

UTM 4594285 N, 478796 E

DISCUSSION

Trend Study No. 2-29

The Woodruff Creek trend study samples critical winter range which supports a scattered juniper-pinyon woodland of about 200 trees/acre. Wyoming big sagebrush with a fair herbaceous association is also intermixed. The site is located north of Woodruff Creek on gentle, rolling terrain at approximately 6,720 feet in elevation. The area sustains heavy use from deer and livestock. Wildlife use may have intensified in recent years because surrounding habitat has been chained and seeded to provide livestock forage. Design of the chaining project has resulted in extremely large open areas that are devoid of cover, producing minimum "edge" and little browse. Wildlife habitat needs were obviously not a consideration. Quadrat frequency of deer pellet groups was moderately high at 38% in 1996 and 42% in 2001. Elk pellet groups were also encountered but in small numbers. Rabbit pellet groups were also fairly common. Some cattle pats were seen in the area in 1996, but none were encountered within the quadrats. More occur in the chained areas. A pellet group transect read along the study site baseline in 2001 estimated 103 deer days use/acre (255 ddu/ha). About 3/4 of the deer pellet groups encountered appeared to be from late winter/early spring use with the other 1/4 being more recent and likely from a few resident deer. Cattle use was estimated at 2 cow days use/acre (5 cdu/ha).

Soil is moderately shallow with an effective rooting depth (see methods) estimated at 12 inches. Soil texture is a clay loam with some gravel in the profile and pavement concentrated on the surface. Rock and pavement combined for an estimated 11% cover in 1996 and 2001. Soil on the site has a neutral soil reaction (7.3 pH). Chemical analysis of the soil indicates a low level of phosphorus (6.2 ppm), which could be a limiting factor to the site as values less than 10 ppm may limit plant growth and development. Protective ground cover is poor leaving large unprotected interspaces. Soil pedestalling is evident and sheet erosion is occurring, yet no large gullies have formed on the site due to the gentle terrain. The soil condition class was determined to be slight in 2001.

Available browse forage comes primarily from Wyoming big sagebrush which accounted for 35% of the shrub cover in 2001. The moderately dense stand had an estimated density of 6,465 plants/acre in 1984. Utilization was heavy at that time (>60% of twigs browsed) on 78% of the shrubs and 57% were classified as decadent. The population remained stable in 1990 with moderate to heavy use, poor vigor on one-third of the population, and percent decadence remained high at 58%. Reproduction was poor with 57% (1,666 plants/acre) of the decadent sagebrush sampled classified as dying (>50% crown death). During the 1996 reading, the baseline was lengthened to greatly increase the area sampled. The longer baseline extends into a more dense stand of juniper trees than the original 100 foot baseline, therefore density estimates for 1996 may be lower. Juniper canopy cover is variable on the site and ranged from 2% to as high as 43% in 1996. Average canopy cover was 14% in 1996 and 10% in 2001. Wyoming big sagebrush density was estimated at 2,260 plants/acre in 1996. Mature plants were somewhat stunted and measured only 16 inches in height. Utilization was light to moderate with 11% of the plants displaying heavy use. Even with the change in sample size, the population has obviously declined since 1990 due to the large number of dead plants (1,260 plants/acre) sampled in 1996. Dead plants were not previously sampled. Percent decadence declined slightly to 41% in 1996, but half of those shrubs were classified as dying. Reproduction continued to be poor. No young plants and few seedlings were encountered. The population remained stable in 2001 at 2,540 plants/acre. Utilization was classified mostly as moderate. Vigor improved but percent decadence has increased from 41% to 57%. Reproduction improved with more seedlings and young being sampled.

Other browse species found on the site include serviceberry, stickyleaf low rabbitbrush, snowberry, and gray horsebrush. All occur in small numbers except rabbitbrush which accounts for about one-third of the browse cover and has a density of nearly 5,000 plants/acre. The population is mostly mature.

The herbaceous understory is diverse, yet not particularly abundant. Seven perennial and one annual grass combined to produce about 10% cover in 1996 and 11% in 2001. The most common species include thickspike, mutton and Sandberg bluegrass. The accompanying data summary is indicative of forb diversity on this site. The number of species considerably exceeds that normally encountered on juniper-pinyon sites. However, in spite of the apparent diversity, forage production and cover from forbs is quite low. Even annual forbs are of no significance on this site.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be declining. Almost every trend parameter suggests that erosion losses far exceed the rate of soil formation. Vegetative trends are more difficult to assess. Our best estimate is that Wyoming big sagebrush is slowly declining in density due to excessive use and inadequate reproduction. At the same time, the Utah juniper overstory may be expanding. The herbaceous understory is a remarkably good one for this range type, but still likely to decline if the juniper canopy increases.

1990 TREND ASSESSMENT

The soil trend is stable but in poor condition. Percent bare ground has declined due primarily to an increase in pavement and cryptogamic cover. Percent basal vegetation cover increased while litter cover declined. The Wyoming big sagebrush stand on the Woodruff Creek study site has remained stable in density since 1984. However, the relatively small shrubs display heavy hedging and poor vigor. There is an overly high percentage (58%) of decadent plants. However, this is not much different than 1984 when percent decadence was 57%. The density of juniper has not increased since 1984. The point-centered quarter method estimate is 182 juniper/acre, mostly young trees. There have been some changes in composition of the herbaceous understory, but sum of nested frequency and diversity remain high for the type of site. Sum of nested frequency for perennial grasses increased, while frequency of perennial forbs declined. Overall trend is considered stable.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - stable but in poor condition (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in bare ground from 21% to 28%. This increase in bare ground cover comes primarily from a reduction in pavement cover which declined from 22% to 9%, and a decline in cryptogams from 14% to 2%. This would indicate possible recent sedimentation. Trend for the key browse species, Wyoming big sagebrush is down and appears to be in a state of decline. Density has dropped 55% since 1990. Some of the change is due to the much larger sample used in 1996, but dead plants, first sampled in 1996, number 1,260 plants/acre. Due to the lack of adequate reproduction, it is obvious that the population has declined since 1990. Utilization has been heavy in the past, although current use is mostly light to moderate. Vigor is poor on 25% of the shrubs with 41% of the population classified as decadent. Of the plants that were classified as decadent, 50% appear to be dying. Reproduction is poor with only a few seedlings encountered. This downward trend will continue as juniper cover increases. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency for perennial grasses. Sum of nested frequency for perennial forbs remained similar to 1990, but forbs make up only 29% of the herbaceous cover.

TREND ASSESSMENT

soil - down slightly (2)

browse - down (1)

herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is stable but in poor condition. Ground cover characteristics are similar to 1996 with erosion still occurring. Trend for Wyoming big sagebrush is stable yet in poor condition. Utilization is mostly moderate with improved vigor. However, percent decadence is still high at 57%. Average vigor of the decadent age class has improved as only 17% are currently classified as dying. Annual leader growth is minimal, averaging only 1 inch in 2001. Reproduction has improved since 1990 and appears to be adequate to maintain the stand. Trend for the herbaceous understory is stable with sum of nested frequency values for perennial grasses and forbs remaining similar to 1996 values.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - stable but in poor condition (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 29

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-	a1	b12	-	-	1	6	.03	.51
G	Agropyron dasystachyum	b195	b201	a101	a142	70	75	39	55	.54	1.97
G	Agropyron spicatum	a1	a7	b24	a8	1	4	10	3	.36	.41
G	Bromus tectorum (a)	-	-	11	6	-	-	4	3	.16	.01
G	Oryzopsis hymenoides	a1	ab20	ab11	b24	1	8	4	10	.61	1.22
G	Poa fendleriana	a46	c141	bc133	b102	20	60	56	37	5.24	4.10
G	Poa pratensis	-	-	1	-	-	-	1	-	.03	-
G	Poa secunda	ab123	b161	a102	ab111	56	62	42	40	2.53	2.26
G	Sitanion hystrix	ab22	ab22	b27	a9	13	12	15	4	.57	.24
Total for Annual Grasses		0	0	11	6	0	0	4	3	0.16	0.01
Total for Perennial Grasses		388	552	400	408	161	221	168	155	9.94	10.73
Total for Grasses		388	552	411	414	161	221	172	158	10.10	10.75
F	Achillea millefolium	-	-	1	-	-	-	1	-	.00	-
F	Allium acuminatum	b14	a-	a-	a-	7	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	-	1	-	-	-	1	-	.00
F	Antennaria rosea	7	10	3	2	3	5	1	1	.00	.03
F	Arabis holboellii	2	-	4	-	1	-	2	-	.01	-
F	Astragalus beckwithii	b13	a-	a-	a3	6	-	-	1	-	.03

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Astragalus convallarius</i>	_b 13	_a -	_b 12	_c 34	6	-	5	16	.05	.33
F	<i>Asclepias speciosa</i>	_a -	_a -	_b 12	_a -	-	-	5	-	.36	-
F	<i>Astragalus utahensis</i>	_b 18	_a 6	_a 2	_{ab} 12	11	3	1	5	.00	.12
F	<i>Calochortus nuttallii</i>	1	-	-	-	1	-	-	-	-	-
F	<i>Chaenactis douglasii</i>	_b 34	_a 2	_a 6	_a 7	18	1	3	4	.01	.02
F	<i>Comandra pallida</i>	35	21	23	24	19	8	11	14	.13	.17
F	<i>Cordylanthus ramosus</i> (a)	-	-	12	20	-	-	8	9	.07	.09
F	<i>Crepis acuminata</i>	3	-	4	3	2	-	1	1	.00	.03
F	<i>Cryptantha</i> spp.	26	22	26	32	16	12	17	13	.46	1.08
F	<i>Cymopterus</i> spp.	_a -	_a -	_b 10	_a -	-	-	5	-	.02	-
F	<i>Descurainia pinnata</i> (a)	-	-	3	-	-	-	1	-	.00	-
F	<i>Erigeron pumilus</i>	_b 11	_a -	_a -	_a 2	7	-	-	1	-	.00
F	<i>Eriogonum umbellatum</i>	4	-	5	-	2	-	4	-	.04	-
F	<i>Halogeton glomeratus</i> (a)	-	-	1	-	-	-	1	-	.00	-
F	<i>Ipomopsis aggregata</i>	7	-	4	-	3	-	2	-	.01	-
F	<i>Lithospermum ruderales</i>	3	-	-	4	1	-	-	2	-	.15
F	<i>Microsteris gracilis</i> (a)	-	-	-	4	-	-	-	2	-	.01
F	<i>Penstemon humilis</i>	_b 86	_b 85	_a 46	_a 53	40	43	19	25	.58	.40
F	<i>Phlox hoodii</i>	88	103	80	80	39	42	37	35	1.41	.74
F	<i>Phlox longifolia</i>	62	48	33	58	26	19	16	25	.08	.15
F	<i>Ranunculus testiculatus</i> (a)	-	-	1	-	-	-	1	-	.00	-
F	<i>Senecio multilobatus</i>	_b 61	_a 10	_b 75	_a 20	29	6	31	10	.89	.07
Total for Annual Forbs		0	0	17	25	0	0	11	12	0.08	0.11
Total for Perennial Forbs		488	307	346	334	237	139	161	153	4.11	3.37
Total for Forbs		488	307	363	359	237	139	172	165	4.19	3.48

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

BROWSE TRENDS --

Herd unit 02 , Study no: 29

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	60	60	5.53	5.25
B	Chrysothamnus viscidiflorus viscidiflorus	77	74	4.97	4.13
B	Juniperus osteosperma	8	8	4.42	4.32
B	Symphoricarpos oreophilus	3	1	.15	.30
B	Tetradymia canescens	19	18	1.01	.85
Total for Browse		167	161	16.11	14.86

CANOPY COVER --

Herd unit 02 , Study no: 29

Species	Percent Cover		Point-Quarter Tree Data			
	'96	'01	Trees per Acre		Average diameter (in)	
			'96	'01	'96	'01
Juniperus osteosperma	14	10	205	218	5.3	7.1

BASIC COVER --

Herd unit 02 , Study no: 29

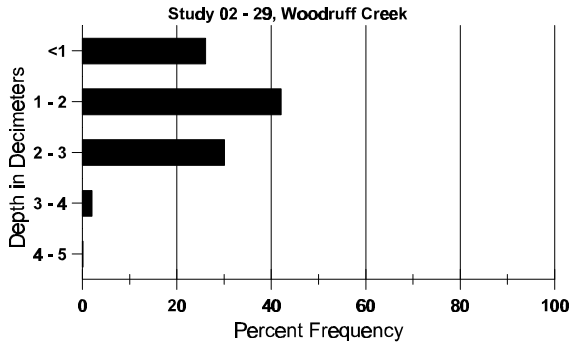
Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	306	315	4.75	7.50	30.55	31.23
Rock	105	40	1.75	2.50	1.46	.78
Pavement	273	265	10.50	21.75	9.37	9.81
Litter	390	367	47.25	33.50	38.38	42.15
Cryptogams	88	117	3.00	13.75	2.05	3.30
Bare Ground	306	289	32.75	21.00	27.75	31.45

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 29, Woodruff Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.2	55.8 (13.7)	7.3	34.6	32.1	33.4	2.5	6.2	25.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 29

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	21	15	104	N/A
Elk	6	2	-	-
Deer	38	42	1340	103 (255)
Cattle	-	-	26	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 29

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	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	24	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 wyomingensis																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	3	1	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	6	-	-	3	-	-	-	-	-	9	-	-	-	180		9	
M	84	5	8	24	-	-	-	-	-	-	36	1	-	-	2466	13 16	37	
	90	2	16	17	1	2	-	-	-	-	37	-	-	1	2533	19 21	38	
	96	37	26	3	1	-	-	-	-	-	61	1	-	5	1340	16 27	67	
	01	20	23	1	-	1	1	-	-	-	46	-	-	-	920	16 25	46	
D	84	-	3	52	-	-	-	-	-	-	49	-	3	3	3666		55	
	90	2	30	23	-	-	-	-	-	-	29	-	-	26	3666		55	
	96	17	20	9	-	-	-	-	-	-	23	-	-	23	920		46	
	01	23	46	1	-	2	-	-	-	-	60	-	-	12	1440		72	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1260		63	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1320		66	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		11%			78%			06%			+ 0%							
'90		51%			41%			28%			-65%							
'96		41%			11%			25%			+11%							
'01		57%			02%			09%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	6465	Dec:	57%			
												'90	6465		57%			
												'96	2260		41%			
												'01	2540		57%			

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	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	90	9	4	-	2	-	-	-	-	-	15	-	-	-	1000		15
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
M	84	36	-	-	-	-	-	-	-	-	36	-	-	-	2400	7 10	36
	90	11	12	-	6	-	-	-	-	-	29	-	-	-	1933	7 12	29
	96	218	-	-	15	-	-	-	-	-	233	-	-	-	4660	9 15	233
	01	209	1	-	-	-	-	-	-	-	208	2	-	-	4200	9 13	210
D	84	7	-	-	-	-	-	-	-	-	6	-	1	-	466		7
	90	2	6	1	-	1	-	-	-	-	10	-	-	-	666		10
	96	4	-	-	-	-	-	-	-	-	2	-	-	2	80		4
	01	22	-	-	-	-	-	-	-	-	15	-	-	7	440		22
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%			02%			+17%						
	'90	43%			02%			00%			+27%						
	'96	00%			00%			.81%			- 4%						
	'01	.42%			00%			03%									
Total Plants/Acre (excluding Dead & Seedlings)											'84	2999	Dec:	16%			
											'90	3599		19%			
											'96	4900		2%			
											'01	4720		9%			

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	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	2	2	-	-	-	-	-	-	-	4	-	-	-	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
M	84	1	-	-	-	-	1	-	-	-	2	-	-	-	133	57	22	2
	90	-	-	-	-	-	1	-	-	-	1	-	-	-	66	89	51	1
	96	6	2	-	-	-	-	-	-	-	8	-	-	-	160	-	-	8
	01	3	-	-	-	-	-	-	2	-	3	2	-	-	100	-	-	5
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%			25%			00%			+20%							
'90		40%			20%			00%			-52%							
'96		25%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	-			
												'90	332		-			
												'96	160		-			
												'01	160		-			
Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	2	-	-	-	-	-	3	-	1	-	80	11	21	4
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	10	29	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%			25%			-75%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			
												'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				
Tetradymia canescens																		
M	84	-	1	1	-	-	-	-	-	-	2	-	-	-	133	9	16	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	18	2	-	-	-	-	-	-	-	20	-	-	-	400	12	20	20
	01	16	-	-	-	-	-	-	-	-	16	-	-	-	320	12	21	16
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	2	1	-	-	-	-	-	3	-	-	-	200			3	
	96	2	-	-	-	-	-	-	-	1	-	-	1	40			2	
	01	4	-	-	-	-	-	-	-	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		50%			50%			00%			+34%							
'90		67%			33%			00%			+55%							
'96		09%			00%			05%			- 9%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%			
												'90	200		100%			
												'96	440		9%			
												'01	400		20%			

Trend Study 2-30-01

Study site name: State Line.

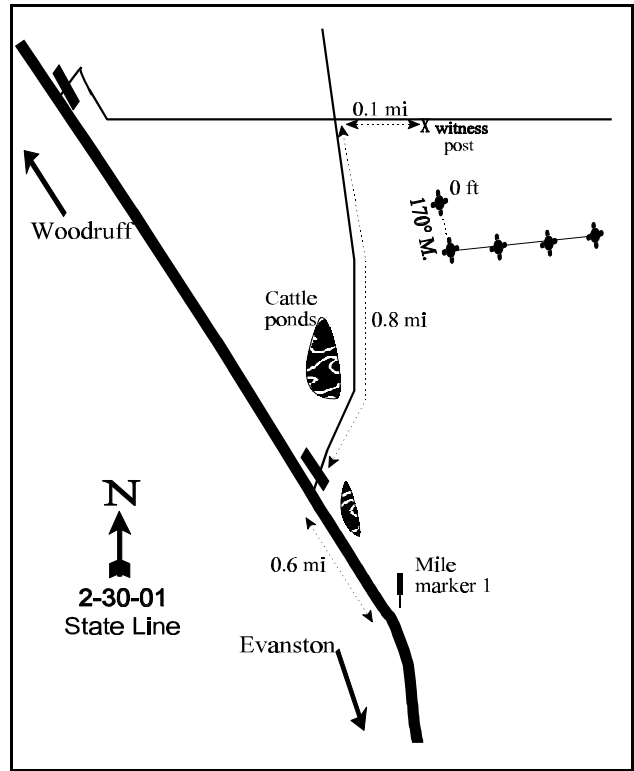
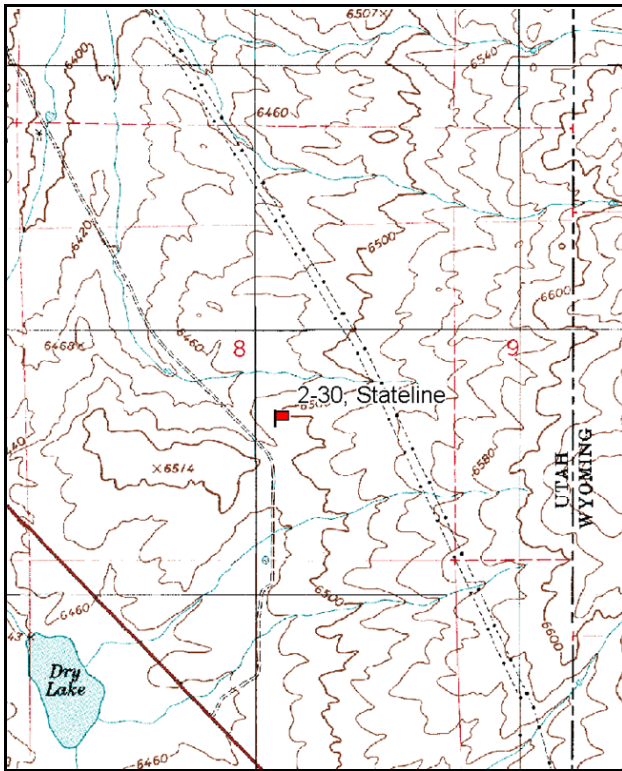
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 170 degrees magnetic.

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

LOCATION DESCRIPTION

From the Utah/Wyoming border, proceed north on Highway 16 for 0.6 miles past mile marker 1. Turn right proceeding through gate, and travel 0.8 miles north to an intersection in a wash. Turn right, and drive 0.1 miles east to a witness post. Walk ten paces at a bearing of 170 degrees magnetic. The 0-foot stake is wired with a browse tag # 7991



Map Name: Neponset Reservoir NE

Diagrammatic Sketch

Township 8N, Range 8E, Section 8

UTM 4587628 N, 495083 E

DISCUSSION

Trend Study No. 2-30

The State Line trend study is located near the Utah-Wyoming border east and south of Woodruff on gentle to nearly level terrain at an elevation of 6,490 feet. This area is dominated by Wyoming big sagebrush which provides more than 70% of the total plant cover at the site. The area is used by deer, antelope, and rabbits. Quadrat frequency of deer pellet groups was moderately high at 26% in 1996, declining to 13% by 2001. A pellet group transect read along the study site baseline in 2001 estimated 31 deer, 7 elk, and 12 cow days use/acre (76 ddu/ha, 17 edu/ha, and 29 cdu/ha). Antelope also use the area. Deer and antelope pellet groups were combined due to their similarity in appearance. About 90% of the deer/antelope pellet groups encountered appear to be from winter use with 10% from spring use. A 3-point antler shed was found on the site during the 2001 reading. Cattle were in the area during the spring and early summer of 2001. Sage grouse also use the area, and some sage grouse droppings were encountered in quadrats.

Soil is classified as "Neponset Sandy Loam," a moderately deep, well drained soil residually formed from sandstone and siltstone. Total soil depth ranges from 20 to 40 inches and is moderately to strongly alkaline and calcareous throughout. Neponset soil is moderately permeable to water and has low available water capacity. It is moderately susceptible to water erosion and highly susceptible to wind erosion and dune formation (Campbell and Lacey 1982). Soil on the site varies slightly from this description. It has a clay loam texture and a soil reaction that is slightly alkaline (7.8 pH). This value is near the borderline of being moderately alkaline. Effective rooting depth (see methods) is slightly more than 10 inches. Soil temperature is low, averaging only 55°F at a depth of 9 inches. The surface is nearly free of rock cover with a calcareous layer about 10 inches below the surface. Current or actual soil condition is fair. Although moderately high amounts of bare ground are exposed, terrain is nearly level so water erosion is not excessive. Soil pedestalling is evident around plants and the presence of flow patterns, rills, and soil movement indicate continual erosion is occurring. A dense stand of Wyoming big sagebrush and the associated cryptogams under their crowns help stabilize the area and prevent formation of dunes and "blowouts." The erosion condition class was determined to be slight in 2001.

Vegetatively, the landscape is dominated by Wyoming big sagebrush which currently ('01) provides 90% of the browse cover and 67% of the total vegetative cover. Its density has fluctuated between 8,066 plants/acre in 1990 to 6,500 in 1996, and 6,700 in 2001. The decline in density is largely the result of changes in the number of young plants which accounted for 15% of the population density in 1984 and 17% in 1990. Due to drought, seedlings and young were scarce in 1996 and 2001. Few mature plants were producing seed in 1996. However, seed production was better in 2001. Annual leader growth was relatively poor in 2001, averaging only 1 inch. Utilization of sagebrush has been consistently moderate to heavy since 1990. Vigor has remained normal on most plants, and percent decadence has steadily declined from 39% in 1990 to 21% in 2001.

Other fairly common browse species include Gardner saltbush (*Atriplex gardneri falcata*) and stickyleaf low rabbitbrush. Gardner saltbush is a very small, low-growing saltbush that is strongly rhizomatous and sprouts profusely. It is an important browse, especially on disturbed sites where it seems to perform exceptionally well. The density plot data from 1984 and 1990 almost certainly present a biased picture of this species importance with 3,866 and 5,532 plants/acre estimated respectively. The much larger sample used in 1996 and 2001 gives a better picture of the species true density (1,840 plants/acre). Narrowleaf low rabbitbrush has a mostly mature population of around 2,000 plants/acre. The stand is mostly mature with few seedlings or young.

Herbaceous composition produces little forage and lacks diversity. Grass production is poor and many acres are required to support a single AUM. Total grass cover was estimated at only 5% in 1996 and 6% in 2001.

The only common grass is Sandberg bluegrass which accounted for 87% of the grass cover in 1996 and 78% in 2001. Forbs are even less productive and few species have any significant value. The only fairly common species include hoods phlox and stemless goldenweed (*Haplopappus acaulis*).

1984 APPARENT TREND ASSESSMENT

Soil and vegetation trend are closely related and interdependent factors. Currently, both appear stable but any significant disturbance could bring considerable change. This soil is highly susceptible to wind erosion and depends on the dominant sagebrush for stabilization. Disturbed sites blow easily and are favorable places for saltbush and stemless hymenoxys to become established.

1990 TREND ASSESSMENT

The Wyoming big sagebrush on the State Line site displays a stable trend. It is moderately to heavily hedged with fair vigor and a well-balanced age class structure. The herbaceous understory is in poor condition on this lightly grazed site. Nested frequency of western wheatgrass declined significantly while the dominant Sandberg bluegrass remained stable. As with the previous sites, the percentage of litter cover is lower, and the amount of bare soil increased. However, basal vegetation cover has increased and soil erosion is not excessive due to the mild slope.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Ground cover characteristics have remained similar to 1990, indicating a stable soil trend. However, conditions are still poor due to the abundance of unprotected bare ground. Trend for Wyoming big sagebrush is stable although it could decline in the near future without an improvement in reproduction. The number of seedlings and young plants have declined since 1990, but the number of mature and decadent sagebrush have remained similar. Total density has declined from 8,066 plants/acre in 1990 to 6,500 plants/acre in 1996. Some of the difference in density is due to the much larger sample used in 1996. Dead sagebrush, first included in 1996, number 800 plants/acre. Considering the large population, this would not suggest a major die-off. It is indicative that the larger sample used in 1996 gives a more accurate estimate of the actual Wyoming big sagebrush density. There is less heavy use of the sagebrush, vigor has improved, and percent decadency has declined slightly (38% to 32%). However, 26% (540 plants/acre) of the decadent sagebrush sampled were classified as dying (>50% crown death). If reproduction does not improve, the population will likely decline slightly. Grasses and forbs are severely lacking on this site and sum of nested frequency for perennial grasses and forbs declined slightly. Sum of nested frequency for western wheatgrass declined significantly while that of the dominant Sandberg bluegrass remained stable. Overall, trend for the herbaceous understory is considered stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable but in poor condition. Ground cover characteristics are similar to 1996 estimates. Percent cover of bare ground continues to be high with inadequate herbaceous cover. The main factor holding the soil in place is the abundance of cryptogamic crusts under sagebrush crowns. All shrubs are pedestalled and there are signs of soil movement in the shrub interspaces. Due in part to the gentle terrain, the erosion condition class is classified as slight. Trend for Wyoming big sagebrush is stable. Density has remained similar. Utilization is moderate, vigor normal on most plants, and percent decadence has declined to 21%. Seed production is good this year, while annual leader growth appeared to be poor averaging only 1 inch. Reproduction is poor with few seedlings and young encountered. In addition, 38% (540 plants/acre) of the decadent plants sampled were classified as dying. The population will eventually decline if reproduction does not improve. A similar number of plants were classified as dying in 1996, yet the population did not decline. In fact, it appears that some of the decadent plants sampled in 1996 regained their vigor and are now classified as mature. It also looks like many of the sagebrush that were classified as dying in 1996 have not died yet, but continue to display >50% crown death. Trend for the herbaceous understory is mixed. Sum of nested frequency for perennial grasses increased with frequency of perennial forbs declining. Nested frequency of western wheatgrass increased significantly as the frequency of the dominant grass, Sandberg bluegrass, remained similar to 1996. The dominant forb, hoods phlox, declined significantly. Since grasses provide two-thirds of the herbaceous cover, the herbaceous trend is considered stable at this time.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 30

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron smithii	c140	b94	a-	b96	56	39	-	42	-	.87
G	Agropyron spicatum	-	-	51	-	-	-	22	-	.36	-
G	Oryzopsis hymenoides	5	9	8	10	3	3	4	5	.19	.51
G	Poa secunda	235	248	232	245	90	84	89	91	4.11	4.94
G	Sitanion hystrix	a-	ab9	b23	a-	-	4	10	-	.07	-
G	Stipa comata	b39	a-	a-	a-	19	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		419	360	314	351	168	130	125	138	4.73	6.32
Total for Grasses		419	360	314	351	168	130	125	138	4.73	6.32
F	Alyssum alyssoides (a)	-	-	a2	b211	-	-	1	79	.00	.69
F	Antennaria rosea	6	9	2	1	3	3	1	1	.15	.00
F	Arabis spp.	b19	a-	a-	a3	9	-	-	1	-	.00
F	Astragalus convallarius	b20	a6	a2	ab9	9	2	1	5	.00	.07
F	Astragalus utahensis	-	2	1	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.	-	-	-	3	-	-	-	1	-	.00
F	Draba spp. (a)	-	-	3	3	-	-	1	1	.00	.03
F	Eriogonum caespitosum	-	2	-	-	-	2	-	-	-	-
F	Eriogonum cernuum (a)	-	-	-	1	-	-	-	1	-	.00
F	Erigeron pumilus	3	5	-	-	1	2	-	-	-	-
F	Haplopappus acaulis	_b 69	_b 64	_a 30	_a 15	27	27	12	6	.74	.54
F	Phlox hoodii	_{ab} 125	_{ab} 128	_b 133	_a 89	57	58	60	47	2.08	1.88
F	Phlox longifolia	_a 3	_{ab} 25	_b 39	_b 29	1	10	17	10	.11	.12
F	Trifolium spp.	7	4	-	2	3	1	-	1	-	.00
F	Unknown forb-perennial	1	-	-	-	1	-	-	-	-	-
Total for Annual Forbs		0	0	5	215	0	0	2	81	0.00	0.73
Total for Perennial Forbs		253	245	207	152	111	107	92	73	3.09	2.64
Total for Forbs		253	245	212	367	111	107	94	154	3.10	3.37

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

BROWSE TRENDS --

Herd unit 02 , Study no: 30

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	98	96	23.38	25.17
B	Atriplex gardneri falcata	14	15	.56	.27
B	Chrysothamnus viscidiflorus viscidiflorus	56	51	1.41	1.91
B	Leptodactylon pungens	0	3	-	.53
B	Opuntia spp.	9	12	.21	.21
B	Tetradymia canescens	6	4	.01	.00
Total for Browse		183	181	25.57	28.10

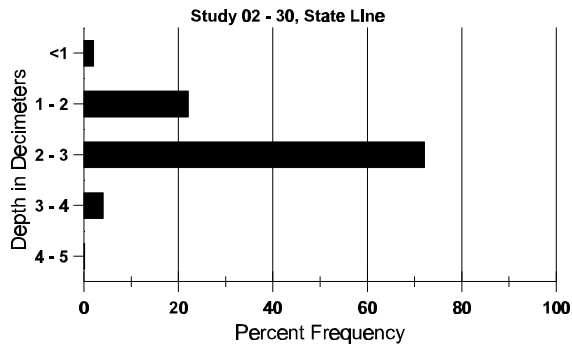
BASIC COVER --
Herd unit 02 , Study no: 30

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	311	330	6.25	12.00	31.88	39.17
Rock	58	21	.75	.25	.33	.11
Pavement	141	106	7.00	7.00	1.16	1.01
Litter	386	363	42.75	24.00	26.83	28.42
Cryptogams	242	262	5.50	14.00	8.70	12.45
Bare Ground	341	319	37.75	42.75	39.54	42.63

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 30, State Line

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.4	54.8 (9.3)	7.8	41.9	28.1	30.0	2.0	8.4	99.2	.8

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 30

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre 01	Days Use per Acre (ha) 01
Rabbit	4	1	-	-
Grouse	-	5	-	-
Elk	-	-	87	7 (17)
Deer	26	13	400	31 (76)
Cattle	-	1	139	12 (29)
Antelope	1	1	-	-

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 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 wyomingensis																		
S	'84	23	-	-	-	-	-	-	-	-	23	-	-	-	1533			23
	'90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	'01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	'84	12	5	-	-	-	-	-	-	-	17	-	-	-	1133			17
	'90	18	-	-	2	-	1	-	-	-	20	1	-	-	1400			21
	'96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'84	10	29	13	-	-	-	-	-	-	52	-	-	-	3466	14	19	52
	'90	4	28	22	-	-	-	-	-	-	45	1	8	-	3600	15	16	54
	'96	103	105	8	-	-	-	-	-	-	216	-	-	-	4320	15	31	216
	'01	62	152	35	-	10	4	-	-	-	261	2	-	-	5260	18	30	263
D	'84	9	17	18	-	-	-	-	-	-	41	-	3	-	2933			44
	'90	1	23	22	-	-	-	-	-	-	31	-	5	10	3066			46
	'96	31	44	29	-	-	-	-	-	-	77	-	-	27	2080			104
	'01	28	30	10	-	2	-	1	-	-	39	5	-	27	1420			71
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	800			40
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	700			35
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		45%			27%			03%			+ 7%							
'90		42%			37%			19%			-19%							
'96		46%			11%			08%			+ 3%							
'01		58%			15%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	7532	Dec:	39%			
												'90	8066		38%			
												'96	6500		32%			
												'01	6700		21%			

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				
Atriplex gardneri falcata																					
S	84	81	-	-	-	-	-	-	-	-	-	-	-	81	-	-	-	5400		81	
	90	53	-	-	-	-	-	-	1	-	-	-	-	54	-	-	-	3600		54	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	24	9	-	-	-	-	-	-	-	-	-	-	24	9	-	-	2200		33	
	90	63	3	-	1	-	-	-	-	-	-	-	-	67	-	-	-	4466		67	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	12	13	-	-	-	-	-	-	-	-	-	-	18	7	-	-	1666	7	11	25
	90	10	1	3	1	-	1	-	-	-	-	-	-	16	-	-	-	1066	5	7	16
	96	89	-	-	1	-	-	-	-	-	-	-	-	90	-	-	-	1800	3	7	90
	01	18	10	20	2	-	-	-	-	-	-	-	-	48	2	-	-	1000	4	7	50
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>							
'84		38%				00%				00%				+30%							
'90		05%				05%				00%				-67%							
'96		00%				00%				00%				-42%							
'01		23%				38%				00%											
Total Plants/Acre (excluding Dead & Seedlings)												'84	3866	Dec:	0%						
												'90	5532		0%						
												'96	1840		2%						
												'01	1060		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				
Chrysothamnus viscidiflorus viscidiflorus																			
S	84	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	1	-	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	1	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	24	-	-	-	-	-	-	-	-	24	-	-	-	1600	11	14	24	
	90	10	5	1	-	-	-	-	-	-	15	-	1	-	1066	6	10	16	
	96	71	-	-	12	-	-	-	-	-	83	-	-	-	1660	8	13	83	
	01	91	-	-	1	-	-	-	-	-	90	2	-	-	1840	8	12	92	
D	84	1	-	-	-	-	-	-	-	-	-	-	-	1	66		1		
	90	6	7	-	-	-	-	-	-	-	12	-	1	-	866		13		
	96	16	-	-	2	-	-	-	-	-	8	-	10	-	360		18		
	01	7	-	-	-	-	-	-	-	-	3	-	4	-	140		7		
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%				04%				+16%					
'90		39%				03%				06%				- 2%					
'96		00%				00%				10%				- 1%					
'01		00%				00%				04%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	1732	Dec:	4%				
												'90	2065		42%				
												'96	2020		18%				
												'01	2000		7%				
Eriogonum microthecum																			
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	1	2	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%									
'90		00%				00%				00%									
'96		00%				00%				00%									
'01		00%				00%				00%									
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	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				
Leptodactylon pungens																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	10	-	-	-	-	-	-	-	-	10	-	-	-	200	4	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%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
												'01	220		-			

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	1	-	-	1	-	-	-	-	2	-	-	-	133		2
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	8	-	-	-	-	-	-	-	8	-	-	-	533		8
	96	5	-	-	-	-	-	-	-	5	-	-	-	100		5
	01	1	-	-	-	-	-	-	-	1	-	-	-	20		1
M	84	9	-	-	-	-	-	-	-	9	-	-	-	600	5 13	9
	90	2	-	-	-	-	-	-	-	2	-	-	-	133	4 6	2
	96	17	-	-	-	-	-	-	-	17	-	-	-	340	3 11	17
	01	17	-	-	-	-	-	-	-	16	1	-	-	340	3 7	17
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	4	-	-	-	-	-	-	-	2	-	1	1	266		4
	96	3	-	-	-	-	-	-	-	2	-	-	1	60		3
	01	4	-	-	-	-	-	-	-	3	-	-	1	80		4
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%		+36%								
'90		00%		00%		14%		-46%								
'96		00%		00%		04%		-12%								
'01		00%		00%		05%										
Total Plants/Acre (excluding Dead & Seedlings)										'84		600	Dec:		0%	
										'90		932			29%	
										'96		500			12%	
										'01		440			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				
Tetradymia canescens																		
M	'84	-	1	-	-	-	-	-	-	-	1	-	-	-	66	4	5	1
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	4	9	10
	'01	3	1	-	-	-	-	-	-	-	4	-	-	-	80	7	12	4
D	'84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'96	5	-	3	-	-	-	-	-	6	-	-	2	160			8	
	'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%			17%			11%			-78%							
'01		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	0		0%			
												'96	360		44%			
												'01	80		0%			

Trend Study 2-31-01

Study site name: South Crawford Mountains.

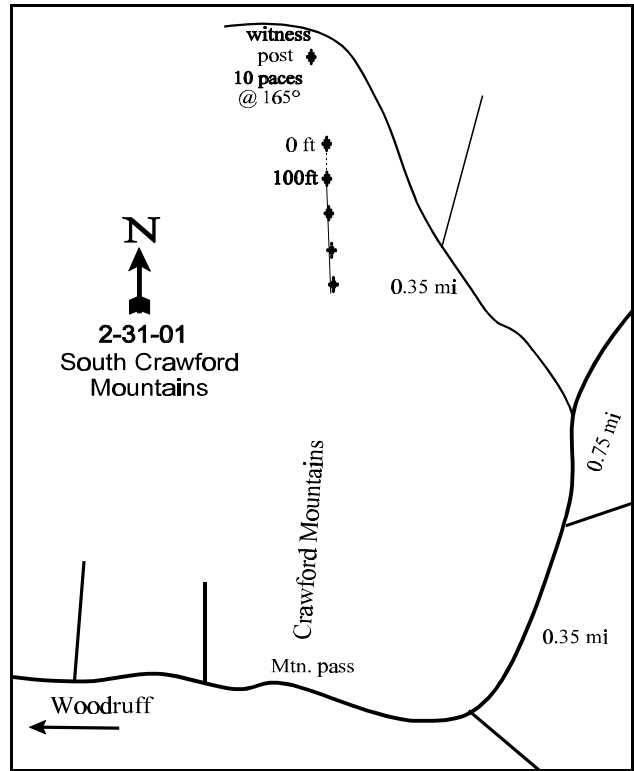
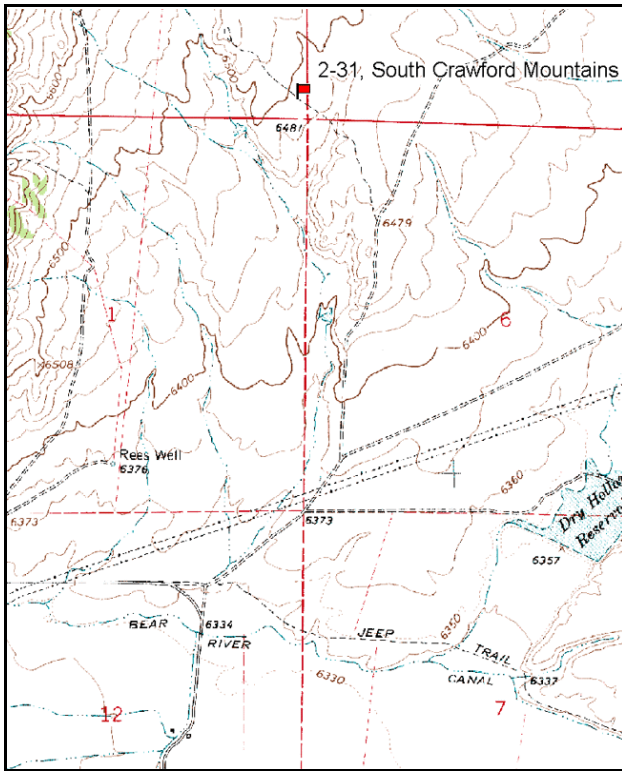
Vegetation type: Big Sagebrush.

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 the intersection of Wilson Lane and Little Crawford Road east of Woodruff proceed east 1.6 miles through the small pass to the east side of the mountains. Take the left fork and travel northeast for 0.35 miles. Turn left here and proceed northeast for 0.75 miles. At this point, turn left onto a lightly used jeep trail and travel northwest for an additional 0.35 miles to a witness post on the left hand side of the road. From the witness post walk 10 paces at 165 degrees magnetic to the 0-foot baseline stake of the baseline. The baseline is marked by browse tag #7940.



Map Name: Woodruff Narrows

Diagrammatic Sketch

Township 10N, Range 7E, Section 36

UTM 4600223 N, 492408 E

DISCUSSION

Trend Study No. 2-31

The South Crawford Mountains trend study samples the Wyoming big sagebrush type. The site is nearly level and has an elevation of 6,500 feet with a slight east aspect. An important wildlife area, this area helps sustain deer and elk in the winter. It is also used intermittently year-round by pronghorn and sage grouse. Cattle graze the area in spring and summer, and were present during the 1996 reading. Quadrat frequency of deer pellet groups was moderately high at 31% in 1996. Elk pellet groups were rare. A deer antler drop was also found on site. A pellet group transect read along the study site baseline in 2001 estimated 23 deer and 13 cow days use/acre (56 ddu/ha and 32 cdu/ha). One pronghorn antelope, 1 elk pellet group, and 3 sage grouse pellet groups were also sampled on the transect.

Soil is classified as "Woodpass Loam," a widely distributed category in this area. It is a deep, well-drained soil that forms in alluvial deposits derived from sandstone and limestone. Permeability is slow and available water capacity is high. Erosion hazard is moderate. Although the Woodpass soil is moderately to strongly alkaline and calcareous, root penetration is not inhibited (Campbell and Lacey 1982). Soil tests from the site show a sandy clay loam texture with a neutral pH (7.1) in the upper horizons. Effective rooting depth (see methods) was estimated at just over 12 inches with a rocky calcium carbonate layer starting at about 12 inches. This layer appears to limit rooting depth at the end of the baseline where black sagebrush was encountered. Potassium is low at 51.2 ppm, which could be a limiting factor for the site. Potassium values less than 70 ppm may limit plant development and growth. Exposed bare ground is common averaging 33% between 1984 and 2001. Wind and water erosion are not severe due to the gentle terrain and a uniform sagebrush cover. The erosion condition class was determined to be stable in 2001 with slight pedestalling of sagebrush the only notable sign of past soil movement.

The dominant browse is a somewhat dense and vigorous stand of Wyoming big sagebrush that receives moderate to occasional heavy use. Heavy utilization, poor vigor, and high decadence (72%) were found during the 1990 reading. In 1996, many of the decadent plants apparently regained their vigor, and percent decadency declined to 30%, which is good for a typical Wyoming big sagebrush site in this area. Dead plants, first sampled in 1996, numbered 1,300, resulting in a ratio of dead to live plants of 1:5. Seedling and young plants were extremely common in 1984, but have since declined. During the 2001 reading, no seedlings were encountered and young plants accounted for only 3% of the population. Annual leader growth appeared relatively poor averaging less than 1 inch in 2001. Few shrubs appeared to be producing seed in 1996 or 2001.

Other shrubs are of secondary importance and none appear to be increasing or decreasing in density. These species include black sagebrush, narrowleaf low rabbitbrush, slenderbush eriogonum, prickly phlox, pricklypear, and gray horsebrush,

Grasses and forbs are sparsely distributed and include a mix of species which looks about average for the Wyoming big sagebrush type in Rich County. Four perennial grass species provide the bulk of the herbaceous forage, which is supplemented by low-growing, low-value forbs. Annual plants are rare. Sandberg bluegrass is the most common perennial grass which accounted for 65% of the grass cover in 1996 and 69% in 2001. Forbs are fairly diverse for this type, yet only hoods phlox is abundant. Trend studies located within this unit on the Wyoming big sagebrush type have shown remarkable similarity in plant composition.

1984 APPARENT TREND ASSESSMENT

Our best estimate is that soil and vegetative trends are both stable. No imminent changes in soil condition, vegetative composition, or productivity are expected.

1990 TREND ASSESSMENT

Wyoming big sagebrush has declined in all measurements on this heavily used winter range. Density declined by 6%. The percentage of decadent sagebrush increased to 72% of the population, and very few young plants were counted. The sagebrush is moderately to heavily hedged and has poor vigor and low growth. Sagebrush canopy cover averages 16%. Low rabbitbrush is unchanged. Sandberg bluegrass is still very abundant, while bluebunch wheatgrass decreased significantly in nested frequency. The percentage of litter cover has concurrently declined, but there was a significant increase in the amount of cryptogamic cover. Sheet erosion and plant pedestalling are still evident.

TREND ASSESSMENT

soil - down slightly (2)

browse - down (1)

herbaceous understory - down slightly (2)

1996 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground is similar to 1990 estimates. Litter cover increased, but cryptogamic cover declined 62%. Erosion is not severe due to the gentle terrain. Trend for Wyoming big sagebrush is up slightly. Total density declined 18% since 1990, but utilization is more moderate, vigor has improved, and percent decadency has declined from 72% to 30%. Young plants are more abundant this year, although seedlings are limited. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has increased slightly, while frequency of forbs has declined slightly.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable. Percent cover of bare ground has increased slightly but litter and vegetation cover increased. Erosion appears minimal and the erosion condition class was determined to be stable. Trend for the key browse species, Wyoming big sagebrush, is up slightly. Density has increased by 13%, utilization is mostly light, average vigor has improved, and percent decadence has declined from 30% to 20%. No seedlings were sampled; however, young plants account for 3% of the population. Annual leader growth appears to be poor averaging less than 1 inch. Narrowleaf low rabbitbrush appears to have a stable population of about 3,000 plants/acre. The herbaceous trend is stable with similar sum of nested frequency values for perennial grasses and forbs compared to 1996. Herbaceous production is poor with grasses producing 9% cover. Sandberg bluegrass dominates the grass composition by providing 69% of the grass cover. The forb composition is still poor and totally dominated by hood's phlox which provides 83% of the forb cover. All forbs combine to produce less than 5% cover.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 31

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron smithii	-	-	-	4	-	-	-	2	-	.06
G	Agropyron spicatum	c140	a53	ab81	b97	60	23	33	40	.84	1.12
G	Bromus tectorum (a)	-	-	1	-	-	-	1	-	.00	-
G	Carex spp.	a-	a-	a-	b12	-	-	-	5	-	.07
G	Oryzopsis hymenoides	c60	bc45	a21	ab30	27	24	10	15	.21	.64
G	Poa fendleriana	a-	a-	b30	a2	-	-	12	1	.50	.00
G	Poa secunda	a231	b275	ab246	b272	90	95	87	94	5.18	6.03
G	Sitanion hystrix	c107	a3	b29	ab17	53	1	14	7	.22	.13
G	Stipa comata	a16	c98	bc79	ab56	10	45	35	20	1.06	.64
Total for Annual Grasses		0	0	1	0	0	0	1	0	0.00	0
Total for Perennial Grasses		554	474	486	490	240	188	191	184	8.03	8.72
Total for Grasses		554	474	487	490	240	188	192	184	8.03	8.72
F	Agoseris glauca	1	-	-	-	1	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	a-	b15	-	-	-	8	-	.04
F	Antennaria rosea	a-	b12	ab3	a-	-	5	3	-	.04	-
F	Arabis drummondii	b31	a-	a6	a4	17	-	3	2	.07	.01
F	Astragalus convallarius	b60	a1	a8	a19	30	1	4	9	.04	.12
F	Astragalus utahensis	10	8	13	10	5	4	5	4	.19	.09
F	Cordylanthus ramosus (a)	-	-	a2	b29	-	-	2	14	.01	.27
F	Cryptantha spp.	c80	b40	ab24	a11	41	16	13	5	.19	.02
F	Draba spp. (a)	-	-	-	2	-	-	-	1	-	.00
F	Erigeron pumilus	8	-	6	2	4	-	3	1	.01	.00
F	Eriogonum umbellatum	-	-	1	1	-	-	1	1	.00	.00
F	Haplopappus acaulis	3	-	1	1	1	-	1	1	.03	.03
F	Lappula occidentalis (a)	-	-	a-	b31	-	-	-	16	-	.08
F	Phlox hoodii	b220	b200	a153	b180	87	84	65	73	3.00	3.80
F	Phlox longifolia	-	-	8	2	-	-	3	2	.01	.01
F	Tragopogon dubius	4	-	-	-	2	-	-	-	-	-
F	Trifolium spp.	c26	ab2	a-	bc15	13	1	-	7	-	.06
Total for Annual Forbs		0	0	2	77	0	0	2	39	0.00	0.39
Total for Perennial Forbs		443	263	223	245	201	111	101	105	3.61	4.17
Total for Forbs		443	263	225	322	201	111	103	144	3.62	4.57

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

BROWSE TRENDS --
Herd unit 02 , Study no: 31

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	7	7	.19	1.24
B	Artemisia tridentata wyomingensis	98	98	16.34	20.70
B	Chrysothamnus viscidiflorus stenophyllus	70	62	1.77	1.83
B	Eriogonum microthecum	23	15	.29	.34
B	Leptodactylon pungens	14	11	.24	.19
B	Opuntia spp.	4	5	.03	-
B	Tetradymia canescens	1	1	-	-
Total for Browse		217	199	18.87	24.31

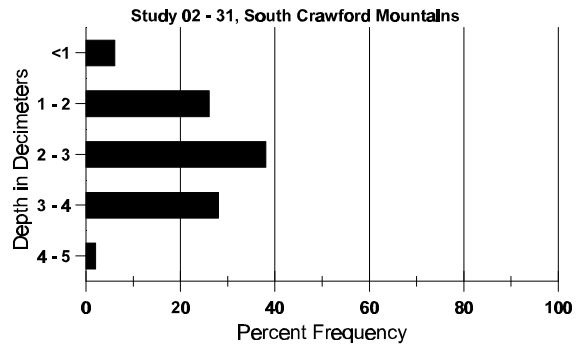
BASIC COVER --
Herd unit 02 , Study no: 31

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	325	333	9.25	9.75	29.03	37.43
Rock	68	26	.25	.75	1.10	.13
Pavement	275	241	8.00	3.00	7.37	2.61
Litter	391	377	52.25	26.00	30.34	34.68
Cryptogams	241	207	5.00	25.25	9.66	7.50
Bare Ground	316	317	25.25	35.25	32.97	37.84

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 31, South Crawford Mountains

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.5	57.8 (13.0)	7.1	55.3	17.4	27.4	1.9	160.3	51.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 31

Type	Quadrat Frequency	
	'96	'01
Rabbit	3	7
Grouse	-	2
Elk	2	-
Deer	31	13
Cattle	1	1

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
26	N/A
26	N/A
9	<1 (2)
296	23 (56)
157	13 (32)

BROWSE CHARACTERISTICS --

Herd unit 02 , 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												
Artemisia nova																	
Y	84	-	-	-	-	-	-	-	0	-	-	0					
	90	-	-	-	-	-	-	-	-	-	-	0					
	96	1	-	-	-	-	-	-	-	1	-	-	20	9	14	14	
	01	1	-	-	-	-	-	-	-	1	-	-	-	20	12	16	20
M	84	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	13	1	-	-	-	-	-	-	14	-	-	-	280	9	14	14
	01	1	19	-	-	-	-	-	-	20	-	-	-	400	12	16	20
D	84	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	-	-	-	-	-	-	-	-	-	1	20	-	-	1	
	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%									
'90		00%			00%			00%									
'96		06%			00%			06%			+27%						
'01		86%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	0	Dec:	0%				
										'90	0		0%				
										'96	320		6%				
										'01	440		5%				

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 wyomingensis																					
S	84	35	-	-	-	-	-	-	-	-	-	-	35	-	-	-	2333		35		
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	66		1		
	96	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	40		2		
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	84	8	10	2	-	-	-	-	-	-	-	-	20	-	-	-	1333		20		
	90	1	1	-	-	-	-	-	-	-	-	-	2	-	-	-	133		2		
	96	14	4	-	-	-	-	-	-	-	-	-	17	-	-	1	360		18		
	01	10	-	-	2	-	-	-	-	-	-	-	12	-	-	-	240		12		
M	84	-	60	18	-	-	-	-	-	-	-	-	78	-	-	-	5200	14	21	78	
	90	4	10	17	-	-	-	-	-	-	-	-	19	-	12	-	2066	12	19	31	
	96	68	140	-	-	-	-	-	-	-	-	-	208	-	-	-	4160	15	27	208	
	01	216	55	10	-	4	-	-	-	-	-	-	273	12	-	-	5700	16	25	285	
D	84	-	14	12	-	-	-	-	-	-	-	-	20	-	4	2	1733		26		
	90	6	48	30	-	-	-	-	-	-	-	-	37	-	29	18	5600		84		
	96	23	58	13	-	1	-	-	-	-	-	-	60	-	-	35	1900		95		
	01	48	25	1	-	-	-	-	-	-	-	-	47	-	-	27	1480		74		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1300		65		
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1140		57		
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>							
'84		68%				26%				05%				- 6%							
'90		50%				40%				50%				-18%							
'96		63%				04%				11%				+13%							
'01		23%				03%				07%											
Total Plants/Acre (excluding Dead & Seedlings)														'84		8266		Dec:		21%	
														'90		7799				72%	
														'96		6420				30%	
														'01		7420				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 stenophyllus																	
Y	'84	10	2	-	-	-	-	-	-	-	12	-	-	-	800		12
	'90	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10
	'96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7
	'01	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2
M	'84	51	40	-	-	-	-	-	-	-	91	-	-	-	6066	9 12	91
	'90	13	14	8	2	1	-	-	-	-	37	-	1	-	2533	6 6	38
	'96	85	3	9	23	-	-	-	-	-	115	-	-	5	2400	9 11	120
	'01	111	6	3	5	2	-	3	-	-	126	4	-	-	2600	8 10	130
D	'84	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2
	'90	20	19	6	3	1	-	-	-	-	30	-	7	12	3266		49
	'96	15	1	1	-	-	-	-	-	-	9	-	-	8	340		17
	'01	15	-	-	-	-	-	-	-	-	9	-	-	6	300		15
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		42%					00%			00%				- 8%			
'90		36%					14%			21%				-55%			
'96		03%					07%			09%				+ 2%			
'01		05%					02%			04%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	6999	Dec:	2%		
												'90	6465		51%		
												'96	2880		12%		
												'01	2940		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 microthecum																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	2	3	-	-	-	-	-	-	-	5	-	-	-	333	5	8	5
	90	5	3	1	-	-	-	-	-	-	9	-	-	-	600	5	7	9
	96	33	-	-	1	-	-	-	-	-	34	-	-	-	680	6	9	34
	01	23	-	-	2	-	-	-	-	-	23	2	-	-	500	4	7	25
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		60%			00%			00%			+55%							
'90		27%			09%			00%			- 5%							
'96		00%			00%			00%			-23%							
'01		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	733		0%			
												'96	700		3%			
												'01	540		7%			
Leptodactylon pungens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	18	-	-	1	-	-	-	-	-	19	-	-	-	380	6	12	19
	01	20	-	-	-	-	-	-	-	-	20	-	-	-	400	4	9	20
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	-	-	-	2	133		2	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	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%			100%			+67%							
'96		00%			00%			00%			+ 9%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	133		100%			
												'96	400		5%			
												'01	440		9%			

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	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266	4	5	4
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66	3	6	1
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	12	3
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100	3	10	5
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%			+50%							
'90		00%			00%			00%			-85%							
'96		00%			00%			00%			+20%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'84	266	Dec:	0%				
											'90	532		0%				
											'96	80		25%				
											'01	100		0%				
Tetradymia canescens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	9	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	13	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		-				

Trend Study 2-32-01

Study site name: Wood Pass.

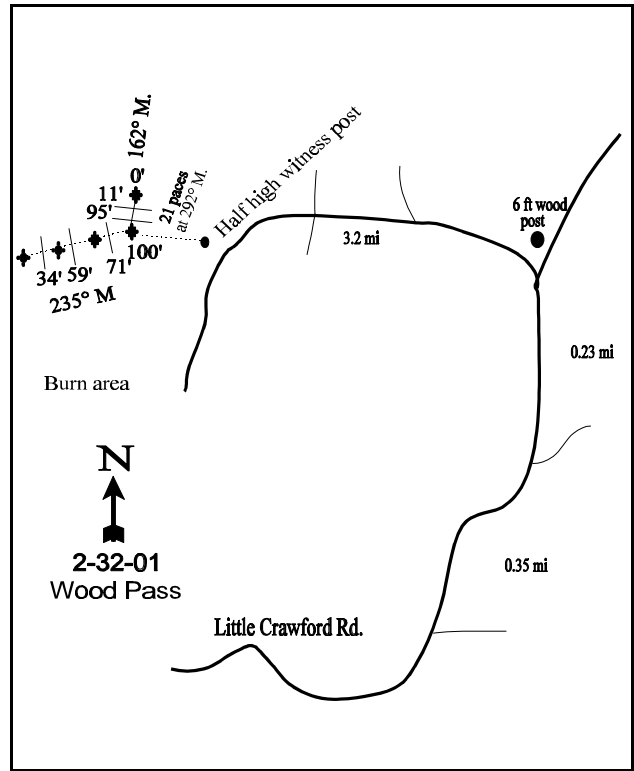
Vegetation type: Juniper.

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 intersection of Wilson Lane and Little Crawford Road east of Woodruff proceed northeast for 1.35 miles to a fork. Turn left and travel 0.35 mile to another fork. Turn left and proceed 2.6 miles to a third fork marked by a six-foot tall wooden post. Turn left and proceed 3.2 miles staying on the main road, to a witness post just off the right side of road. From the witness post walk 21 paces at 292 degrees magnetic to the 100-foot baseline stake. Walk 100 feet at 342 degrees magnetic from the 100-foot stake to the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7942. The baseline doglegs at 100 feet and runs 235 degrees magnetic.



Map Name: Woodruff Narrows

Diagrammatic Sketch

Township 10N, Range 7E, Section 13

UTM 4605849 N, 491564 E

DISCUSSION

Trend Study No. 2-32

The Wood Pass trend study is located on the east side of the Crawford Mountains approximately ½ mile south of Wood Pass. Elevation (6,800 feet) is moderately high, yet the area is still considered critical winter range. The study site lies on a gentle (10%), southeast-facing slope. The range type is an open juniper woodland with an abundant association of low-growing black sagebrush and Wyoming big sagebrush. Animal use includes cattle in spring and summer, and deer and elk in winter. Pronghorn and sage grouse use the area continuously. Deer pellet groups are the most abundant. The intensity of use is moderate to high and is most evident on juniper. Depending on the winter, snow depth could limit mid-winter utilization of the sagebrush. A pellet group transect read along the study site baseline in 2001 estimated 19 deer and 9 cow days use/acre (46 ddu/ha and 23 cdu/ha).

The NRCS classifies the study site as "Solak Gravelly Loam, Dry." This is a shallow, excessively drained soil formed residually from limestone and sandstone parent material. Total soil depth does not usually exceed 20 inches. Permeability to water is moderate, but available water capacity is low and erosion hazard is high. This soil, although occupied by Utah juniper, has a very low site productivity index or capability for producing juniper (Campbell and Lacey 1982). Soils at the site have a clay loam texture with a soil reaction that is slightly alkaline (pH of 7.4). Effective rooting depth (see methods) is variable, ranging from 10 inches to nearly 14 inches along the baseline. Average effective rooting depth is almost 10 inches. Black sagebrush will be found in the more shallow soil, while Wyoming big sagebrush occupies the deeper soil. The soil is rocky throughout the profile with a calcareous layer at about 10 to 12 inches. Phosphorus could be a limiting factor at only 4.5 ppm as values less than 10 ppm may limit normal plant growth and development. Potassium is marginal at 70.4 ppm where values less than 70 ppm could be limiting. There is some localized erosion, but it is not severe. The erosion condition class was determined as stable in 2001.

The important species include Utah juniper, Wyoming big sagebrush, and black sagebrush. Between 1984 and 1990, both Wyoming big sagebrush and black sagebrush had relatively stable populations of about 4,500 and 1,500 plants/acre respectively. Black sagebrush was classified mostly as lightly hedged, but had a high decadency rate of 65% in 1990. Wyoming big sagebrush showed light to moderate hedging and generally had good vigor. Decadency was also moderately high at 56% in 1984 and 41% in 1990. During the 1996 reading, the baseline was extended from 100 feet to 400 feet. This new and much larger sample estimated a population density for black sagebrush of 3,800 plants/acre. Due to the lack of large numbers of seedling and young plants on previous readings, this new estimate does not represent an increase in density, but a more accurate estimate of the actual black sagebrush population over the whole area. Utilization of the black sagebrush was light to moderate with good vigor. Percent decadence was moderate at 25%. Wyoming big sagebrush density declined with the new, larger sample size from 4,532 plants/acre in 1990 to 2,440 in 1996. The change in density came primarily from a reduction in the density of young and decadent plants. Some of the change may be due to the new, larger sample used in 1996. Density of mature shrubs remained similar between readings. During the 2001 reading, both populations of sagebrush remained relatively stable. Utilization continues to be light to moderate, vigor normal on most plants, and percent decadence moderately low.

The trend for juniper density appears to be increasing with each reading of the shrub plots or strips, but the sample is too small to get a good estimate of its real density. The strip counts can be used to determine trends, yet should not be considered as reliable to estimate tree density. Density strip data in 1996 indicated that 28% of the population was classified as young trees. Point-quarter data gives a much better population estimate for trees. Data from 1996 estimated 235 trees/acre with an average diameter of just over 5 inches. Canopy cover varied from 8% to 34% in 1996, with an average of 15% cover for the site. Some of the more mature trees were highlined. Point-quarter data from 2001 estimated 216 trees/acre with an average diameter of 6 inches. Canopy cover was estimated at 13%.

The herbaceous understory is diverse but not abundant. Eight perennial grasses produced less than 6% total cover in 1996 and 9% in 2001. Sandberg bluegrass is the most abundant species. Forbs are also diverse yet few occur more than occasionally. Hoods phlox is the only common species. This low growing species accounted for 74% of the forb cover in 1996 and 55% in 2001.

1984 APPARENT TREND ASSESSMENT

Soil appears to be stable in spite of a few small active "rills" and some soil compaction in the immediate vicinity. Ground cover is adequate but certainly not outstanding. The sagebrush populations are half decadent with moderate utilization. Recruitment appears adequate to maintain the stand. The greatest potential change will likely concern density and canopy cover of Utah juniper.

1990 TREND ASSESSMENT

Density data indicates a slight increase in juniper on this open site. The trees are highlined. Sagebrush is common on the density plots where a large number of young sagebrush were classified. The sagebrush currently display a moderately hedged growth form. Rabbits have heavily browsed the low rabbitbrush. The herbaceous understory is typically sparse, but there is a fair diversity of perennial species. Although there are deeper swales dominated by sagebrush, the majority of the site has shallow soil with moderate pavement cover and soil movement.

TREND ASSESSMENT

soil - stable but in poor condition (3)

browse - stable (3)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

Ground cover characteristics are similar to 1990, indicating a stable soil trend. The browse trend is up for black sagebrush and Wyoming big sagebrush. Black sagebrush shows improved vigor and a decline in percent decadence from 65% to 25%. Wyoming big sagebrush is less heavily utilized, and displays improved vigor and a decline in percent decadence. Seedlings and young plants are in sufficient numbers to maintain the population. Total density has declined, but the number of mature plants is similar to 1990 estimates. Some of the change in density of black sagebrush and Wyoming big sagebrush are due to the larger sample used in 1996. Trend for the herbaceous understory is stable but deficient. Sum of nested frequency for grasses increased slightly while sum of nested frequency for forbs remained similar to 1990 estimates. Nested frequency of the dominant grass, Sandberg bluegrass, declined slightly but not significantly.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is down slightly. Percent cover of bare ground has increased and the ratio of protective ground cover to bare ground has also decreased. There is some localized erosion occurring but the erosion condition class was determined to be stable. Trend for black and Wyoming big sagebrush is stable. Black sagebrush has remained at a similar density compared to 1996. Utilization is mostly light, vigor normal, and percent decadence similar (25% to 31%). Recruitment is currently poor and the population could decline slightly if drought conditions continue. Wyoming big sagebrush displays mostly light use and good vigor. Percent decadence has also declined from 30% to 21%. Recruitment is good with 16% of the population consisting of young plants. Both sagebrush species displayed minimal annual leader growth in 2001. Average annual leader growth for black sagebrush was ½ of an inch, while Wyoming big sagebrush averaged just under 1 inch. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses remained similar to 1996 even though sum of nested frequency for perennial forbs increased. Since grasses provide 67% of the herbaceous cover, the overall herbaceous trend is considered stable.

TREND ASSESSMENT

soil - down slightly (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 32

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron smithii	b ₃₁	a ⁻	c ₈₈	bc ₅₈	13	-	32	23	.97	.49
G	Agropyron spicatum	a ₄₇	b ₇₉	a ₃₄	ab ₆₄	24	38	15	27	.65	2.08
G	Bromus tectorum (a)	-	-	25	30	-	-	10	9	.10	.45
G	Oryzopsis hymenoides	a ₈	a ₁₇	b ₃₂	ab ₁₉	7	6	16	11	.52	.63
G	Poa fendleriana	-	-	13	10	-	-	5	5	.07	.10
G	Poa secunda	a ₁₄₅	b ₂₀₆	b ₁₉₁	b ₁₉₈	63	75	71	71	3.28	3.77
G	Sitanion hystrix	b ₃₆	a ₉	ab ₂₆	ab ₁₆	16	3	9	8	.11	.57
G	Stipa comata	ab ₇	a ₅	a ₁₇	b ₂₅	5	3	8	12	.21	.78
Total for Annual Grasses		0	0	25	30	0	0	10	9	0.10	0.45
Total for Perennial Grasses		274	316	401	390	128	125	156	157	5.84	8.43
Total for Grasses		274	316	426	420	128	125	166	166	5.94	8.89
F	Agoseris glauca	-	-	3	3	-	-	1	1	.00	.03
F	Alyssum alyssoides (a)	-	-	-	6	-	-	-	3	-	.01
F	Antennaria rosea	a ⁻	a ₄	ab ₈	b ₁₅	-	2	4	7	.31	.25
F	Arabis spp.	a ⁻	a ⁻	b ₁₀	ab ₁	-	-	5	1	.02	.00
F	Arenaria spp.	1	-	-	-	1	-	-	-	-	-
F	Astragalus convallarius	8	-	10	7	3	-	4	4	.02	.10
F	Astragalus utahensis	b ₂₉	ab ₁₄	ab ₂₁	a ₁₄	15	8	9	8	.12	.11

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	<i>Calochortus nuttallii</i>	4	-	-	-	2	-	-	-	-	-
F	<i>Chaenactis douglasii</i>	7	-	-	-	3	-	-	-	-	-
F	<i>Cirsium undulatum</i>	-	-	-	3	-	-	-	1	-	.00
F	<i>Collomia linearis</i> (a)	-	-	-	3	-	-	-	1	-	.03
F	<i>Comandra pallida</i>	6	5	-	-	3	3	-	-	-	-
F	<i>Cordylanthus ramosus</i> (a)	-	-	15	36	-	-	10	16	.10	.18
F	<i>Crepis acuminata</i>	_b 11	_a 2	_a 3	_a 1	6	2	2	1	.06	.00
F	<i>Cryptantha</i> spp.	_b 25	_a -	_{ab} 8	_c 47	10	-	4	19	.09	.58
F	<i>Cymopterus</i> spp.	-	-	-	2	-	-	-	1	-	.03
F	<i>Cynoglossum officinale</i>	-	-	-	3	-	-	-	1	-	.00
F	<i>Descurainia pinnata</i> (a)	_a -	_a -	_{ab} 6	_b 8	-	-	2	5	.01	.03
F	<i>Draba</i> spp. (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Gilia aggregata</i>	5	-	-	-	2	-	-	-	-	-
F	<i>Haplopappus acaulis</i>	-	4	-	-	-	1	-	-	-	-
F	<i>Lappula occidentalis</i> (a)	-	-	3	9	-	-	1	5	.00	.02
F	<i>Microsteris gracilis</i> (a)	-	-	-	2	-	-	-	2	-	.01
F	<i>Penstemon humilis</i>	_b 49	_b 36	_a 3	_b 24	23	15	2	15	.01	.22
F	<i>Phlox hoodii</i>	115	133	104	111	53	58	52	49	2.30	2.45
F	<i>Phlox longifolia</i>	11	6	13	5	4	2	7	3	.03	.04
F	<i>Senecio multilobatus</i>	_b 21	_a -	_a 3	_a 4	9	-	1	2	.00	.03
F	<i>Trifolium</i> spp.	_b 45	_a 6	_a 3	_b 43	23	4	1	20	.00	.27
Total for Annual Forbs		0	0	24	65	0	0	13	33	0.12	0.29
Total for Perennial Forbs		337	210	189	283	157	95	92	133	3.00	4.16
Total for Forbs		337	210	213	348	157	95	105	166	3.12	4.45

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

BROWSE TRENDS --
Herd unit 02 , Study no: 32

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia nova	55	52	6.93	7.48
B	Artemisia tridentata wyomingensis	50	41	6.50	6.23
B	Atriplex canescens	0	0	-	.00
B	Chrysothamnus nauseosus consimilis	0	2	-	-
B	Chrysothamnus viscidiflorus stenophyllus	13	11	.10	.53
B	Eriogonum microthecum	1	2	.03	.15
B	Juniperus osteosperma	23	20	7.63	11.09
B	Leptodactylon pungens	0	1	-	.03
B	Opuntia spp.	1	0	-	-
B	Tetradymia canescens	0	1	-	-
Total for Browse		143	130	21.20	25.53

CANOPY COVER --
Herd unit 02 , Study no: 32

Species	Percent Cover		Point-Quarter Tree Data			
	'96	'01	Trees per Acre		Average diameter (in)	
			'96	'01	'96	'01
Juniperus osteosperma	15	13	235	216	5.2	6.0

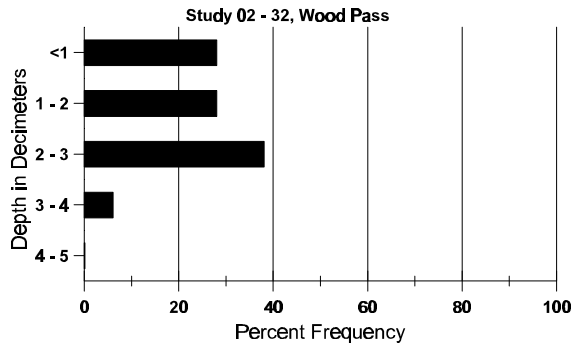
BASIC COVER --
Herd unit 02 , Study no: 32

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	311	309	1.75	6.00	29.52	36.61
Rock	114	60	2.00	3.25	1.21	1.04
Pavement	221	210	14.75	18.00	4.10	3.92
Litter	393	376	55.50	41.00	39.92	40.78
Cryptogams	177	63	3.00	8.75	4.83	3.94
Bare Ground	228	273	23.00	23.00	21.77	37.10

SOIL ANALYSIS DATA --
 Herd Unit 02, Study no: 32, Wood Pass

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.7	60.6 (12.7)	7.4	32.9	36.7	30.4	3.3	4.5	70.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 32

Type	Quadrat Frequency	
	'96	'01
Rabbit	15	20
Elk	2	-
Deer	38	17
Cattle	1	4

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
157	N/A
-	-
244	19 (46)
113	9 (23)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 32

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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	2	5	-	-	-	-	-	-	-	7	-	-	-	466	9	16	7
	90	2	4	-	-	-	-	-	-	-	6	-	-	-	400	10	13	6
	96	113	21	-	4	-	-	-	-	-	138	-	-	-	2760	11	21	138
	01	128	-	-	-	-	-	-	-	-	128	-	-	-	2560	12	22	128
D	84	-	9	-	-	-	-	-	-	-	9	-	-	-	600			9
	90	11	4	-	-	-	-	-	-	-	9	-	2	4	1000			15
	96	27	17	3	-	-	-	-	-	-	44	-	-	3	940			47
	01	51	8	-	-	-	-	-	-	-	48	-	-	11	1180			59
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	460			23
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	580			29
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		78%			00%			00%			+22%							
'90		39%			00%			26%			+60%							
'96		20%			02%			02%			- 1%							
'01		04%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1199	Dec:	50%			
												'90	1533		65%			
												'96	3800		25%			
												'01	3760		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			
<i>Artemisia tridentata wyomingensis</i>																				
S	84	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	7	3	-	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	14	11	1	-	-	-	-	-	-	-	-	18	7	1	-	1733		26	
	96	32	-	-	-	-	-	-	-	-	-	-	32	-	-	-	640		32	
	01	16	-	-	-	-	-	-	-	-	-	-	16	-	-	-	320		16	
M	84	6	13	2	-	-	-	-	-	-	-	-	20	-	1	-	1400	18	24	21
	90	2	7	5	-	-	-	-	-	-	-	-	13	-	1	-	933	18	20	14
	96	37	15	2	-	-	-	-	-	-	-	-	54	-	-	-	1080	17	31	54
	01	51	6	-	4	2	-	-	-	-	-	-	63	-	-	-	1260	16	28	63
D	84	3	34	2	-	-	-	-	-	-	-	-	29	1	9	-	2600		39	
	90	6	17	4	-	1	-	-	-	-	-	-	19	1	5	3	1866		28	
	96	17	19	-	-	-	-	-	-	-	-	-	36	-	-	-	720		36	
	01	10	4	-	7	-	-	-	-	-	-	-	13	1	-	7	420		21	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	600		30	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	620		31	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>						
'84		71%				06%				14%				- 3%						
'90		53%				15%				15%				-46%						
'96		28%				02%				00%				-18%						
'01		12%				00%				07%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	4666	Dec:	56%					
												'90	4532		41%					
												'96	2440		30%					
												'01	2000		21%					
<i>Atriplex canescens</i>																				
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	10	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					
Chrysothamnus nauseosus consimilis													
M	84	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	0	24	28	0	
	01	2	-	-	-	-	-	-	40	31	45	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		-
Chrysothamnus viscidiflorus stenophyllus													
Y	84	-	-	-	-	-	-	-	-	0		0	
	90	3	2	1	-	-	-	-	-	6	-	6	
	96	4	-	-	-	-	-	-	-	4	-	4	
	01	4	-	-	-	-	-	-	-	4	-	4	
M	84	5	-	-	-	-	-	-	-	5	-	5	
	90	5	6	4	-	-	-	-	-	13	2	15	
	96	5	-	-	3	-	-	-	-	8	-	8	
	01	15	-	-	-	-	-	-	-	15	-	15	
D	84	2	-	-	-	-	-	-	-	2	-	2	
	90	-	-	-	-	-	-	-	-	0	-	0	
	96	10	3	-	-	-	-	-	-	4	-	13	
	01	-	-	-	-	-	-	-	-	0	-	0	
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%		+67%			
	'90	38%			24%			00%		-64%			
	'96	12%			00%			36%		-24%			
	'01	00%			00%			00%					
Total Plants/Acre (excluding Dead & Seedlings)										'84	466	Dec:	29%
										'90	1400		0%
										'96	500		52%
										'01	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				
Eriogonum microthecum																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	9	1
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	5	10	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%			+67%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
												'01	60		-			
Juniperus osteosperma																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
	01	4	-	-	2	-	-	-	-	-	6	-	-	-	120			6
M	84	-	-	-	2	-	-	-	-	-	2	-	-	-	133	69	43	2
	90	-	2	-	-	-	2	-	-	-	4	-	-	-	266	84	49	4
	96	15	-	-	-	-	-	-	3	-	18	-	-	-	360	-	-	18
	01	13	-	-	1	1	-	1	-	-	16	-	-	-	320	-	-	16
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	1	-	1	-	-	-	20			1
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%			+33%							
'90		33%			33%			00%			+20%							
'96		00%			00%			00%			- 8%							
'01		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	399		0%			
												'96	500		0%			
												'01	460		4%			

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		
Leptodactylon pungens																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	4	-	-	-	-	-	-	-	-	-	-	-	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	-	-	-	66	2	3	1
	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	66		-		
												'96	0		-		
												'01	20		-		
Opuntia spp.																	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	-	-	-	66	3	9	1
	96	3	-	-	-	-	-	-	-	-	-	-	-	60	4	8	3
	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%				- 9%			
'96		00%				00%				00%							
'01		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-		
												'90	66		-		
												'96	60		-		
												'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>Symphoricarpos oreophilus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	27	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	29	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>Tetradymia canescens</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	8	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	19	1
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		50%			50%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	132		50%			
												'96	0		0%			
												'01	20		0%			

Trend Study 2-33-01

Study site name: Brazier Canyon.

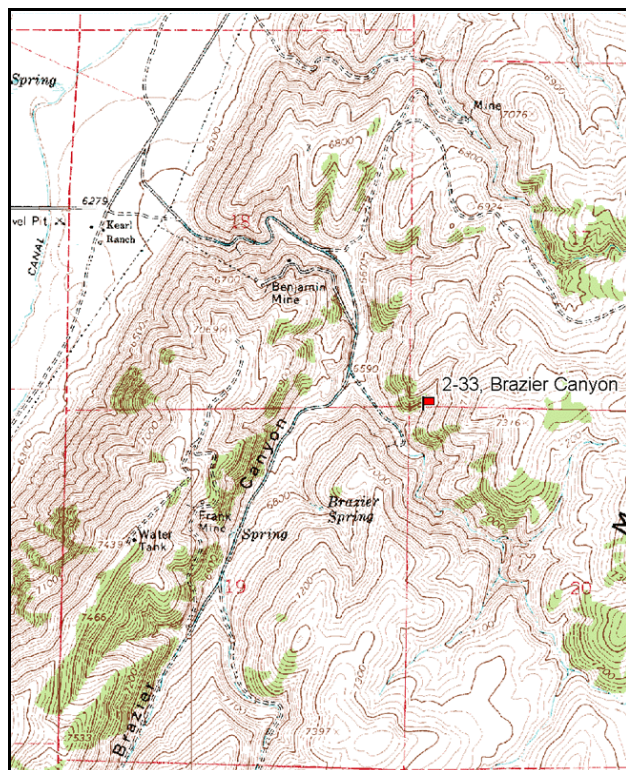
Vegetation type: Black Sagebrush.

Compass bearing: frequency baseline 162 degrees magnetic.

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

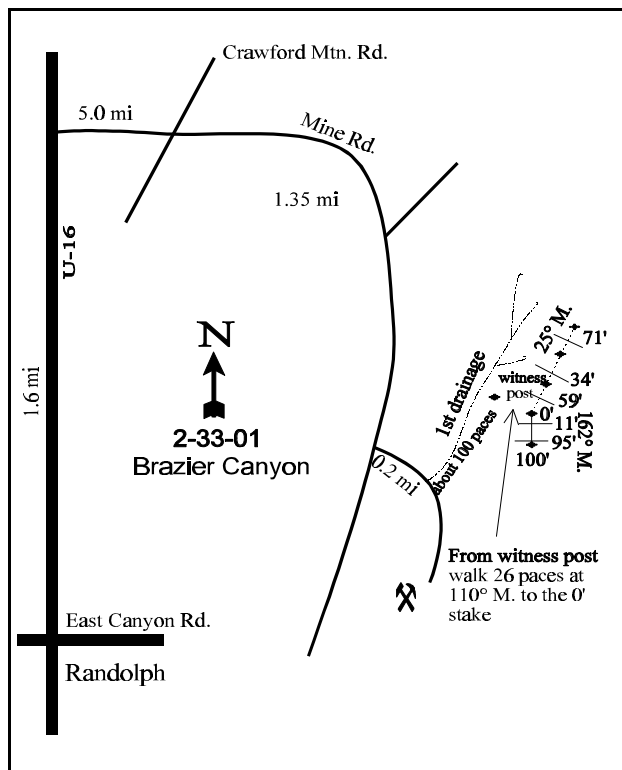
LOCATION DESCRIPTION

From North Main and East Canyon Road (100 North) in Randolph proceed north on U-16 from 1.60 miles, and turn right (east) onto Crawford Mountain Road. continue east for 5.0 miles to a fork. Turn right (i.e. southeast) and proceed 1.35 miles on this road to where there is a small canyon on the left with a road going up it. Turn left (i.e. east) onto this road, and proceed 0.2 miles to the first ravine on the left (i.e., north) side of the road. Walk up ravine 100 paces to a witness post. From the witness post walk 26 paces at a bearing of 110 degrees magnetic to the 0-foot baseline stake. The 0-foot stake is marked by a browse tag, #7978. The rest of the baseline runs off the 0-foot baseline stake at a bearing of 25 degrees magnetic.



Map Name: Rex Peak

Township 11N, Range 8E, Section 20



Diagrammatic Sketch

UTM 4614824 N, 494144 E

DISCUSSION

Trend Study No. 2-33

The Brazier Canyon trend study, the last of three on the Crawford Mountains, is located in a tributary of Brazier Canyon at approximately 6,780 feet elevation. The site is on a steep (50% to 55%), west-facing slope dominated by black sagebrush. The slope also contains fair numbers of other shrubs, most notably Wyoming big sagebrush and narrowleaf low rabbitbrush. This area is considered winter range for deer. Although the site is available to cattle in spring, the steep slopes prevent most livestock use. Deer use was moderately high in 1996 with a quadrat frequency of pellet groups at 33%. In addition, two deer carcasses were found on the study site in 1984 and two antler drops (spike and 2-point) were seen in 1996. A pellet group transect read along the study site baseline in 2001, estimated 48 deer days use/acre (117 ddu/ha). One cattle pat and 2 elk pellet groups were also encountered.

The soil mapping unit that includes the study site is entitled "Rexmont-Rock Outcrop Complex." Soils in this unit are shallow and excessively drained gravelly loams. They are primarily residual soils derived from limestone and thus are moderately to strongly alkaline and calcareous throughout the 20" soil profile. Permeability is moderate, available water capacity is poor, and both runoff and erosion hazard are high (Campbell and Lacey 1982). Soils at the study site have a loam texture and a soil reaction that is slightly alkaline (pH of 7.7). Effective rooting depth (see methods) was estimated at almost 16 inches in 1996. Rock and pavement are common on the surface. The study site showed evidence of significant sheet erosion and somewhat less serious gully erosion in 1984. Soil pedestalling was evident in 1996 and 2001, but abundant vegetation and litter cover adequately protect the soil from serious erosion. The erosion condition class was determined to be slight in 2001.

Two key browse species occupy the area. Most numerous is black sagebrush which forms a moderately dense and uniform stand. Utilization is generally light to moderate even though the data indicated a substantially high level of decadence in 1984 and 1990. The larger sample taken in 1996 estimated a much lower density of black sagebrush, (5,340 plants/acre compared to 11,199). The lack of large numbers of dead plants in 1996, about 14% (880 plants/acre), suggests that this new density estimate is more reflective of the actual population over the whole area. Utilization in 1996 was light and percent decadence has declined from 48% to 14%. Data from 2001 show similar light use, good vigor, and low decadence for black sagebrush.

Wyoming big sagebrush is less abundant and is hybridizing with black sagebrush. Unlike black sagebrush, density estimates have remained similar between 1990 and 1996. Although more heavily browsed than black sagebrush, Wyoming big sagebrush appears to have a stable population. Due to the dry conditions during the summer of 1996, many of the Wyoming big sagebrush plants were dropping their leaves. This is likely a marginal site for Wyoming big sagebrush under drought conditions. The population declined slightly in 2001. Utilization was similar to 1996, but percent decadence increased from 30% to 42%. Other preferred shrubs found on the site include winterfat and serviceberry which occur in relatively small numbers. Point-quarter data from 2001 estimated 121 juniper trees/acre occupy the site. Average diameter was estimated at almost 4 inches.

Perennial grasses are the most abundant herbaceous component. Within that category, bluebunch wheatgrass is easily the most productive. It produced 41% of the grass cover in 1996 and 66% in 2001. Sandberg bluegrass is also abundant. Forb composition is moderately diverse, yet relatively unproductive and unpalatable. Longleaf phlox, hoods phlox, and fendler sandwort accounted for 63% of the forb cover in 1996 and 56% in 2001. Nevertheless, forbs that occur in this area are not unusual for this range type or for the Crawford Mountains in general.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be in a state of decline because of persistent erosion due to steep slope, highly erodible soil, and incomplete ground cover. Our assessment of vegetative trend can best be described as tentative. Both key sagebrush species appear stable and perhaps even increasing. An increase in total shrub density appears unlikely though, because the area already has what appears to be a maximum shrub density. In the future, changes in relative abundance of species should be monitored. At the present time, trend seems stable.

1990 TREND ASSESSMENT

Allowing for difficulties in separating sagebrush species at the Brazier Canyon site, the total density of sagebrush declined slightly. A dense stand of sagebrush, dominated by black sagebrush, remains. While the black sagebrush decreased in density, improvements were seen in age class structure, vigor, and growth form. The sagebrush appear moderately hedged, although there is evidence of very heavy deer use. Several deer carcasses were found on the site. A density of 89 juniper/acre was calculated from the point-quarter method. Sandberg bluegrass remains the most abundant grass. The frequency of bluebunch wheatgrass shows a significant decline. Percent cover of bare ground nearly doubled since 1984 (10% to 18%), while litter cover declined. Due to adequate litter and vegetative cover and a significant amount of erosion pavement on the ground surface, current soil erosion is minimal.

TREND ASSESSMENT

soil - slightly declining (2)

browse - stable (3)

herbaceous understory - down slightly (2)

1996 TREND ASSESSMENT

The soil trend appears stable. Percent bare ground declined but this was offset by a decline in litter cover. Herbaceous cover is abundant and well dispersed, effectively limiting erosion. The browse trend appears stable for black sagebrush. Population density declined 52% compared to 1990 data. However, the lack of large numbers of dead shrubs suggests that this new estimate using a much larger sample is a more accurate reflection of black sagebrush density. Utilization of black sagebrush is mostly light to moderate, vigor is good, and percent decadence has declined from 48% in 1990 to 14%. Black sagebrush makes up the majority of the browse cover (68%). Wyoming big sagebrush has a similar density compared to 1990. Utilization is less heavy, yet vigor is poor on 11% of the population, and percent decadence has increased from 22% in 1990 to 30% in 1996. There is one dead plant for every two live ones. Trend for Wyoming big sagebrush appears slightly down, but it only contributes 13% of the browse cover. The browse trend is considered stable overall. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses has increased, while sum of nested frequency for perennial forbs has remained stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up slightly (4)

2001 TREND ASSESSMENT

Trend for soil is stable. Although percent cover of bare ground increased, relative percent cover of litter and vegetation increased slightly as well. Herbaceous cover is abundant and stable. There is some localized soil movement which is inevitable due to the steep slope. The erosion condition class was determined to be slight. Trend for the key browse species, black sagebrush, is stable. Utilization continues to be light to moderate, vigor normal on most plants, and percent decadence low at 13%. Young plants are abundant and adequate to maintain the stand. Wyoming big sagebrush is of secondary importance. It has declined slightly in density. It displays moderate to heavy use, poor vigor on 19% of the population, and high percent decadence at 42%. Recruitment is poor and there are not currently enough young plants to replace the decadent plants classified as dying (200 plants/acre). This is probably a marginal site for Wyoming big sagebrush, especially during drought. Another negative aspect of the browse trend is the increase in young juniper trees (20 plants/acre to 100) between 1996 and 2001. Over time, the increase in juniper cover could negatively effect the sagebrush understory. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses declined slightly, while sum of nested frequency for perennial forbs increased slightly. Nested frequency of bluebunch wheatgrass increased significantly with frequency of Sandberg bluegrass declining. The forb composition is diverse, but dominated by only a few species including fendler sandwort and 2 phlox's, Hoods and longleaf.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 33

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	_b 208	_a 119	_a 166	_b 212	87	58	69	84	6.76	10.46
G	Bromus tectorum (a)	-	-	19	43	-	-	9	16	.21	.66
G	Koeleria cristata	_b 23	_{ab} 11	_a 1	_a 6	9	5	1	3	.00	.09
G	Poa fendleriana	_{ab} 8	_a -	_c 27	_{bc} 14	2	-	11	6	.28	.27
G	Poa secunda	_a 190	_c 302	_c 308	_b 252	75	99	97	90	8.95	4.30
G	Sitanion hystrix	-	-	3	-	-	-	1	-	.15	-
Total for Annual Grasses		0	0	19	43	0	0	9	16	0.21	0.66
Total for Perennial Grasses		429	432	505	484	173	162	179	183	16.16	15.13
Total for Grasses		429	432	524	527	173	162	188	199	16.38	15.79
F	Antennaria rosea	10	6	5	5	4	3	2	2	.06	.06
F	Arenaria fendleri	46	44	35	21	20	19	13	12	1.61	.37
F	Arabis holboellii	_a 1	_a -	_b 10	_{ab} 6	1	-	7	2	.03	.06
F	Astragalus convallarius	_b 43	_a 4	_b 25	_b 43	23	2	14	21	.51	.90
F	Astragalus spp.	_b 115	_a 13	_a 8	_a 4	51	7	4	3	.09	.01
F	Astragalus utahensis	1	3	-	2	1	1	-	1	-	.00

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Balsamorhiza sagittata	8	5	2	14	3	4	1	6	.15	.31
F	Castilleja linariaefolia	-	-	-	4	-	-	-	2	-	.06
F	Camelina microcarpa (a)	-	-	-	-	-	-	-	-	-	.00
F	Calochortus nuttallii	1	4	-	-	1	2	-	-	-	-
F	Chaenactis douglasii	3	-	-	-	1	-	-	-	-	-
F	Comandra pallida	-	-	-	8	-	-	-	3	-	.09
F	Collinsia parviflora (a)	-	-	6	-	-	-	3	-	.01	-
F	Cordylanthus ramosus (a)	-	-	7	1	-	-	4	1	.07	.00
F	Crepis acuminata	28	23	24	43	17	10	11	19	.49	.57
F	Cryptantha spp.	_b 39	_a -	_a -	_a -	21	-	-	-	-	-
F	Cymopterus spp.	_a -	_a -	_a -	_b 8	-	-	-	5	-	.05
F	Descurainia pinnata (a)	-	-	3	4	-	-	1	2	.03	.03
F	Erigeron divergens	_a -	_b 34	_a 4	_a 6	-	17	3	2	.06	.06
F	Haplopappus acaulis	_{ab} 4	_a -	_b 14	_{ab} 2	2	-	7	2	.21	.03
F	Hackelia patens	-	9	-	3	-	4	-	1	-	.03
F	Lupinus spp.	-	-	-	2	-	-	-	1	-	.00
F	Machaeranthera canescens	-	-	-	2	-	-	-	1	-	.00
F	Penstemon humilis	_b 10	_a 2	_{ab} 3	_a 1	6	1	3	1	.01	.00
F	Phacelia spp.	6	-	-	-	3	-	-	-	-	-
F	Phlox hoodii	_a 32	_a 34	_b 74	_b 80	16	15	31	35	.93	2.57
F	Phlox longifolia	_a 29	_b 83	_{ab} 60	_a 38	18	36	26	18	.52	.21
F	Senecio multilobatus	3	-	-	1	1	-	-	1	-	.03
F	Solidago spp.	3	-	-	-	1	-	-	-	-	-
F	Trifolium spp.	_a -	_a -	_{ab} 6	_b 13	-	-	4	6	.02	.08
Total for Annual Forbs		0	0	16	5	0	0	8	3	0.11	0.04
Total for Perennial Forbs		382	264	270	306	190	121	126	144	4.73	5.54
Total for Forbs		382	264	286	311	190	121	134	147	4.85	5.59

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

BROWSE TRENDS --
Herd unit 02 , Study no: 33

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	4	1	-	.00
B	Artemisia nova	82	80	10.04	13.06
B	Artemisia tridentata wyomingensis	42	30	1.89	.98
B	Ceratoides lanata	15	15	.07	.30
B	Chrysothamnus viscidiflorus viscidiflorus	29	34	1.03	3.69
B	Eriogonum microthecum	37	36	.87	1.05
B	Juniperus osteosperma	4	7	.56	1.23
B	Opuntia spp.	2	2	-	-
B	Symphoricarpos oreophilus	5	4	.38	.21
B	Tetradymia canescens	0	0	-	.03
Total for Browse		220	209	14.85	20.59

CANOPY COVER --
Herd unit 02 , Study no: 33

Species	Percent Cover		Point-Quarter Tree Data	
	'96	'01	Trees per Acre '01	Average diameter (in) '01
Juniperus osteosperma	1	1	121	3.7

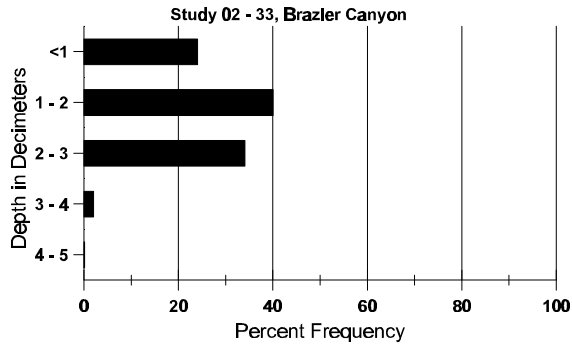
BASIC COVER --
Herd unit 02 , Study no: 33

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	346	337	3.00	14.75	35.12	42.21
Rock	323	220	15.50	6.00	13.34	5.89
Pavement	322	336	16.00	24.50	16.43	13.54
Litter	392	371	49.25	32.50	26.29	33.81
Cryptogams	213	152	6.75	4.75	5.01	2.72
Bare Ground	266	268	9.50	17.50	11.36	19.00

SOIL ANALYSIS DATA --
 Herd Unit 02, Study no: 33, Brazier Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.5	53.2 (16.8)	7.7	36.7	39.0	24.3	4.0	14.4	105.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 33

Type	Quadrat Frequency	
	'96	'01
Rabbit	7	5
Elk	-	2
Deer	33	25
Cattle	1	1

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
139	N/A
17	1 (3)
618	48 (117)
9	<1 (2)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 33

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	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	2	-	-	-	133		2		
	96	1	-	-	1	-	-	-	-	2	-	-	-	40		2		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	14	13	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	19	20	0	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	2	-	-	-	-	-	-	-	-	-	-	2	40		2		
	01	-	-	1	-	-	-	-	-	-	-	-	1	20		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%			+50%							
'90		00%			00%			00%			-40%							
'96		00%			00%			50%			-75%							
'01		00%			100%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	133		0%			
												'96	80		50%			
												'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				
Artemisia nova																		
S	'84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	'90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	'96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
	'01	28	-	-	-	-	-	-	-	-	28	-	-	-	560		28	
Y	'84	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	'90	9	6	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	'96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	'01	20	-	-	1	-	-	-	-	-	19	2	-	-	420		21	
M	'84	56	26	-	-	-	-	-	-	-	82	-	-	-	5466	7 13	82	
	'90	30	47	3	-	-	-	-	-	-	79	-	1	-	5333	10 11	80	
	'96	160	62	-	-	-	-	-	-	-	222	-	-	-	4440	12 21	222	
	'01	186	45	-	-	-	-	-	-	-	222	9	-	-	4620	12 20	231	
D	'84	93	27	1	-	-	-	-	-	-	115	2	4	-	8066		121	
	'90	21	57	1	-	1	-	-	-	-	73	1	3	3	5333		80	
	'96	24	12	1	-	-	-	-	-	-	32	-	-	5	740		37	
	'01	27	5	3	-	-	-	1	-	-	19	-	-	17	720		36	
X	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	880		44	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	900		45	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		25%			.47%			02%			-17%							
'90		63%			02%			04%			-54%							
'96		28%			.37%			02%			+ 7%							
'01		17%			01%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	14132	Dec:	57%			
												'90	11666		46%			
												'96	5340		14%			
												'01	5760		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 wyomingensis																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	3	-	-	2	-	-	-	-	-	5	-	-	-	100		5	
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	84	3	4	1	-	-	-	-	-	-	8	-	-	-	533	12	12	8
	90	10	4	2	-	-	-	-	-	-	14	2	-	-	1066	33	26	16
	96	16	26	4	-	-	-	-	-	-	44	-	-	2	920	14	24	46
	01	13	13	4	-	-	-	-	-	-	28	2	-	-	600	12	21	30
D	84	-	3	1	-	-	-	-	-	-	4	-	-	-	266		4	
	90	-	-	4	-	1	-	-	-	-	3	-	2	-	333		5	
	96	10	12	-	-	-	-	-	-	-	16	-	-	6	440		22	
	01	7	8	5	1	-	-	1	-	-	12	-	-	10	440		22	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	620		31	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	300		15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		54%			15%			00%			+44%							
'90		22%			26%			09%			- 5%							
'96		52%			05%			11%			-27%							
'01		40%			17%			19%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	865	Dec:	31%			
												'90	1532		22%			
												'96	1460		30%			
												'01	1060		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>Ceratoides lanata</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	4	-	-	-	-	-	-	-	5	-	-	-	333	6	7	5
	90	-	1	1	-	-	-	-	-	-	2	-	-	-	133	6	5	2
	96	13	11	3	-	-	-	-	-	-	27	-	-	-	540	8	10	27
	01	32	2	-	-	-	-	-	-	-	32	2	-	-	680	8	15	34
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		67%			00%			00%			+14%							
'90		29%			14%			00%			+20%							
'96		38%			10%			00%			+15%							
'01		06%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	0%			
												'90	465		14%			
												'96	580		0%			
												'01	680		0%			
<i>Chrysothamnus nauseosus consimilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	65	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									
Chrysothamnus viscidiflorus viscidiflorus																	
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	1	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	9	-	-	-	-	-	1	-	10	-	-	-	666		10	
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	19	-	-	-	-	-	-	-	19	-	-	-	1266	15	12	19
	90	22	-	1	1	-	-	-	-	24	-	-	-	1600	13	11	24
	96	31	1	-	3	-	-	-	-	35	-	-	-	700	13	19	35
	01	45	-	-	2	-	-	-	-	42	5	-	-	940	12	20	47
D	84	14	-	-	-	-	-	-	-	14	-	-	-	933		14	
	90	7	-	-	-	-	-	-	-	7	-	-	-	466		7	
	96	6	-	-	-	-	-	-	-	6	-	-	-	120		6	
	01	4	-	-	-	-	-	-	-	4	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'84		00%			00%			00%			+12%						
'90		00%			02%			00%			-69%						
'96		02%			00%			00%			+18%						
'01		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'84	2399	Dec:	39%				
										'90	2732		17%				
										'96	840		14%				
										'01	1020		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				
Eriogonum microthecum																		
S	84	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	90	11	1	-	-	-	-	-	-	-	12	-	-	-	800		12	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	9	8	15
	90	10	-	-	-	-	-	-	-	-	10	-	-	-	666	5	7	10
	96	56	-	-	8	-	-	-	-	-	64	-	-	-	1280	7	9	64
	01	62	-	1	6	-	-	-	-	-	68	1	-	-	1380	6	8	69
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+ 5%							
'90		05%			00%			00%			-11%							
'96		00%			00%			00%			+ 6%							
'01		00%			01%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	1400	Dec:	-			
												'90	1466		-			
												'96	1300		-			
												'01	1380		-			

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	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	01	1	-	-	-	-	-	-	1	-	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		00%			00%			00%			+ 0%							
'90		00%			00%			00%			+18%							
'96		00%			00%			00%			+43%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	80		-			
												'01	140		-			
Opuntia spp.																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	3	10	2
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	6	12	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:	-			
												'90	0		-			
												'96	40		-			
												'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				
Symphoricarpos oreophilus																		
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333	16	6	5
	90	18	5	1	-	-	-	2	-	-	22	-	4	-	1733	22	12	26
	96	4	-	-	2	-	-	-	-	-	5	-	1	-	120	16	32	6
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120	18	32	6
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			+67%							
'90		19%			04%			15%			-92%							
'96		00%			00%			14%			-14%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	599	Dec:	-			
												'90	1799		-			
												'96	140		-			
												'01	120		-			
Tetradymia canescens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	30	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 2-34-01

Study site name: Otter Creek.

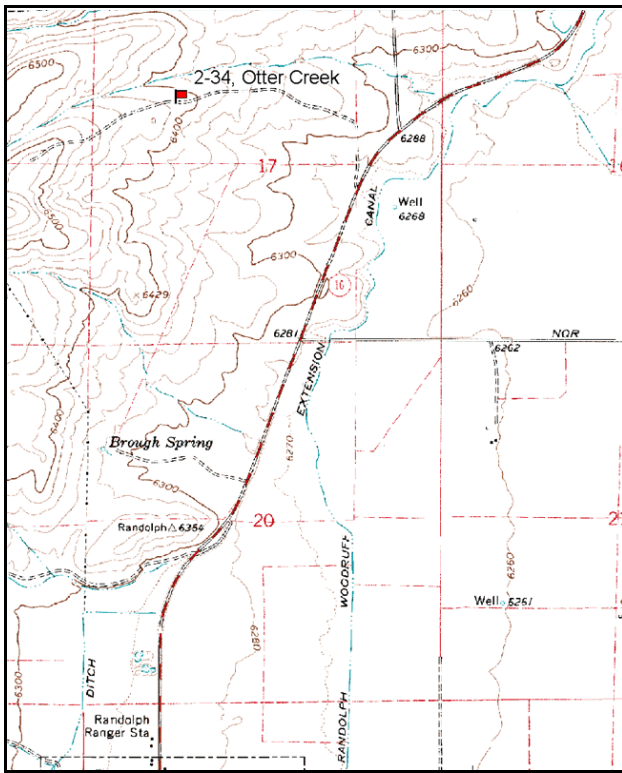
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 146 degrees magnetic.

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

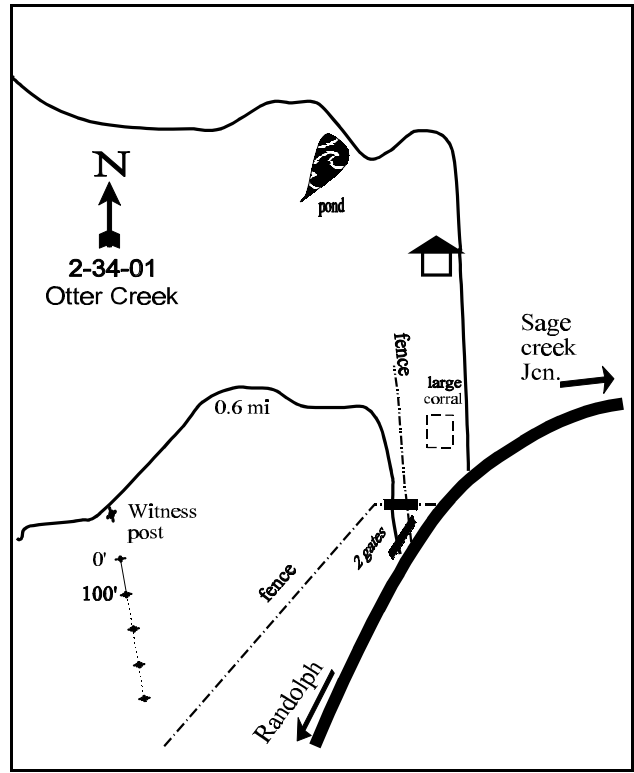
LOCATION DESCRIPTION

Proceed north from Randolph on U-16. Travel 1/2 mile past Nor Gray Lane. Turn left here, and proceed 0.7 miles from the first gate to a witness post on the left hand side of the road. From the witness post walk 15 feet at 160 degrees magnetic to the 0-foot stake of the baseline marked with browse tag #7977.



Map Name: Randolph

Township 11N, Range 7E, Section 17



Diagrammatic Sketch

UTM 4616055 N, 484758 E

DISCUSSION

Trend Study No. 2-34

The Otter Creek study lies on critical deer winter range located approximately 2 miles north of Randolph. This is an area that formerly supported a climax Wyoming big sagebrush community typical of this area. The study area has been treated with herbicides or some kind of mechanical means to control sagebrush prior to 1984. In addition, crested wheatgrass has been seeded by a drill to increase forage production for livestock. This study should provide useful information about potential longevity and effectiveness of such treatments. The study site is at 6,410 feet in elevation on a gentle (5%), east-facing slope. Many different animals use the area which include cattle, sheep, deer, pronghorn, elk, and sage grouse. Pellet group transect data from the site in 2001 estimated 42 deer/pronghorn days use/acre (103 days use/ha) and 11 cow days use/acre (27 cdu/ha). Deer and pronghorn pellets were combined due to difficulty in distinguishing one from the other. Sage grouse droppings were seen on the site, although they were not picked up in the pellet group transect in 2001.

Soils in the area are described as the "Pancheri Silt Loam". This is a deep, fertile soil with agricultural potential. It also has the capability to produce abundant sagebrush forage. The principal problem is high susceptibility to wind and water erosion. A good plant cover is essential (Campbell and Lacey 1982). Soils at the study site have a loam texture with a neutral pH of 6.9 and limited organic matter (1.4%). Effective rooting depth (see methods) is estimated at almost 16 inches. There is little rock on the surface, but a calcareous layer becomes evident at about 10 inches. The study area is not badly eroded even though the amount of exposed bare ground is greater than on nearby undisturbed big sagebrush types. In 2001, an erosion condition class determined soils to be eroding slightly due mostly to pedestalling. After the original mechanical treatment and subsequent drill seeding, there has been minimal spread of crested wheatgrass from the original drill rows. The herbaceous cover provided by crested wheatgrass helps stabilize the soil.

Browse composition consists almost entirely of Wyoming big sagebrush, which makes up nearly all of the browse cover and half of the total vegetation cover on the site in 1996 and 2001. Density averaged 9,620 plants/acre in 1996 and 10,440 in 2001. Recruitment by young plants has been moderate to high in all sampling years. Currently ('01), young plants make up 12% of the population and are adequate to replace the decadent plants classified as dying in the population. Utilization has been mostly light to moderate during all sampling years. Percent decadence has fluctuated between sampling years. Nine percent of the population was classified as decadent in 1984 and 1996, but noticeably higher in 1990 (35%) and 2001 (41%). Vigor has been generally good except in 1996 when 87% of the population was classified as having poor vigor. However, this value may have been overestimated in 1996 due to most of the population experiencing early leaf drop. Sagebrush often drops leaves early during dry periods, and this condition should not be considered poor vigor. Leader growth was very minimal in 2001 averaging less than 1 inch, but seed production was good.

The herbaceous understory consists exclusively of perennial grasses, with the dominant species being crested wheatgrass. This species was seeded prior to site establishment and accounted for 81% of the grass cover in 2001. Sandberg bluegrass is the only other common perennial grass found on the site. Grasses showed a moderate level of grazing use in 1984, but current use appears light. Forbs occur rarely and produce about 1% average cover. Hood's phlox is the most abundant forb on the site with a quadrat frequency of 29% in 2001.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable to improving. Although little soil was lost during the time crested wheatgrass dominated the site, the species never expanded much beyond the original drill rows. This left a considerable

area of bare ground which should be reduced as big sagebrush increases. Vegetative trend depends on one's point of view. In an objective sense, the major trend is an increase in Wyoming big sagebrush and a concurrent decrease in grass productivity, vigor, and density.

1990 TREND ASSESSMENT

This seeded Wyoming big sagebrush site shows a slight decrease. Young plants still make up a significant portion of the population, although the percentage of decadent plants has increased. Canopy cover is estimated at 14%. The sagebrush have been moderately hedged and have normal vigor. Crested wheatgrass has been heavily grazed by cattle. It shows a decline in sum of nested frequency, but quadrat frequency is still 100%. There is an excessive amount of bare soil and plant pedestaling is widespread. However, erosion is minimized by the gentle slope.

TREND ASSESSMENT

soil - down slightly (2)

browse - down slightly (2)

herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The soil trend is stable. Percent bare ground declined by 21%, but percent litter cover also declined by 28%. Soil pedestaling is evident on the site, yet sum of nested frequency of herbaceous vegetation remained similar to 1990 estimates. Erosion is minimized due to the gentle terrain. Trend for Wyoming big sagebrush is stable. Utilization is light to moderate and percent decadence low. Recruitment is good with abundant seedlings and young. The poor vigor found on the majority of the population appears to be a temporary condition brought on by prolonged drought conditions. Current cover for sagebrush is 16%. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses has increased slightly, while frequency of forbs has declined slightly. Nested frequency for the native Sandberg bluegrass has increased significantly.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable. The ratio of bare soil to protective ground cover has remained stable. Percent bare soil slightly increased as did litter cover. Erosion is minimal at the present time although pedestaling around sagebrush stems is evidence of past erosion. Trend for browse is stable. Wyoming big sagebrush density remains stable, and recruitment from young plants is adequate to replace the decadent plants classified as dying in the population. Vigor is generally good, although percent decadency increased from 9% to 41%. Increased decadency is likely due to drought and should improve with normal precipitation in the future. Use remains light to moderate. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses and forbs slightly decreased in 2001, but not enough to warrant a downward trend. Crested wheatgrass, the dominant herbaceous species, remains at a stable frequency.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 34

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	_b 341	_a 309	_{ab} 310	_a 300	100	100	98	94	11.62	10.64
G	Carex spp.	-	4	-	4	-	2	-	2	-	.01
G	Oryzopsis hymenoides	-	-	-	3	-	-	-	1	-	.00
G	Poa secunda	_a 147	_b 208	_c 265	_{bc} 227	76	87	93	79	5.29	2.48
G	Stipa comata	-	3	2	3	-	1	2	1	.01	.03
Total for Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		488	524	577	537	176	190	193	177	16.93	13.17
Total for Grasses		488	524	577	537	176	190	193	177	16.93	13.17
F	Alyssum alyssoides (a)	-	-	_a -	_b 20	-	-	-	8	-	.04
F	Arabis spp.	-	-	-	1	-	-	-	1	-	.00
F	Astragalus utahensis	2	6	5	3	2	5	2	1	.03	.00
F	Calochortus nuttallii	-	-	-	2	-	-	-	1	-	.00
F	Cordylanthus ramosus (a)	-	-	-	2	-	-	-	2	-	.01
F	Erigeron pumilus	-	-	-	1	-	-	-	1	-	.00
F	Lomatium spp.	-	1	-	9	-	1	-	4	-	.02
F	Phlox hoodii	_a 38	_b 81	_b 75	_{ab} 58	16	35	32	29	1.16	.54
F	Phlox longifolia	_a -	_c 50	_{bc} 31	_b 25	-	19	15	10	.15	.10
F	Tragopogon dubius	-	-	-	4	-	-	-	1	-	.03
F	Trifolium spp.	_b 29	_a 4	_a -	_b 18	13	2	-	11	-	.05
F	Unknown forb-perennial	1	-	-	-	1	-	-	-	-	-
F	Zigadenus paniculatus	-	-	-	4	-	-	-	2	-	.03
Total for Annual Forbs		0	0	0	22	0	0	0	10	0	0.04
Total for Perennial Forbs		70	142	111	125	32	62	49	61	1.35	0.80
Total for Forbs		70	142	111	147	32	62	49	71	1.35	0.85

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

BROWSE TRENDS --
Herd unit 02 , Study no: 34

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	98	94	16.12	11.36
B	Atriplex gardneri falcata	8	9	.06	.18
B	Chrysothamnus viscidiflorus stenophyllus	10	5	.60	.03
B	Eriogonum microthecum	1	1	.15	.03
B	Opuntia spp.	2	1	-	-
Total for Browse		119	110	16.93	11.60

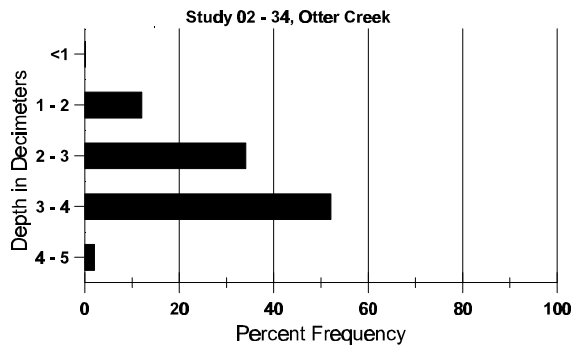
BASIC COVER --
Herd unit 02 , Study no: 34

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	362	344	13.50	5.00	36.29	28.72
Rock	3	6	0	0	.03	.01
Pavement	41	37	0	0	.22	.10
Litter	392	368	40.25	40.50	29.26	35.75
Cryptogams	161	169	0	.50	3.84	4.25
Bare Ground	348	337	46.25	54.00	42.42	46.36

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 34, Otter Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.6	62.0 (13.6)	6.9	40.6	35.1	24.4	1.4	15.2	108.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 34

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Coyote	-	1	-	-
Sheep	3	4	44	N/A
Rabbit	1	-	-	-
Elk	7	-	-	-
Deer	14	23	539	42 (103)
Cattle	5	6	131	11 (27)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 34

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
<i>Artemisia tridentata wyomingensis</i>																
S	84	21	-	-	-	-	-	-	21	-	-	-	700		21	
	90	5	-	-	-	-	-	-	5	-	-	-	166		5	
	96	18	2	-	-	-	-	-	17	-	3	-	400		20	
	01	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	84	71	2	-	-	-	-	157	-	-	-	5233		157	
	90	51	13	-	-	-	-	-	64	-	-	-	2133		64	
	96	61	14	-	-	-	-	-	10	-	65	-	1500		75	
	01	63	-	-	-	-	-	-	63	-	-	-	1260		63	
M	84	28	60	15	-	-	-	-	101	2	-	-	3433	17 28	103	
	90	45	39	-	1	1	-	-	86	-	-	-	2866	15 14	86	
	96	238	116	11	-	-	-	-	50	3	312	-	7300	16 23	365	
	01	183	63	-	-	-	-	-	239	7	-	-	4920	15 22	246	
D	84	6	14	7	-	-	-	-	27	-	-	-	900		27	
	90	35	41	-	1	3	-	-	58	-	-	22	2666		80	
	96	22	17	2	-	-	-	-	-	-	30	11	820		41	
	01	107	106	-	-	-	-	-	200	2	-	11	4260		213	
X	84	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	340		17	
	01	-	-	-	-	-	-	-	-	-	-	-	860		43	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'84		51%		08%		00%		-20%								
'90		42%		00%		10%		+20%								
'96		31%		03%		87%		+ 8%								
'01		32%		00%		02%										
Total Plants/Acre (excluding Dead & Seedlings)										'84	9566	Dec:	9%			
										'90	7665		35%			
										'96	9620		9%			
										'01	10440		41%			

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 gardneri falcata</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180	4	10	9
	01	12	-	-	-	-	-	-	-	-	12	-	-	-	240	2	7	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%			+82%							
'96		00%			00%			00%			+25%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	33		-			
												'96	180		-			
												'01	240		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	4	1	-	-	-	-	-	-	-	5	-	-	-	166	11	25	5
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	8	15	1
	96	16	-	-	-	-	-	-	-	-	1	-	14	1	320	9	15	16
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	7	14	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	20	-	-	-	-	-	-	-	-	2	-	-	18	666		20	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		10%			00%			00%			+53%							
'90		00%			00%			86%			-51%							
'96		00%			00%			88%			-59%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	0%			
												'90	699		95%			
												'96	340		6%			
												'01	140		43%			

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	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	11	1
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	9	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		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	20		0%			
												'01	20		100%			
Leptodactylon pungens																		
M	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33	44	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				
Opuntia spp.																		
Y	'84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	7	17	1
	'90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	6	17	1
	'96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	7	2
	'01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	11	1
% 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%			+45%							
'96		00%			00%			00%			-67%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	-			
												'90	33		-			
												'96	60		-			
												'01	20		-			

Trend Study 2-35-01

Study site name: Higgins Hollow.

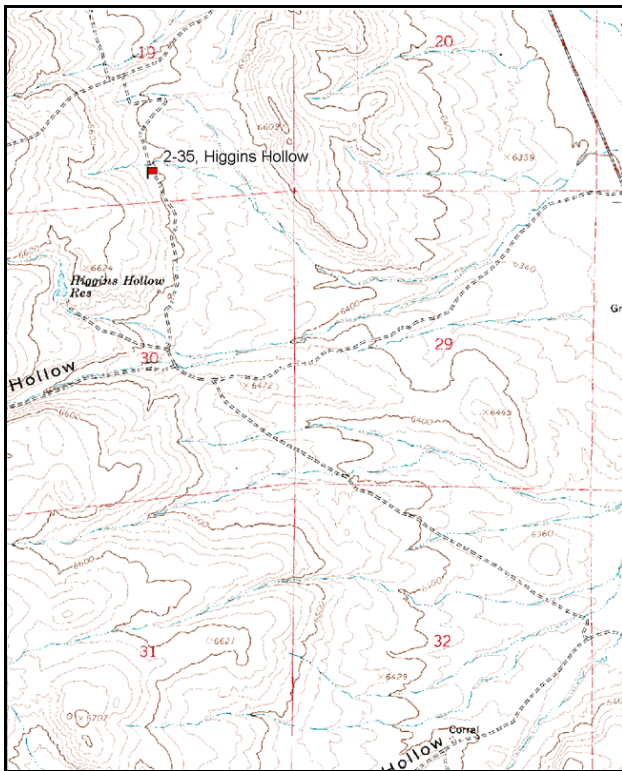
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

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

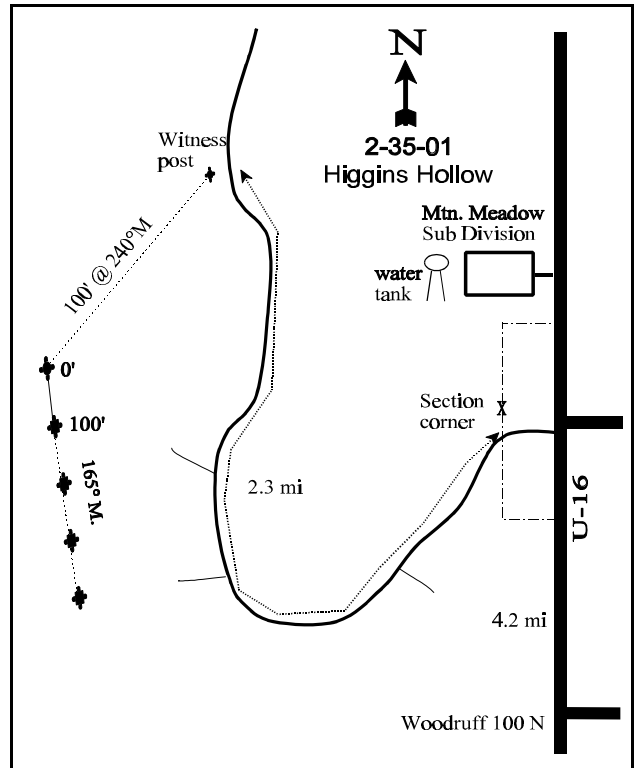
LOCATION DESCRIPTION

From 1st North in Woodruff proceed north on U-16 for 4.2 miles, and turn west to a dirt road. Proceed through pasture passing section marker at west gate. Travel a total of 2.3 miles (staying right) to a witness post on west side of road. From the witness post walk 100 feet at 240 degrees magnetic to the 0-foot stake of the baseline.



Map Name: Woodruff

Township 10N, Range 7E, Section 19



Diagrammatic Sketch

UTM 4603446 N, 483519 E

DISCUSSION

Trend Study No. 2-35

The Higgins Hollow trend study is similar physically and edaphically to the Otter Creek study (2-34). Slope is east-facing and averages 15% to 20%. Elevation (6,520 feet) is slightly higher but the study area is on the same soil type. Apart from location, the principal difference between these two areas is management practices of the past. This study samples a relatively "undisturbed" Wyoming big sagebrush type. Thus, it provides a good comparison to the Otter Creek study (2-34), an area that was mechanically treated and seeded. Wildlife use of the Higgin's Hollow study area appears light to moderate. Pellet group transect data collected along the study site baseline in 2001 estimated 7 deer/pronghorn days use/acre (17 days use/ha). Deer and pronghorn pellet groups were combined due to their similarity in appearance. Cattle graze the area and were present during the 1996 reading. In 2001, livestock use was estimated at 12 cow days use/acre (29 cdu/ha).

The "Pancheri Silt Loam" that prevails on this site is the same soil type as that described for study 2-34. It is a moderately deep, fertile soil with few growth limiting factors (Campbell and Lacey 1982). Soil at the site is deep and mostly rock free. It has a clay loam texture and a neutral soil reaction (pH of 7.1). The study site has an irregular ground cover composed primarily of perennial grasses, shrub crowns, and accumulated litter. There is a considerable amount of roots in the top 6 inches of the soil, due mostly to Sandberg bluegrass. Shrub interspaces tend to be bare and remain that way due to animal trailing and trampling. Some erosion is apparent but not serious. An erosion condition class conducted in 2001 showed soils to be stable.

The key browse species is Wyoming big sagebrush. It accounted for over 90% of the shrub cover in 1996 and 2001. It is by far the most abundant, visible, and palatable shrub on the study area. Stickyleaf low rabbitbrush occurs in fairly high numbers, although it is much smaller and seldom utilized. Although this species often acts as an increaser, it shows no such tendency on this site. Wyoming big sagebrush density was relatively stable from 1984-1996 at around 7,000 plants/acre, and young plants were abundant over this same period. The number of young plants in the population declined to only 160 plants/acre in 2001. However, sagebrush density did increase in 2001 as some of the young sampled in 1996 have reached maturity. Percent decadence has been high at over 40% in all sampling years, except in 1996, when decadency was estimated at 19%. Overall use has been at a moderate level, with heavier use occurring in 1984 and 1990. In 2001, sagebrush leader growth averaged less than 1 inch, even though seed production was abundant. Some plants were dropping leaves in 2001 due to several consecutive years of relatively dry conditions.

The herbaceous component at Higgin's Hollow is dominated by Sandberg bluegrass, a low-growing species. This species provided more than 90% of the grass cover and over three-fourth's of the total herbaceous cover in 1996 and 2001. Several other perennials are present but in more limited numbers. These species include western wheatgrass, bluebunch wheatgrass, and bottlebrush squirreltail. Forbs occur only rarely and are primarily low growing species with little forage value. Hood's phlox and longleaf phlox are the most common species.

1984 APPARENT TREND ASSESSMENT

This site is characterized by a fertile soil that is lightly eroded. It supports a dense and vigorous Wyoming big sagebrush community associated with a rather poor understory. Cattle grazing tends to impact grasses greatly and is allowing vigorous Wyoming big sagebrush reproduction to occur. Grazing is also resulting in some trampling damage detrimental to watershed values. However, overall trend appears stable but could easily change, especially if some disturbance were to occur. One only has to look at roadsides where increaser plants and weeds prevail to see the possibilities.

1990 TREND ASSESSMENT

The Higgins Hollow winter range continues to support a dense stand of Wyoming big sagebrush. At about 20% canopy cover, the sagebrush community appears about at its maxim. There is a high percentage of seedling and young plants. The sagebrush tends to be moderately hedged, as opposed to the more heavily hedged classification of mature plants in 1984. The frequency of bluebunch wheatgrass has declined dramatically, even if the increase in western wheatgrass is interpreted as a misidentification. However, the most abundant grass, Sandberg bluegrass, increased significantly. A fair percentage of litter cover remains, although the changes in ground cover percentages have resulted in increased soil movement and plant pedestalling.

TREND ASSESSMENT

soil - down slightly (2)

browse - stable (3)

herbaceous understory - up slightly (4)

1996 TREND ASSESSMENT

The soil trend appears stable, yet percent litter cover has declined by 30%. Percent bare ground has remained similar to 1990 estimates. The browse trend has improved slightly since 1990. Heavy use has declined and percent decadence decreased from 45% to 19%. Sagebrush density appears to be at its limit, but canopy cover may increase slightly in the future. Trend for the herbaceous understory is down slightly even though nested frequency for Sandberg bluegrass increased. Sum of nested frequency for the more preferred forage species, western wheatgrass and bluebunch wheatgrass, declined significantly as did bottlebrush squirreltail. Sum of nested frequency for all perennial grasses combined declined by 26%. Sum of nested frequency for perennial forbs declined slightly.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - down slightly (2)

2001 TREND ASSESSMENT

Soil trend is slightly up. Bare ground decreased and vegetation and litter cover both increased. Trend for browse is stable. Wyoming big sagebrush density increased in 2001, but young plants are few with percent decadency increasing from 19% to 48%. Utilization is light to moderate, and vigor is normal on most plants. The herbaceous understory has a slightly upward trend. Sum of nested frequency for perennial grasses increased by 15%. Western wheatgrass significantly increased in nested frequency, while bluebunch wheatgrass and squirreltail also increased, but not significantly.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 35

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-	c105	b14	c84	-	49	5	40	.07	.62
G	Agropyron spicatum	b217	a14	a9	a24	80	10	3	10	.04	.29
G	Bromus tectorum (a)	-	-	2	-	-	-	1	-	.00	-
G	Carex spp.	b29	c55	a4	a2	15	27	4	1	.02	.03
G	Oryzopsis hymenoides	-	-	1	-	-	-	1	-	.00	-
G	Poa bulbosa	-	-	4	-	-	-	1	-	.15	-
G	Poa fendleriana	-	-	4	8	-	-	3	3	.04	.06
G	Poa pratensis	-	-	-	2	-	-	-	1	-	.03
G	Poa secunda	a263	b304	c339	bc318	93	97	100	97	15.75	14.18
G	Sitanion hystrix	c91	b69	a30	a34	45	31	15	17	.25	.50
G	Stipa comata	-	-	-	2	-	-	-	1	-	.03
Total for Annual Grasses		0	0	2	0	0	0	1	0	0.00	0
Total for Perennial Grasses		600	547	405	474	233	214	132	170	16.32	15.75
Total for Grasses		600	547	407	474	233	214	133	170	16.33	15.75
F	Agoseris glauca	4	-	-	4	2	-	-	2	-	.03
F	Antennaria rosea	-	8	4	2	-	4	2	1	.06	.03
F	Arabis spp.	a2	b13	ab3	ab6	1	6	1	3	.00	.02
F	Astragalus convallarius	2	2	3	4	2	1	1	2	.03	.01
F	Calochortus nuttallii	3	4	-	3	1	2	-	1	-	.00
F	Collinsia parviflora (a)	-	-	-	1	-	-	-	1	-	.00
F	Cordylanthus ramosus (a)	-	-	a8	b23	-	-	4	14	.04	.14
F	Cryptantha spp.	b13	a-	a-	a-	8	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	5	10	-	-	3	4	.01	.02
F	Erigeron divergens	14	14	19	18	6	6	8	8	.28	.14
F	Erigeron pumilus	b12	a-	ab3	ab8	5	-	1	4	.03	.02
F	Lomatium triternatum	-	9	-	-	-	4	-	-	-	-
F	Lomatium triternatum	-	-	-	5	-	-	-	3	-	.18
F	Microsteris gracilis (a)	-	-	-	16	-	-	-	7	-	.03
F	Penstemon humilis	5	1	1	-	2	1	1	-	.00	-
F	Phlox hoodii	a5	a7	b53	b60	2	3	24	23	1.12	1.24
F	Phlox longifolia	a57	c160	b113	ab89	30	59	46	40	.55	.40
F	Salsola iberica (a)	-	-	-	3	-	-	-	1	-	.00
F	Schoenocrambe linifolia	-	-	-	1	-	-	-	1	-	.00
F	Trifolium spp.	b25	b12	a-	b24	16	7	-	12	-	.08

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Zigadenus paniculatus	_a -	_b 11	_a 2	_a 1	-	6	1	1	.03	.03
	Total for Annual Forbs	0	0	13	53	0	0	7	27	0.06	0.21
	Total for Perennial Forbs	142	241	201	225	75	99	85	101	2.11	2.21
	Total for Forbs	142	241	214	278	75	99	92	128	2.17	2.43

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

BROWSE TRENDS --

Herd unit 02 , Study no: 35

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	96	97	20.53	26.73
B	Chrysothamnus viscidiflorus stenophyllus	39	46	1.36	1.90
B	Eriogonum microthecum	8	4	.01	.00
B	Opuntia spp.	3	6	.00	-
B	Tetradymia canescens	3	7	-	.06
	Total for Browse	149	160	21.92	28.70

BASIC COVER --

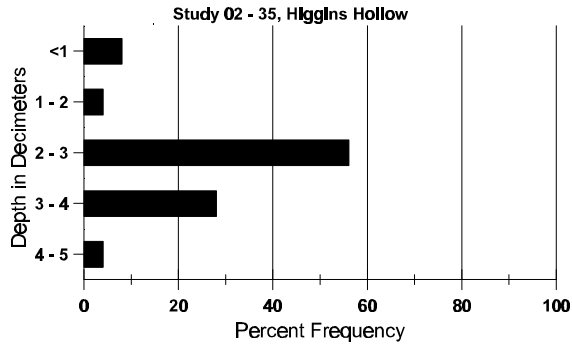
Herd unit 02 , Study no: 35

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	351	347	7.75	7.75	39.28	49.63
Rock	24	3	0	0	.10	.09
Pavement	44	76	.75	.25	.36	.46
Litter	394	387	76.00	54.25	38.15	44.29
Cryptogams	188	229	2.75	14.25	10.31	13.38
Bare Ground	275	248	12.75	23.50	23.33	17.78

SOIL ANALYSIS DATA --
 Herd Unit 02, Study no: 35, Higgins Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.9	59.0 (13.1)	7.1	42.9	31.1	26.0	1.9	11.8	137.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 35

Type	Quadrat Frequency	
	'96	'01
Rabbit	12	14
Deer	13	11
Cattle	9	2

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
261	N/A
87	7 (17)
139	12 (29)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 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				
Artemisia tridentata wyomingensis																		
S	84	64	-	-	-	-	-	-	-	-	64	-	-	-	4266		64	
	90	21	-	-	-	-	-	-	-	-	21	-	-	-	1400		21	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	24	-	-	-	-	-	-	-	-	24	-	-	-	1600		24	
	90	31	3	-	-	-	-	-	-	-	33	-	-	1	2266		34	
	96	59	6	-	-	-	-	-	-	-	65	-	-	-	1300		65	
	01	8	-	-	-	-	-	-	-	-	7	1	-	-	160		8	
M	84	6	20	9	-	-	-	-	-	-	35	-	-	-	2333	17	21	35
	90	4	18	-	-	-	-	-	-	-	21	1	-	-	1466	23	21	22
	96	101	101	7	-	-	-	-	-	-	209	-	-	-	4180	24	33	209
	01	176	28	-	-	-	-	-	-	-	194	10	-	-	4080	23	30	204
D	84	10	25	8	1	-	-	-	-	-	41	-	1	2	2933		44	
	90	19	14	10	3	-	-	-	-	-	39	-	-	7	3066		46	
	96	14	38	6	5	1	-	-	-	-	56	-	-	8	1280		64	
	01	123	63	5	1	-	-	-	-	-	186	-	-	6	3840		192	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1500		75	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1260		63	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		44%			17%			03%			- 1%							
'90		34%			10%			08%			- 1%							
'96		43%			04%			02%			+16%							
'01		23%			01%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	6866	Dec:	43%			
												'90	6798		45%			
												'96	6760		19%			
												'01	8080		48%			

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																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	13	-	-	-	-	-	-	-	-	13	-	-	-	866		13	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	55	-	-	-	-	-	-	-	-	55	-	-	-	3666	9 13	55	
	90	-	-	-	4	-	-	-	-	-	4	-	-	-	266	8 12	4	
	96	78	-	-	-	-	-	-	-	-	74	-	4	-	1560	10 17	78	
	01	102	-	-	1	-	-	-	-	-	100	4	-	-	2080	10 17	104	
D	84	15	-	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	90	65	3	-	-	-	-	-	-	-	29	-	38	1	4533		68	
	96	3	-	-	-	-	-	-	-	-	-	-	1	2	60		3	
	01	10	-	-	2	-	-	-	-	-	6	-	-	6	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%			-10%							
'90		04%			00%			52%			-68%							
'96		00%			00%			09%			+30%							
'01		00%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	5532	Dec:	18%			
												'90	4999		91%			
												'96	1620		4%			
												'01	2320		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		1	2				
Eriogonum microthecum												
Y	84	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	133		2	
	96	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	0		0	
M	84	4	-	-	-	-	-	-	266	4	4	4
	90	-	-	-	-	-	-	-	0	-	-	0
	96	7	-	-	2	-	-	-	180	7	8	9
	01	4	-	-	-	-	-	-	80	6	9	4
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%		-50%				
'90		00%		00%		00%		+40%				
'96		00%		00%		09%		-64%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'84	266	Dec:	0%		
							'90	133		0%		
							'96	220		9%		
							'01	80		0%		
Opuntia spp.												
S	84	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	66		1	
	96	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	0		0	
M	84	6	-	-	-	-	-	-	400	5	7	6
	90	3	-	-	-	-	-	-	200	5	1	3
	96	5	-	-	-	-	-	-	100	4	11	5
	01	7	-	-	-	-	1	-	160	3	8	8
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%		-50%				
'90		00%		00%		00%		-50%				
'96		00%		00%		00%		+44%				
'01		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'84	400	Dec:	0%		
							'90	200		0%		
							'96	100		0%		
							'01	180		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				
Tetradymia canescens																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	4	-	-	-	-	-	-	-	4	-	-	-	266	5	4	4
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	10	2
	01	5	1	-	-	-	-	-	-	-	6	-	-	-	120	7	12	6
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	3	-	-	-	-	-	-	-	-	-	3	200		3	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	01	-	2	-	-	-	-	-	-	-	-	-	-	2	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		80%			00%			00%			-20%							
'90		00%			75%			75%			-77%							
'96		00%			00%			33%			+67%							
'01		33%			00%			22%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	0%			
												'90	266		75%			
												'96	60		33%			
												'01	180		22%			

Trend Study 2-36-01

Study site name: Woodruff Co-op.

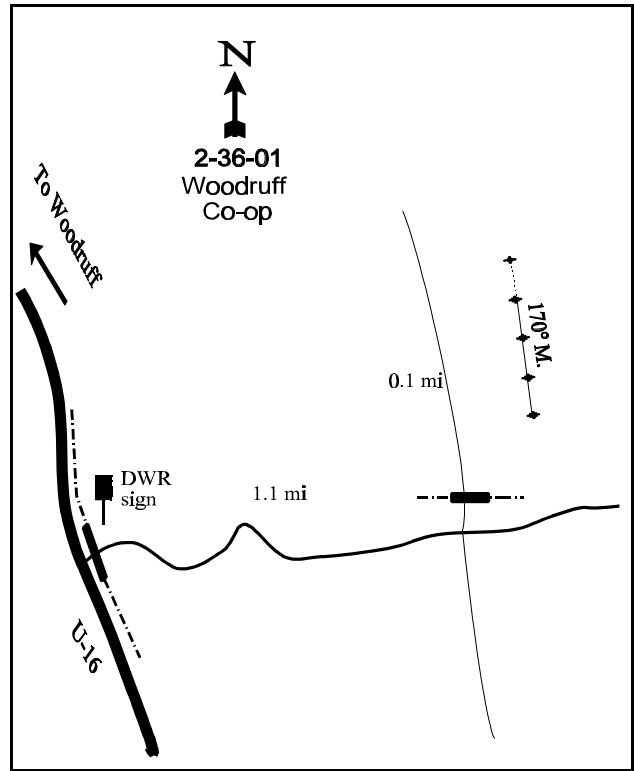
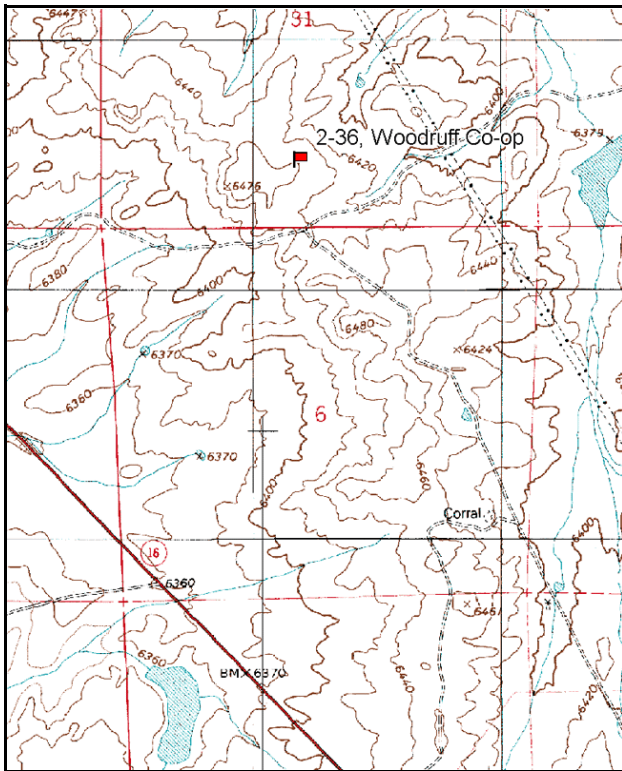
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 170 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of U-39 and U-16 in Woodruff, travel south on U-16 5.7 miles to the Woodruff Co-op Livestock Management Area. Turn left (east) through the gate. Drive 1.1 miles to a fork. Turn left and go north through the gate. From the gate, go 0.1 miles. The study is on the east side of the road, approximately 60 paces to the 0-foot baseline stake. The study stakes are short fenceposts. The baseline stakes are easily seen from the road so no witness posts were needed. The 0-foot baseline stake is marked with browse tag #55.



Map Name: Neponset Reservoir NE

Diagrammatic Sketch

Township 9N, Range 8E, Section 31

UTM 4590485 N, 493173 E

DISCUSSION

Trend Study No. 2-36

The Woodruff Co-op trend study was established in 1990 on DWR property. The purpose of this study is to monitor sagebrush reestablishment on a treated site dominated by introduced perennial grasses. Study site elevation is approximately 6,500 feet on a nearly flat, southeast-facing slope. The allotment continues to be used for spring cattle grazing. It is also antelope range that is used by deer and elk in the winter. Signs of sage grouse are also common. Pellet group transect data collected in 2001 estimated 3 elk days use/acre (7 edu/ha), 7 deer days use/acre (18 ddu/ha), and 41 cow days use/acre (102 cdu/ha). Deer pellet groups appear to be from the previous fall and winter, while elk pellet groups appear more recent.

The soil is moderately deep with an estimated effective rooting depth (see methods) of 13 inches. Soil texture is a sandy clay loam with a neutral soil reaction (pH of 7.2). Phosphorus could be a limiting factor at only 3.9 ppm as values of less than 10 ppm can limit plant growth and development. Pavement and rock cover are limited. The percentage of vegetative cover is moderate due to the dense stand of crested wheatgrass, but there is also a significant amount of bare soil in all sampling years. Cryptogams are abundant around the base of crested wheatgrass plants. An erosion condition class conducted in 2001 determined soils to be stable. Soil pedestalling provides evidence that some erosion has occurred in the past.

Wyoming big sagebrush and winterfat are the most important browse species on the site. Wyoming big sagebrush density was estimated at 320 plants/acre in 1996, increasing to 420 plants/acre in 2001. The slight increase in density was due to recruitment from young plants. Sagebrush density was estimated at nearly 1,000 plants/acre in 1990. The decrease in density between sampling years is due to the much larger sample used in 1996 and 2001. This sample gives considerably greater accuracy for species that are clumped and/or discontinuous in their distributions. The majority of sagebrush plants encountered show light to moderate hedging and are relatively small in stature. Percent decadency has steadily decreased from a high of 31% in 1990 to 0% in 2001. Vigor is good throughout the population. Annual leader growth averaged just over 1 inch in 2001, even though mature plants had abundant seed production. Under the current grazing schedule of early spring use, an increase in browse species should be favored. However, increases in sagebrush are small at the present time.

Winterfat is the most abundant shrub on the site with an estimated density averaging about 2,600 plants/acre in 1996 and 2001. This species is composed primarily of mature plants (90%) with good recruitment from young plants (10%) in 2001. Vigor is good throughout the population and percent decadency is low over all sampling years. Annual leader growth was good on winterfat (a warm season species) in 2001, averaging nearly 5 inches. Other browse that are present on the site include low rabbitbrush, broom snakeweed, gray horsebrush, and pricklypear cactus.

The herbaceous understory is totally dominated by crested wheatgrass which accounted for 94% of the grass cover and over 80% of the total vegetative cover in 1996 and 2001. Crested wheatgrass was sampled in every quadrat in all 3 years that the site was monitored. Crested wheatgrass had been moderately utilized over the entire site in 2001. Sandberg bluegrass, needle-and-thread, and Indian ricegrass were also sampled on the site. Forbs are limited and provide very little cover or forage. Hoods phlox and longleaf phlox are the most abundant of the perennial forb species. Pale alyssum, an annual, is also fairly abundant, significantly increasing in nested frequency in 2001.

1990 APPARENT TREND ASSESSMENT

Under the current livestock grazing regime, Wyoming big sagebrush would be expected to increase. This would create an upward trend for deer and antelope winter range. The study is in a good location to monitor changes in relative composition and indicate when, and if, adjustments should be made in livestock grazing. Soil condition is also an important aspect to monitor. The dense herbaceous cover currently provides fair protection, and trend appears stable to slightly downward.

1996 TREND ASSESSMENT

Trend for soil is up due to a 38% decline in percent bare ground. Herbaceous vegetation is abundant and well dispersed, effectively limiting erosion. Density of Wyoming big sagebrush is still relatively low and does not show signs of increasing. The new much larger sample used in 1996 estimated only 320 plants/acre. No seedlings or young were encountered. The lack of dead plants would suggest that the 1990 population density was overestimated with the smaller sample size. The only positive aspect of the browse trend is an improvement in percent decadency which declined from 31% to 6%. Trend for browse is considered stable. Trend for the herbaceous understory is also stable. Sum of nested frequency for crested wheatgrass increased, with the sum of nested frequency for all perennial grasses remaining similar to 1990. Sum of nested frequency for perennial forbs declined; however, forbs are rare and produce only 1% total cover.

TREND ASSESSMENT

soil - up (5)

browse - stable but very limited population (3)

herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable. The ratio of bare soil to protective ground cover slightly improved, and except for pedestalling in the past, erosion is minimal. Trend for browse is stable overall. Wyoming big sagebrush remains limited, but shows a slightly upward trend with an increase in young plants. Decadency decreased from 6% to 0%, and vigor is good on all plants. Winterfat is the most abundant species and has a stable trend. Density estimates are similar to 1996, where young plants outnumber the decadent and dead in the population. Trend for the herbaceous understory is stable. Crested wheatgrass remains the dominant species. Sum of nested frequency for perennial grasses slightly increased in 2001, but not enough to warrant an upward trend.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 36

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron cristatum	_{ab} 348	_b 360	_a 344	100	100	100	22.46	30.84
G	Oryzopsis hymenoides	5	-	4	3	-	1	-	.03
G	Poa secunda	89	90	99	46	35	38	1.38	1.44
G	Stipa comata	_{ab} 11	_a 1	_b 24	5	1	9	.03	.45
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		453	451	471	154	136	148	23.88	32.77
Total for Grasses		453	451	471	154	136	148	23.88	32.77
F	Alyssum alyssoides (a)	-	_a 41	_b 159	-	16	56	.10	.40
F	Antennaria spp.	-	2	-	-	1	-	.00	-
F	Astragalus convallarius	-	-	4	-	-	2	-	.06
F	Astragalus utahensis	_b 7	_a -	_{ab} 3	5	-	1	-	.03
F	Phlox hoodii	_b 83	_a 43	_a 33	40	20	18	1.10	.41
F	Phlox longifolia	_b 81	_a 37	_b 70	34	16	34	.08	.24
F	Schoenrambe linifolia	-	3	-	-	1	-	.00	-
F	Tragopogon dubius	-	3	8	-	1	3	.00	.06
F	Trifolium spp.	_b 11	_a -	_c 26	5	-	14	-	.11
Total for Annual Forbs		0	41	159	0	16	56	0.10	0.40
Total for Perennial Forbs		182	88	144	84	39	72	1.19	0.93
Total for Forbs		182	129	303	84	55	128	1.30	1.33

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

BROWSE TRENDS --
Herd unit 02 , Study no: 36

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata wyomingensis	14	16	.28	.96
B	Ceratoides lanata	40	42	.59	.53
B	Chrysothamnus nauseosus consimilis	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	33	34	.26	.75
B	Gutierrezia sarothrae	5	7	.03	.33
B	Opuntia polyacantha	12	11	.18	.34
B	Tetradymia canescens	8	3	.06	-
Total for Browse		112	114	1.41	2.92

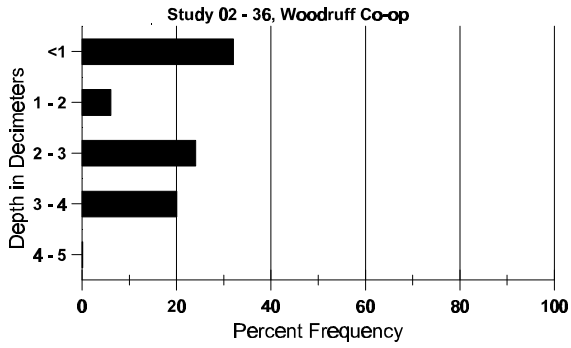
BASIC COVER --
Herd unit 02 , Study no: 36

Cover Type	Nested Frequency		Average Cover %		
	'96	'01	'90	'96	'01
Vegetation	364	351	16.75	28.00	39.97
Rock	225	133	1.75	2.09	1.01
Pavement	251	279	1.25	3.02	1.88
Litter	397	379	36.50	34.31	44.11
Cryptogams	51	143	.50	.28	2.07
Bare Ground	339	344	43.25	26.78	36.09

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 36, Woodruff Co-op

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.2	63.0 (14.1)	7.2	56.6	14.1	29.4	2.1	3.9	108.8	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 36

Type	Quadrat Frequency	
	'96	'01
Sage Grouse	-	-
Rabbit	10	7
Elk	-	-
Deer	8	6
Cattle	15	19
Antelope	6	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'01	'01
26	N/A
200	N/A
35	3 (7)
96	7 (18)
496	41 (102)
-	-

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 36

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 wyomingensis</i>																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	90	2	1	-	-	-	-	-	-	-	3	-	-	-	100			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	90	7	9	1	-	-	-	-	-	-	16	1	-	-	566	10	16	17
	96	10	4	-	-	-	-	1	-	-	15	-	-	-	300	14	24	15
	01	12	4	-	-	-	-	-	-	-	16	-	-	-	320	18	29	16
D	90	1	7	-	-	1	-	-	-	-	8	1	-	-	300			9
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	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>							
'90		62%			03%			00%			-67%							
'96		31%			00%			00%			+24%							
'01		19%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	966	Dec:	31%			
												'96	320		6%			
												'01	420		0%			
<i>Atriplex gardneri falcata</i>																		
M	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	5	5	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	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	33	Dec:	-			
												'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				
<i>Ceratoides lanata</i>																		
Y	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	96	3	2	-	9	-	-	-	-	-	14	-	-	-	280		14	
	01	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12	
M	90	3	4	-	-	-	-	-	-	-	7	-	-	-	233	7	5	7
	96	9	60	46	1	-	-	-	-	-	116	-	-	-	2320	7	9	116
	01	45	67	1	-	-	-	-	-	-	113	-	-	-	2260	8	9	113
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	2	1	-	-	-	-	-	-	3	-	-	-	60		3	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	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>							
'90		40%			00%			00%			+87%							
'96		48%			35%			00%			- 6%							
'01		54%			.80%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	333	Dec:	0%			
												'96	2660		2%			
												'01	2500		0%			
<i>Chrysothamnus nauseosus consimilis</i>																		
M	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>							
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	0		-			
												'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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	90	2	9	-	-	-	-	-	-	-	10	1	-	-	366		11	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	12	15	-	-	-	-	-	-	-	27	-	-	-	900	4	6	27
	96	38	-	-	2	-	-	-	-	-	40	-	-	-	800	7	11	40
	01	52	-	-	-	-	-	-	-	-	52	-	-	-	1040	7	11	52
D	90	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	96	4	-	-	-	-	-	-	-	-	1	-	-	3	80		4	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		53%			00%			00%			-41%							
'96		00%			00%			07%			+17%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	1499	Dec:	16%				
											'96	880		9%				
											'01	1060		2%				
<i>Gutierrezia sarothrae</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120	5	7	6
	01	11	-	-	-	-	-	-	-	-	11	-	-	-	220	7	12	11
% 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%			+45%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	-				
											'96	120		-				
											'01	220		-				

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 polyacantha																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	90	6	-	-	-	-	-	-	-	-	5	-	1	-	200	4	6	6
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	4	12	10
	01	20	-	-	-	-	-	-	-	-	19	1	-	-	400	3	9	20
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	1	-	-	2	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	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>							
'90		00%			00%			13%			+ 5%							
'96		00%			00%			14%			+33%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	266	Dec:	0%				
											'96	280		21%				
											'01	420		0%				
Tetradymia canescens																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	5	3	1	-	-	-	-	-	-	9	-	-	-	180	5	9	9
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	5	13	3
D	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>							
'90		00%			00%			00%										
'96		40%			10%			00%			-70%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	0%				
											'96	200		10%				
											'01	60		0%				

Suspended

Trend Study 2-37-96

Study site name: Rock Creek Riparian.

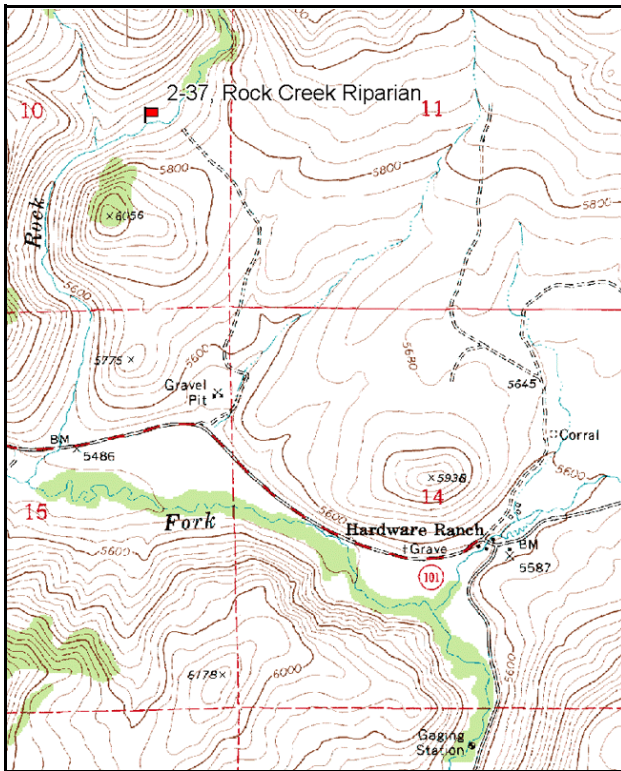
Vegetation type: Riparian.

Compass bearing: frequency baseline 20 degrees magnetic.

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

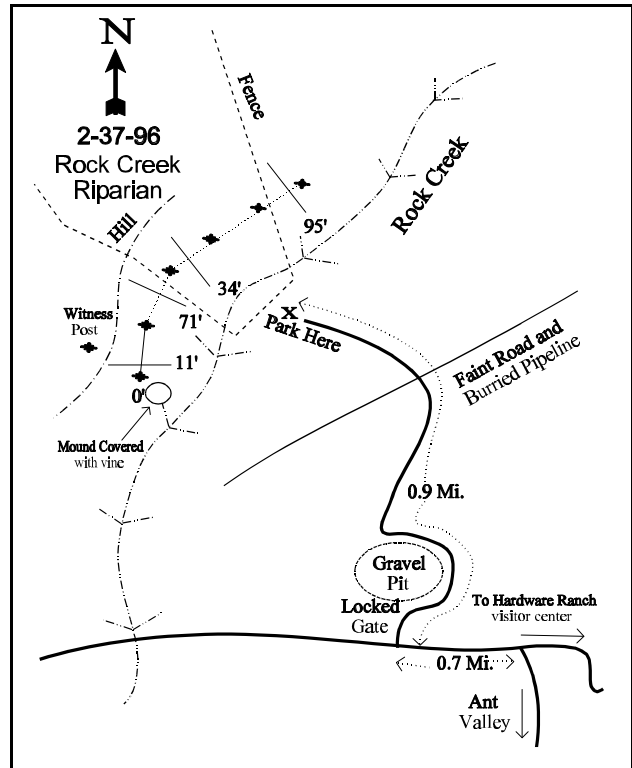
LOCATION DESCRIPTION

From the corner of the ant hill road turnoff, travel down Blacksmith Fork Canyon 0.7 miles and turn right. Go through a locked gate (you'll need a WRP key to open the gate), around a gravel pit, and travel 0.9 miles to a stopping point. Cross the creek and look for a witness post on the hill side 200 feet across the fence. From the witness post to the 0-foot stake, take a bearing of 122 degrees magnetic and pace 8 paces. The baseline doglegs along the river in the riparian area. The 100-line runs 20 degrees magnetic. The 200-foot line runs 36 degrees magnetic and the belt is centered on the 25 foot mark. The 300-foot baseline runs 55 degrees magnetic and the belt is centered on the 15 foot mark. The 400-foot baseline runs 69 degrees magnetic and the quadrats are read along the baseline. The 500-foot baseline runs 61 degrees magnetic.



Map Name: Hardware Ranch

Township 10N, Range 3E, Section 10



Diagrammatic Sketch

UTM 4607376 N, 451297 E

DISCUSSION

Trend Study No. 2-37

*** **SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. The regular range trend methods are not suitable to adequately sample this study and need to be replaced with a riparian monitoring method such as the greenline. Photographs and a pellet group transect were completed in 2001, but the vegetation was not sampled. The site narrative and data tables are included from the 1996 report.

The Rock Creek Riparian study was established in 1996 to monitor a degraded (perceived) riparian community. Slope is nearly level with a slight south aspect. Elevation is about 5,900 feet. Water is available in Rock Creek which is a perennial stream running parallel to the study baseline. The baseline zig-zags next to the creek in order to stay within the narrow riparian corridor. The baseline transects three different fenced pastures, which apparently are on different grazing schedules. Photo points were also established on willows closest to each baseline stake to record utilization visually. This area is grazed by cattle and receives some use by horses and elk. In 2001, pellet group transect data estimated 54 cow days use/acre (134 cdu/ha), while no deer or elk pellet groups were encountered. Most of the cattle use occurred in the middle pasture.

Soil on the site is deep, dark colored with a clay loam texture. Organic matter is high with a neutral soil reaction (pH of 7.3). Effective rooting depth (see methods) is greater than 28 inches along the first two hundred feet of the baseline, then averages 20 inches along the last 300 feet of the baseline which is also much drier. Rock is rare both on the surface and within the profile. Little bare ground occurs on the site, and erosion appears minimal.

Browse is limited on the site and accounts for only 2% of the total vegetative cover. Mountain big sagebrush is the most abundant shrub with an estimated density of 440 plants/acre. Most mountain big sagebrush plants occur along the ecotone of the narrow riparian corridor and the drier upland type. These plants are mostly mature and appear to not be utilized. The only shrubs in the area which likely receive summer use are the coyote willows (*Salix exigua exigua*). The willows were not abundant enough to properly sample them in the shrub density strips. The only relative measure of utilization available is photo point comparisons on the closest individual willow to each baseline stake. Some of the willows are tall and partly unavailable to browsing. Several individuals have been highlined in the past, but current use appears light. Other browse occurring on the site in small numbers include narrowleaf low rabbitbrush, broom snakeweed, Oregon grape, wax current, and Woods rose.

Herbaceous plants dominate the site. Perennial grasses are abundant and diverse. Slender wheatgrass is the most common species along with big mountain brome, Kentucky bluegrass, and orchard grass. Grasses were heavily utilized and trampled making identification difficult. As a result, all perennial and annual grasses were lumped into their respective categories. Sedges and rushes were identified to the genus level. Perennial grasses contributed 53% of the herbaceous cover. Forbs are abundant and diverse with 33 annual and perennial species encountered. Unfortunately, Canada thistle contributed 59% of the forb cover. Other weedy forbs commonly include western yarrow, pacific aster, houndstongue, horsetail, prickly lettuce, and tarweed.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable. Vegetative cover is abundant and little bare soil is exposed. Browse is not an important aspect of this summer range. The only species which receives much use is coyote willow. Future comparisons of photo points on willow will be needed to determine relative utilization and condition. Currently, these willows appear to be lightly utilized with many growing out of reach. The herbaceous

understory is abundant but contains several weedy, invasive forbs. Trend will have to be determined by comparing the composition and abundance of these forbs on future readings.

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 37

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'96	'96	'96
G	Carex spp.	30	12	.80
G	Juncus spp.	90	22	10.28
G	Unknown grass - annual (a)	62	18	1.25
G	Unknown grass - perennial	436	94	41.40
Total for Annual Grasses		62	18	1.25
Total for Perennial Grasses		556	128	52.49
Total for Grasses		618	146	53.74
F	Achillea millefolium	75	27	1.54
F	Alyssum alyssoides (a)	3	2	.01
F	Ambrosia psilostachya	1	1	.00
F	Artemisia ludoviciana	17	6	.27
F	Astragalus ceramicus	5	2	.06
F	Aster chilensis	14	5	.36
F	Cirsium arvense	235	78	14.17
F	Collomia linearis (a)	1	1	.00
F	Collinsia parviflora (a)	3	1	.00
F	Cynoglossum officinale	82	37	1.47
F	Epilobium brachycarpum (a)	21	7	.16
F	Equisetum spp.	136	46	.83
F	Erodium cicutarium (a)	4	1	.03
F	Erigeron spp.	2	1	.00
F	Fragaria virginiana	2	1	.03
F	Hackelia patens	1	1	.00
F	Isatis tinctoria	4	2	.03
F	Lactuca serriola	51	20	.25
F	Madia glomerata (a)	19	9	.17
F	Medicago sativa	4	1	.00
F	Polygonum douglasii (a)	15	6	.10
F	Potentilla gracilis	11	3	.12
F	Ranunculus testiculatus (a)	27	9	.09
F	Rumex crispus	3	2	.06
F	Rudbeckia occidentalis	6	3	.39

T y p e	Species	Nested Frequency	Quadrat Frequency	Average Cover %
		'96	'96	'96
F	<i>Smilacina stellata</i>	61	18	2.11
F	<i>Solidago missouriensis</i>	26	10	1.18
F	<i>Taraxacum officinale</i>	13	5	.10
F	<i>Tragopogon dubius</i>	19	10	.11
F	<i>Trifolium gymnocarpon</i>	3	2	.01
F	<i>Urtica dioica</i>	3	1	.00
F	<i>Verbascum thapsus</i>	10	5	.39
Total for Annual Forbs		93	36	0.57
Total for Perennial Forbs		784	287	23.57
Total for Forbs		877	323	24.15

BROWSE TRENDS --

Herd unit 02 , Study no: 37

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	<i>Artemisia tridentata vaseyana</i>	12	1.01
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	2	.03
B	<i>Gutierrezia sarothrae</i>	1	.03
B	<i>Mahonia repens</i>	5	.03
B	<i>Ribes aureum</i>	2	.03
B	<i>Rosa woodsii</i>	4	.18
B	<i>Salix exigua exigua</i>	0	.03
Total for Browse		26	1.34

BASIC COVER --

Herd unit 02 , Study no: 37

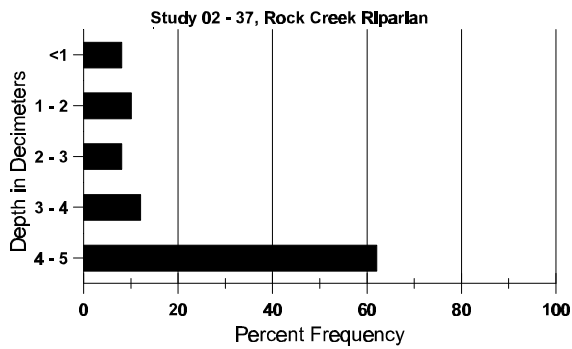
Cover Type	Nested Frequency	Average Cover %
	'96	'96
Vegetation	498	78.00
Rock	63	.97
Pavement	50	.20
Litter	471	44.50
Cryptogams	2	.03
Bare Ground	123	3.07

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 37, Rock Creek Riparian

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
23.0	50.0 (18.1)	7.3	42.2	31.4	26.4	4.8	31.0	243.2	1.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 37

Type	Quadrat Frequency
	'96
Horse	3
Elk	2
Cattle	5

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 37

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	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	21	32	17
		% Plants Showing '96	<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'96	440	Dec:	-	
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
M	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	17	21	6
		% Plants Showing '96	<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'96	120	Dec:	-	
<i>Gutierrezia sarothrae</i>																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	7	1
		% Plants Showing '96	<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'96	20	Dec:	-	
<i>Mahonia repens</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	6	5	10
		% Plants Showing '96	<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'96	340	Dec:	-	
<i>Ribes aureum</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
		% Plants Showing '96	<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)														'96	60	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				
Rosa woodsii																		
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	5	-	-	-	-	-	-	-	-	2	-	3	-	100	13	13	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	180	Dec:	-			

Trend Study 2-38-01

Study site name: Twin Creek.

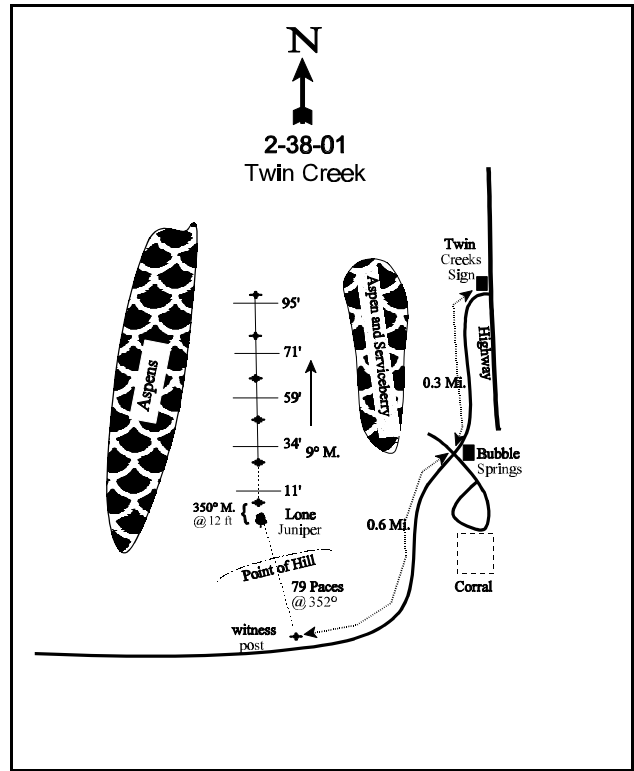
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 9 degrees magnetic.

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

LOCATION DESCRIPTION

Take the Twin Creek turnoff off of U.S. 89 and proceed 0.3 miles to the Bubble Springs turn. Go right for 0.6 miles to a witness post. From the witness post walk 74 paces at a bearing of 352 degrees magnetic to a lone juniper. From the juniper, the 0-foot baseline stake is 12 feet away at a bearing of 350 degrees magnetic. The baseline runs up the slope at 9 degrees magnetic.



Map Name: Temple Peak

Diagrammatic Sketch

Township 13N, Range 3E, Section 3

UTM 4634536 N, 451703 E

DISCUSSION

Trend Study No. 2-38

The Twin Creek trend study was established in 1996, east of the Twin Creek corrals. This site was established to monitor elk concentrations during the winter months. The study is on a south aspect with a 30% slope and an elevation of 6,500 feet. Elk pellet groups were fairly abundant with a quadrat frequency of 28% in 1996 and 18% in 2001. Sign of cattle, sheep, and deer have also been encountered. Moose sign was observed on the site but not within the sampled quadrats in 1996. Pellet group transect data collected on the site in 2001 estimated 42 elk days use/acre (103 edu/ha), 6 deer days use/acre (15 ddu/ha), and 3 cow days use/acre (7 cdu/ha).

The soil is moderately shallow and rocky, similar to most of the sites in this general area. Effective rooting depth (see methods) was estimated at 13 inches in 1996. Soil texture is a loam with a slightly acidic soil reaction (pH of 6.3). Organic matter is high at 6.5%. Bare ground was low in 1996 at 5%, increasing to 11% in 2001. Much of the bare soil in 1996 was caused by gopher activity. Vegetation and litter cover are high and well dispersed, effectively limiting erosion. An erosion condition class determined soils to be stable in 2001.

The site supports a variety of palatable and preferred browse including serviceberry, mountain big sagebrush, chokecherry, bitterbrush, and snowberry. Of these species, only mountain big sagebrush and snowberry are very abundant. Mountain big sagebrush had an estimated density of 1,460 plants/acre in 1996, with mature plants making up the majority of the population. Recruitment from the young age class was good at 18%, but there were nearly twice as many dead plants as there were young. In 2001, density was estimated at 1,260 plants/acre, the decrease resulted from the loss of young plants. Dead plants still outnumber the young age class in 2001. Use was moderate in 1996, decreasing to a lighter level in 2001. Vigor is good and percent decadence is low at 3% and 8% in 1996 and 2001 respectively. Some plants were chlorotic in 1996, yet seed production was good. Sagebrush annual leader growth was relatively low in 2001, averaging only 2 inches. Snowberry had an estimated density of 1,220 plants/acre in 1996, 18% of which were heavily hedged. In 2001, density was estimated at 1,060 plants/acre. Mature plants make up the majority of the population. Young plants numbered 120 per/acre in 1996, but no young plants were sampled in 2001.

The highly preferred shrubs, bitterbrush and serviceberry, are found in small numbers which are understandably heavily hedged. Bitterbrush numbers 180 plants/acre in 1996 and 2001. In 2001, percent decadency increased from 11% to 22%. Poor vigor also increased from 0% to 22%. Bitterbrush annual leader growth averaged just over 3 inches. Serviceberry density was estimated at 20 plants/acre. These were heavily hedged with their leaves covered with a rust fungus in 1996. Serviceberry annual leader growth averaged nearly 4 inches in 2001. Narrowleaf low rabbitbrush is the most abundant shrub on the site with an estimated density of around 2,200 plants/acre in 1996 and 2001. The population is almost entirely mature and does not appear to be increasing.

The herbaceous understory is abundant and diverse. Grasses and forbs combined to produce half of the cover on the site in 2001. Grasses are represented by 10 perennial and one annual species. Bluebunch wheatgrass and Kentucky bluegrass are the dominant species, together providing 75% of the grass cover in 2001. Bluebunch wheatgrass remained at a stable nested frequency, while Kentucky bluegrass significantly increased in nested frequency in 2001. Sandberg bluegrass, slender wheatgrass, bulbous bluegrass, oniongrass, mountain brome, and Great Basin wildrye are also present. Cheatgrass was rarely encountered in 1996 and was not sampled in 2001. Forbs are diverse, but unfortunately, weedy species dominate the composition. Perennials include mulesears wyethia, yellow salsify, pacific aster, and bastard toadflax. Arrowleaf balsamroot is the most abundant desirable species. In 2001, annual species decreased in sum of nested frequency due to the extended drought. However, they still remain abundant on the site.

1996 APPARENT TREND ASSESSMENT

Vegetation and litter cover are abundant and well dispersed on the site. Erosion is not currently a problem. Trend for soil appears stable. The browse trend also appears stable for the key species. Decadency rates are low and recruitment is good. In addition, the population of the less desirable shrub, narrowleaf low rabbitbrush, appears stable. The herbaceous understory is abundant and diverse. The only problem is the forb composition which is dominated by annuals and aggressive perennial increasers. Future trends will depend on compositional changes.

2001 TREND ASSESSMENT

Trend for soil is stable. Bare ground increased from 5% to 11%, but sum of nested frequency for perennial herbaceous species also increased. Protective cover from vegetation and litter remains well distributed over the site and erosion remains minimal. Trend for browse is stable. The most abundant species, mountain big sagebrush and snowberry, have stable densities and low decadency rates. The main negative factor is the decrease of young plants in 2001 which is likely caused by a combination of extended drought and competition with an abundant and weedy herbaceous understory. The more preferred but less abundant species, serviceberry and bitterbrush, have low but stable densities with little to no reproduction at the present time. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses increased while that of perennial forbs slightly decreased. The forb composition remains dominated by weedy increasers. Although annual forbs decreased in sum of nested frequency, they are still abundant.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 38

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron spicatum	265	264	73	74	12.38	7.47
G	Agropyron trachycaulum	70	*19	23	6	1.93	.53
G	Bromus marginatus	40	25	18	11	.79	.38
G	Bromus tectorum (a)	3	-	2	-	.06	-
G	Carex spp.	-	-	-	-	-	.03
G	Elymus cinereus	23	*9	7	5	1.04	.54
G	Melica bulbosa	9	*64	3	27	.06	.89
G	Poa bulbosa	33	50	7	14	1.62	1.22
G	Poa pratensis	162	*222	61	70	3.42	6.82
G	Poa secunda	27	*67	10	18	.46	.80
G	Stipa columbiana	9	13	3	4	.21	.21
Total for Annual Grasses		3	0	2	0	0.06	0
Total for Perennial Grasses		638	733	205	229	21.94	18.93
Total for Grasses		641	733	207	229	22.00	18.93
F	Achillea millefolium	16	10	5	5	.27	.10
F	Alyssum alyssoides (a)	173	*117	57	46	.85	.28
F	Artemisia dracunculus	-	-	-	-	-	.00
F	Arabis drummondi	3	-	2	-	.01	-
F	Aster spp.	9	-	5	-	.71	-
F	Balsamorhiza sagittata	2	6	2	3	.48	.86
F	Camelina microcarpa (a)	-	4	-	2	-	.01
F	Cirsium undulatum	3	-	2	-	.15	.00
F	Collomia linearis (a)	46	*94	24	41	.17	.25
F	Comandra pallida	22	14	9	7	.48	.09
F	Collinsia parviflora (a)	106	99	40	34	.30	.52
F	Crepis acuminata	5	7	2	4	.03	.19
F	Delphinium nuttallianum	10	3	4	2	.02	.01
F	Descurainia pinnata (a)	-	6	-	2	-	.01
F	Draba spp. (a)	3	-	2	-	.01	-
F	Epilobium brachycarpum (a)	99	*53	42	20	.66	.12
F	Galium aparine (a)	4	2	2	1	.03	.00
F	Hackelia patens	-	3	-	1	-	.00
F	Helianthella uniflora	5	9	3	3	.36	.27
F	Lappula occidentalis (a)	8	3	4	1	.07	.00

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Lactuca serriola	18	3	6	2	.08	.03
F	Lithospermum ruderales	14	19	3	7	.24	.83
F	Lupinus argenteus	20	9	11	5	.38	.25
F	Microsteris gracilis (a)	46	54	23	25	.21	.22
F	Polygonum douglasii (a)	69	*22	29	10	.22	.10
F	Senecio multilobatus	5	9	1	3	.03	.04
F	Taraxacum officinale	4	-	2	-	.01	-
F	Thlaspi montanum	1	-	1	-	.00	-
F	Tragopogon dubius	88	94	45	41	1.08	1.20
F	Veronica biloba (a)	132	*18	43	8	1.38	.04
F	Verbascum blattaria	8	-	5	-	.07	-
F	Wyethia amplexicaulis	31	*58	18	23	3.81	6.89
Total for Annual Forbs		686	472	266	190	3.92	1.57
Total for Perennial Forbs		264	244	126	106	8.26	10.81
Total for Forbs		950	716	392	296	12.19	12.38

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

BROWSE TRENDS --

Herd unit 02 , Study no: 38

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	1	1	.38	.15
B	Artemisia tridentata vaseyana	52	50	6.65	11.47
B	Chrysothamnus viscidiflorus viscidiflorus	57	62	7.40	6.65
B	Eriogonum heracleoides	22	25	2.15	2.32
B	Prunus virginiana	5	6	.09	.33
B	Purshia tridentata	8	9	2.02	2.21
B	Symphoricarpos oreophilus	30	38	5.64	7.69
Total for Browse		175	191	24.35	30.85

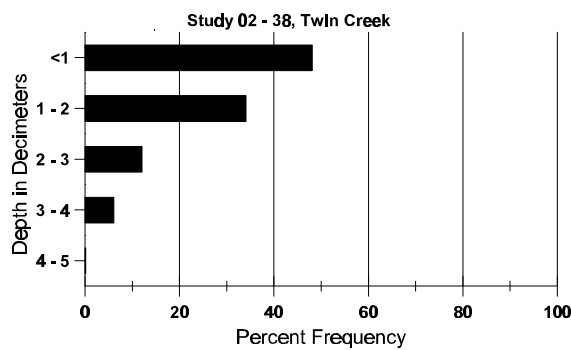
BASIC COVER --
Herd unit 02 , Study no: 38

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	470	457	53.65	58.72
Rock	260	138	5.68	2.70
Pavement	216	327	2.76	5.84
Litter	491	468	55.04	42.15
Cryptogams	40	27	.58	.55
Bare Ground	191	236	5.33	11.01

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 38, Twin Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.0	58.4 (15.9)	6.3	42.9	32.1	25.0	6.5	38.4	278.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 38

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Sheep	2	-	01	01
Elk	28	18	-	-
Deer	4	5	539	42 (103)
Cattle	2	-	78	6 (15)
			35	3 (7)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 38

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	96	-	-	-	-	-	1	-	-	-	-	1	-	-	20	35	25	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33	27	0
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%			100%			00%			+ 0%							
'01		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	0%			
												'01	20		100%			
<i>Artemisia tridentata vaseyana</i>																		
S	96	14	-	-	-	-	-	-	-	-	13	-	1	-	280		14	
	01	1	-	-	-	-	-	-	-	-	1	-	-	20		1		
Y	96	11	1	1	-	-	-	-	-	-	12	-	1	-	260		13	
	01	2	-	-	-	-	-	-	-	-	2	-	-	40		2		
M	96	22	35	1	-	-	-	-	-	-	52	-	6	-	1160	27	43	58
	01	47	6	3	-	-	-	-	-	-	55	1	-	-	1120	33	49	56
D	96	-	1	1	-	-	-	-	-	-	2	-	-	40			2	
	01	4	1	-	-	-	-	-	-	-	4	-	-	100			5	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	460			23	
	01	-	-	-	-	-	-	-	-	-	-	-	-	140			7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		51%			04%			10%			-14%							
'01		11%			05%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	1460	Dec:	3%			
												'01	1260		8%			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	20			1	
Y	96	1	-	-	2	-	-	-	-	-	3	-	-	60			3	
	01	8	-	-	-	-	-	-	-	-	7	-	-	160			8	
M	96	105	-	-	-	-	-	-	-	-	103	-	-	2	2100	16	26	105
	01	98	-	-	1	-	-	-	-	-	98	1	-	-	1980	15	26	99
D	96	-	-	-	1	-	-	-	-	-	1	-	-	20			1	
	01	6	-	-	-	-	-	-	-	-	6	-	-	120			6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			02%			+ 4%							
'01		00%			00%			.88%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	2180	Dec:	1%			
												'01	2260		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>Eriogonum heracleoides</i>																		
M	96	41	-	-	1	-	-	-	-	-	42	-	-	-	840	8	22	42
	01	47	-	-	3	-	-	2	-	-	52	-	-	-	1040	8	21	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		00%			00%			00%			+19%							
'01		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	860	Dec:	2%				
											'01	1060		2%				
<i>Prunus virginiana</i>																		
Y	96	2	2	-	2	-	-	-	-	-	6	-	-	-	120			6
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	96	-	-	-	-	1	-	-	-	-	1	-	-	-	20	13	9	1
	01	5	-	-	1	-	-	-	-	-	6	-	-	-	120	22	25	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		43%			00%			00%			+46%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	140	Dec:	-				
											'01	260		-				
<i>Purshia tridentata</i>																		
Y	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	96	-	1	3	1	1	-	-	-	-	6	-	-	-	120	21	41	6
	01	-	-	6	1	-	-	-	-	-	7	-	-	-	140	25	35	7
D	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	2	-	-	-	-	-	-	-	-	2	40			2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		44%			44%			00%			+ 0%							
'01		00%			89%			22%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	180	Dec:	11%				
											'01	180		22%				

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	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120		6	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	96	17	6	9	19	-	-	-	-	-	45	-	6	-	1020	29	46	51
	01	46	-	-	3	-	-	-	-	-	48	1	-	-	980	32	49	49
D	96	2	-	2	-	-	-	-	-	-	2	-	-	2	80		4	
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
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		10%			18%			13%			-13%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	1220	Dec:	7%				
											'01	1060		8%				

Trend Study 2-39-01

Study site name: Pole Hollow Spring.

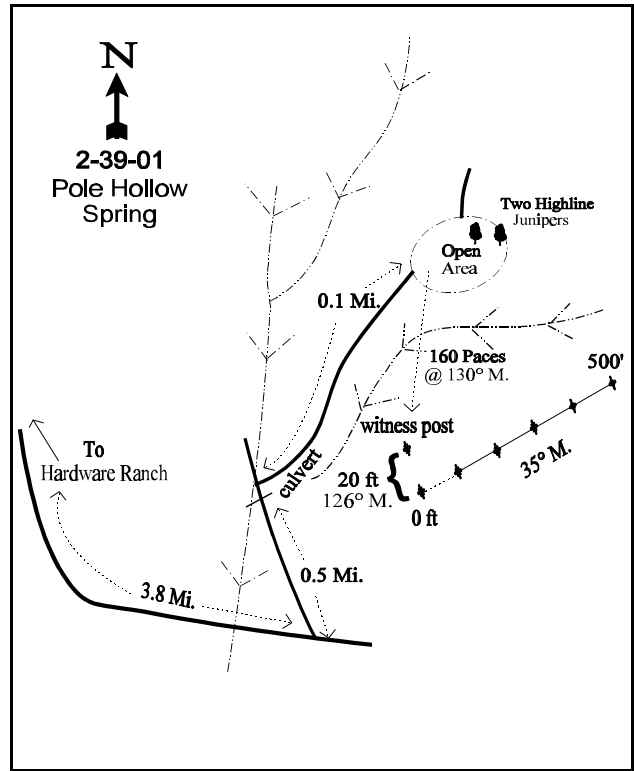
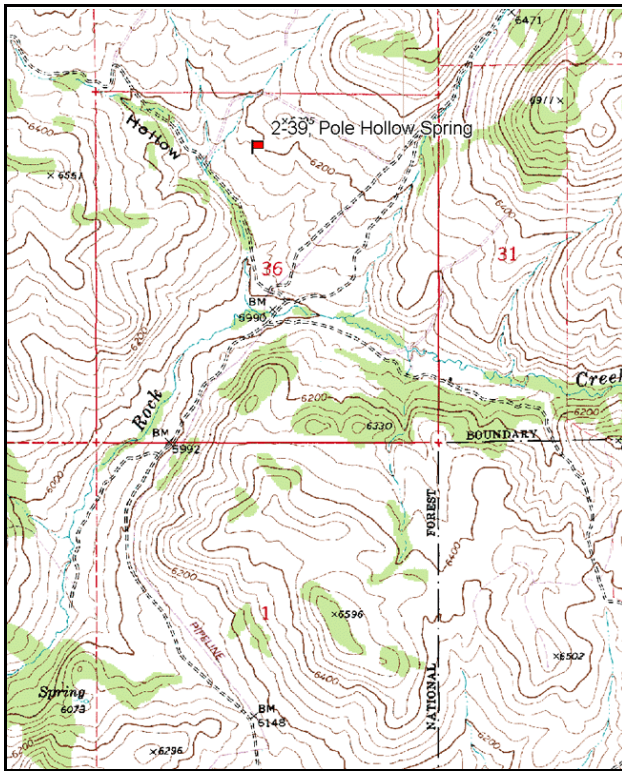
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 35 degrees magnetic.

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

LOCATION DESCRIPTION

From Hardware Ranch, travel northeast for 3.8 miles to the Pole Hollow Road. Take a left and travel up Pole Hollow for 0.5 miles to a culvert. Take a right and drive 0.1 mile to an open area and park. From the open area, walk 160 paces at a bearing of 130 degrees magnetic to the witness post. From the witness post, walk 20 feet at a bearing of 126 degrees magnetic to the 0-foot baseline stake. The baseline runs at a bearing of 35 degrees magnetic.



Map Name: Boulder Mountain

Diagrammatic Sketch

Township 11N, Range 3E, Section 36

UTM 4611017 N, 454192 E

DISCUSSION

Trend Study No. 2-39

The Pole Hollow Spring study was established in 1996 and is 4 miles northeast of Hardware Ranch. The study monitors a mountain brush community on a southwest aspect with a slope of 15%. Elevation at the site is 6,200 feet. This area is best classified as summer/transitional range for wildlife. Elk and deer use of the area was minimal in 1996 and 2001. Cattle use the area in summer. Sheep may have also grazed here in past years. A pellet group transect read on site in 2001 estimated 13 deer days use/acre (32 ddu/ha) and 2 cow days use/acre (4 cdu/ha). No elk pellets were sampled in 2001.

Soil at the site is moderately deep with an estimated effective rooting depth (see methods) of nearly 20 inches. It has a clay texture and organic matter is high at 5.1%. Some gravel occurs in the profile and on the soil surface. Average cover of bare soil was 15% in 1996 and 2001. Vegetation and litter cover are abundant and well dispersed resulting in only limited erosion. Terracing and bare trails were noted in 2001, along with soil movement in small areas. An erosion condition class determined soils to be slightly eroding in 2001.

The site consists of a mixed mountain brush stand with several important browse species. The key species are mountain big sagebrush and bitterbrush. Serviceberry is present but not abundant with an estimated 180 plants/acre in 2001. Snowberry is abundant providing 27% of the browse cover on the site. The snowberry population is mostly mature and showed no use in 2001. Mountain big sagebrush has an estimated density of about 4,000 plants/acre. Utilization was light to moderate in 1996 and 2001, with vigor being generally good. Percent decadence was low even with a slight increase from 7% in 1996 to 16% in 2001. Mature sagebrush were robust and produced abundant seed in 2001, although annual leader growth was relatively low averaging less than 2 inches. Recruitment from young sagebrush plants is moderate and adequate to maintain the present population. The bitterbrush population was estimated at 660 plants/acre in 2001, which accounts for 23% of the shrub cover. Utilization was light to moderate and vigor good. There were no decadent plants sampled in 1996, but 21% of the population was classified as decadent in 2001. Recruitment was low, but with no dead plants in the population, the number of young are adequate to maintain the population. Bitterbrush annual leader growth averaged 3 ½ inches in 2001.

The dominant understory component is perennial grasses. However, the most numerous species is Kentucky bluegrass, an increaser. Bluebunch wheatgrass is also fairly abundant. However, both species significantly decreased in nested frequency in 2001, but still account for about 75% of the grass cover. Cheatgrass and Japanese brome are also present, although they were greatly reduced in abundance in 2001 due to drought. Smooth brome, Prairie junegrass, mutton bluegrass, Sandberg bluegrass, squirreltail, and Letterman needlegrass are all present but in limited numbers. Forbs are fairly abundant and diverse, but weedy and increaser species are present. Western yarrow, pacific aster, and thistle accounted for 68% of the forb cover in 1996. Other perennial forbs include silvery lupine, yellow salsify, and toadflax. When the site was established in 1996, field notes stated that areas dominated by bluebunch wheatgrass were less heavily grazed. Those places dominated by Kentucky bluegrass were more heavily used and contained a higher number of weedy forbs. It was also noted that nearby meadow areas contained large amounts of tarweed, mulesears, and curlycup gumweed.

1996 APPARENT TREND ASSESSMENT

Percent vegetation and litter cover are high and well dispersed. Erosion is not currently a problem and the soil trend appears stable. The browse trend also appears stable with mostly light utilization on all browse. Good reproduction was also found for the key species. The herbaceous understory is abundant and diverse but composition is poor, especially for forbs. Kentucky bluegrass is the most abundant grass, indicating past

heavy grazing. Aggressive weedy forbs dominate the forb composition. Future trends will be determined by compositional changes in grasses and forbs.

2001 TREND ASSESSMENT

Trend for soil is stable. Protective vegetation and litter cover are abundant and well disbursed except along some trails that have bare soil exposed. Trend for browse is stable. The key species, mountain big sagebrush and bitterbrush, show light to moderate use and normal vigor. Percent decadency increased for both species but remains within normal limits for these species, especially during consecutive dry years. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs remains stable. Species classified as weedy and/or increasers are still abundant.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 39

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron spicatum	214	*109	64	33	6.75	2.46
G	Bromus inermis	3	*16	1	4	.03	.48
G	Bromus japonicus (a)	144	*66	43	25	2.54	.29
G	Bromus tectorum (a)	32	*1	11	1	1.62	.03
G	Elymus cinereus	-	1	-	1	-	.00
G	Koeleria cristata	29	32	13	9	.26	.49
G	Poa fendleriana	13	*41	4	14	.12	1.08
G	Poa pratensis	279	*251	78	62	8.06	11.56
G	Poa secunda	8	21	4	6	.19	.51
G	Sitanion hystrix	14	14	5	9	.10	.48
G	Stipa lettermani	42	50	19	17	.40	1.45
Total for Annual Grasses		176	67	54	26	4.17	0.32
Total for Perennial Grasses		602	535	188	155	15.94	18.54
Total for Grasses		778	602	242	181	20.11	18.87
F	Achillea millefolium	98	77	39	30	1.71	.91
F	Agoseris glauca	5	-	2	-	.01	-
F	Allium spp.	-	*47	-	21	-	.33
F	Artemisia ludoviciana	6	7	2	2	.30	.30
F	Aster chilensis	166	170	52	49	2.75	3.96
F	Astragalus convallarius	9	16	4	8	.04	.16
F	Balsamorhiza macrophylla	5	-	1	-	.03	.03

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Calochortus nuttallii</i>	-	3	-	1	-	.03
F	<i>Cirsium undulatum</i>	19	14	10	8	.49	.21
F	<i>Collomia linearis</i> (a)	-	*48	-	22	-	.18
F	<i>Comandra pallida</i>	4	*54	4	19	.07	.90
F	<i>Collinsia parviflora</i> (a)	3	*27	3	11	.01	.10
F	<i>Cryptantha</i> spp.	1	-	1	-	.00	-
F	<i>Eriogonum umbellatum</i>	7	-	2	-	.06	-
F	<i>Geranium richardsonii</i>	-	2	-	2	.03	.03
F	<i>Hackelia patens</i>	-	2	-	1	-	.00
F	<i>Helianthella uniflora</i>	2	-	2	-	.06	-
F	<i>Ipomopsis aggregata</i>	2	-	1	-	.03	-
F	<i>Lappula occidentalis</i> (a)	3	-	1	-	.00	-
F	<i>Lupinus argenteus</i>	50	63	25	33	1.12	1.74
F	<i>Microsteris gracilis</i> (a)	10	*23	3	10	.01	.05
F	<i>Orthocarpus luteus</i> (a)	1	*21	1	9	.03	.72
F	<i>Penstemon humilis</i>	4	4	2	1	.01	.00
F	<i>Phlox longifolia</i>	5	-	2	-	.01	-
F	<i>Potentilla diversifolia</i>	1	-	1	-	.15	-
F	<i>Polygonum douglasii</i> (a)	14	20	5	6	.02	.03
F	<i>Senecio multilobatus</i>	3	4	1	2	.00	.06
F	<i>Taraxacum officinale</i>	3	7	1	2	.00	.01
F	<i>Tragopogon dubius</i>	19	28	11	13	.20	.41
F	<i>Veronica biloba</i> (a)	12	13	3	4	.01	.04
F	<i>Viguiera multiflora</i>	3	-	3	-	.04	-
F	<i>Wyethia amplexicaulis</i>	3	3	1	1	.00	.00
F	<i>Zigadenus paniculatus</i>	2	2	1	1	.00	.00
Total for Annual Forbs		43	152	16	62	0.10	1.13
Total for Perennial Forbs		417	503	168	194	7.17	9.13
Total for Forbs		460	655	184	256	7.27	10.27

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

BROWSE TRENDS --

Herd unit 02 , Study no: 39

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	12	7	.18	.97
B	Artemisia tridentata vaseyana	83	87	12.31	16.63
B	Chrysothamnus viscidiflorus viscidiflorus	72	54	2.93	2.71
B	Eriogonum heracleoides	2	1	-	-
B	Mahonia repens	28	37	1.49	1.11
B	Purshia tridentata	23	30	7.86	9.56
B	Symphoricarpos oreophilus	53	58	11.23	11.42
Total for Browse		273	274	36.02	42.42

BASIC COVER --

Herd unit 02 , Study no: 39

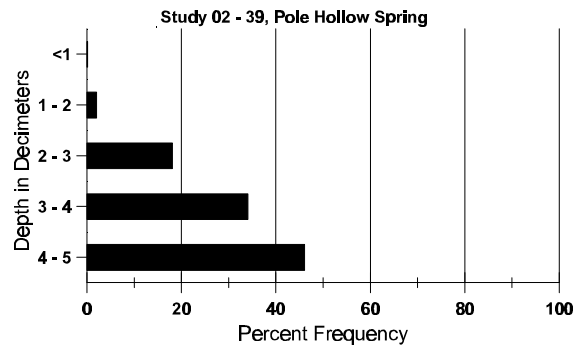
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	464	462	55.67	61.97
Rock	46	11	.50	.19
Pavement	117	137	1.85	1.89
Litter	495	489	56.73	41.05
Bare Ground	229	223	14.36	15.38

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 39, Pole Hollow Spring

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
19.5	52.8 (18.1)	7.0	28.6	27.4	44.0	5.1	28.8	249.6	1.3

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 39

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Elk	6	-	-	-
Deer	2	-	165	13 (32)
Cattle	2	-	17	2 (4)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 39

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total		
		1	2	3	4					
<i>Amelanchier alnifolia</i>										
S	96	-	-	-	-	-	-	0	0	
	01	1	-	-	-	-	-	20	1	
Y	96	2	-	-	-	-	-	40	2	
	01	3	-	-	-	-	-	60	3	
M	96	4	6	1	12	-	-	460	33 33	23
	01	4	2	-	-	-	-	120	44 44	6
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'96		24%		04%		04%		-64%		
'01		22%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'96	500	Dec:	-	
						'01	180		-	
<i>Artemisia tridentata vaseyana</i>										
S	96	21	-	-	-	-	-	420	21	
	01	-	-	-	-	-	-	0	0	
Y	96	16	1	-	2	-	-	380	19	
	01	24	-	-	-	-	-	480	24	
M	96	114	45	7	1	-	-	3340	25 34	167
	01	119	23	2	-	2	-	2920	29 35	146
D	96	4	9	2	-	-	-	300		15
	01	14	15	3	-	-	-	640		32
X	96	-	-	-	-	-	-	700		35
	01	-	-	-	-	-	-	140		7
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'96		27%		04%		.99%		+ 0%		
'01		20%		02%		04%				
Total Plants/Acre (excluding Dead & Seedlings)						'96	4020	Dec:	7%	
						'01	4040		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>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	126	-	-	16	-	-	-	-	-	142	-	-	-	2840	18	21	142
	01	111	-	-	2	-	-	-	-	-	109	4	-	-	2260	14	16	113
D	96	9	1	-	2	-	-	-	-	-	5	-	3	4	240		12	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		.62%			00%			04%			-29%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	3200	Dec:	8%			
												'01	2280		0%			
<i>Eriogonum heracleoides</i>																		
M	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	7	19	3
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20	6	9	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-67%							
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
												'01	20		-			
<i>Mahonia repens</i>																		
S	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	96	55	-	-	3	-	-	-	-	-	58	-	-	-	1160		58	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	220	-	-	4	-	-	-	-	-	224	-	-	-	4480	4	5	224
	01	303	-	-	-	-	-	-	-	-	287	16	-	-	6060	3	4	303
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+ 7%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	5640	Dec:	-			
												'01	6080		-			

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	96	2	1	-	-	-	-	-	-	-	3	-	-	-	60		3	
	01	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	11	9	-	2	-	-	-	-	-	22	-	-	-	440	35	62	22
	01	18	3	2	1	-	-	-	-	-	24	-	-	-	480	34	47	24
D	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	-	6	1	-	-	-	-	-	-	6	-	-	1	140		7	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		40%			00%			00%			+24%							
'01		30%			09%			03%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	500	Dec:	0%				
											'01	660		21%				
Quercus gambelii																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	36	43	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																		
S	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	96	8	-	-	5	-	-	-	-	-	13	-	-	-	260		13	
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	96	79	-	-	12	-	-	-	-	-	91	-	-	-	1820	32	51	91
	01	81	-	-	-	-	-	-	-	-	80	-	1	-	1620	32	51	81
D	96	2	1	-	-	-	-	-	-	-	1	-	-	2	60		3	
	01	7	-	-	-	-	-	-	-	-	6	-	-	1	140		7	
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		.93%			00%			02%			-15%							
'01		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	2140	Dec:	3%				
											'01	1820		8%				

Trend Study 2-40-01

Study site name: Warrens Spring.

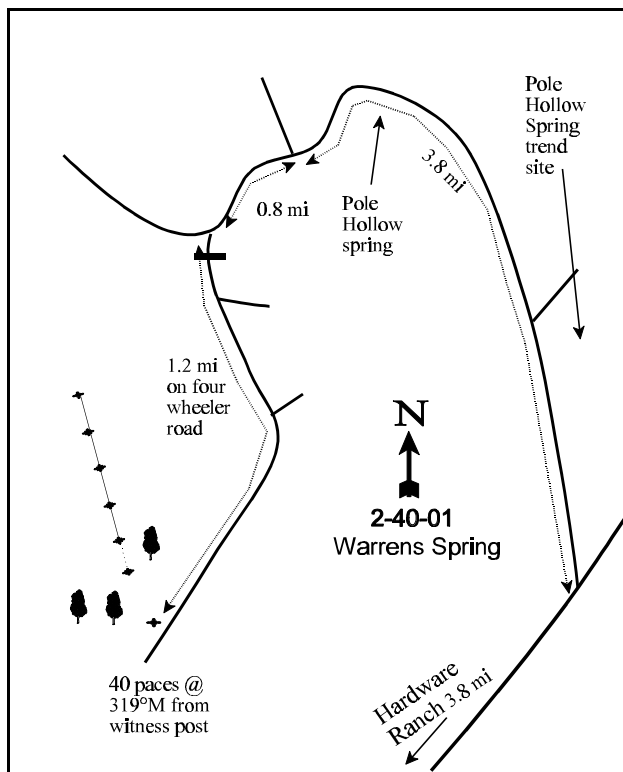
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 10 degrees magnetic.

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

LOCATION DESCRIPTION

From Hardware Ranch, travel northeast for 3.8 miles to the Pole Hollow Road. Take a left and travel up Pole Hollow 3.8 miles, passing the Pole Hollow trend site and Pole Hollow Spring. Continue on the main road 0.8 miles to a fork. Turn left and go over a cattleguard. Continue down the canyon 1.2 mile to a witness post on the right hand side of the road. From the witness post, walk 40 paces at 319 degrees magnetic to the 0-foot baseline stake. The baseline runs at a bearing of 10 degrees magnetic.



Map Name: Boulder Mountain

Diagrammatic Sketch

Township 10N, Range 3E, Section 5

UTM 4608266 N, 449379 E

DISCUSSION

Trend Study No. 2-40

The Warrens Spring site was established in 1996 to monitor winter range in a mountain brush community west of Hardware Ranch. The study lies on a moderately steep (30%), south-facing slope at an elevation of 6,400 feet. Water is available at Warrens Spring which is about 1/3 of a mile southwest of the study area. The site is used by deer, elk, and cattle. Pellet group transect data collected in 2001 estimated 43 deer days use/acre (107 ddu/ha). Elk use was estimated at 11 days use/acre (28 edu/ha). Numerous trails run through the area and off the hills down to the road in the bottom of the canyon and south to the spring. On the site itself, cattle use is light at an estimated 9 days use/acre (23 cdu/ha) in 2001. However, livestock use is heavy in the bottoms throughout nearly the entire canyon. In 1996, elderberry plants had no leaves left and bitterbrush near the bottom of the canyon were heavily utilized. In addition, species composition in the bottoms is dominated by weeds.

Soils at the site are moderately deep with an estimated effective rooting depth (see methods) of 15 inches. Texture is a clay loam with a neutral pH of 6.8. Rock and pavement account for less than 10% of the ground cover. Some compaction occurs due to numerous livestock trails, as most of the bare ground on the site is associated with these trails. Pedestalling provides the most evidence of past erosion. An erosion condition class completed in 2001 determined erosion to be slight at the present time. Phosphorus is low at only 3.9 ppm as values less than 10 ppm may limit normal plant growth and development.

This mountain brush stand is dominated by mountain big sagebrush which accounts for nearly 70% of the total shrub cover. Mountain big sagebrush has an estimated population of about 2,500 plants/acre, with mature plants making up the majority of the age classes. Utilization on sagebrush was mostly light with some shrubs showing moderate use. In 1996, many of the sagebrush were beginning to drop leaves due to the dry conditions. Vigor has been normal and percent decadence moderately low at 15% or less during both sampling years. Bitterbrush has a low density estimated at 180 plants/acre, which show moderate to heavy use. Bitterbrush decadency decreased to only 11% in 2001. Annual leader growth was relatively low on both mountain big sagebrush and bitterbrush. During the 2001 reading, sagebrush leaders averaged 1.5 inches, while bitterbrush annual growth averaged just under 2 inches. Serviceberry is rare and moderately utilized where found. Other browse found on the site include chokecherry, Woods rose, and snowberry. Chokecherry is usually found growing under the canopy of sagebrush and juniper.

The herbaceous understory is not particularly abundant for a mountain brush community. The grass component is diverse, but bluebunch wheatgrass is the only common perennial species. Cheatgrass and Japanese brome were abundant in 1996, producing 50% of the grass cover. Due to drought in 2001, these species only provided 14% of the grass cover. Both significantly declined in nested frequency. In 2001, bluebunch wheatgrass and Great Basin wildrye both displayed moderate to heavy use where found. Forbs are very diverse and produce nearly as much cover as grasses. Composition is not good however. Annual forbs are abundant as are weedy perennials that include western yarrow, pacific aster, thistle, common sunflower, Dyers woad, and yellow salsify. Perennial herbaceous species have shown a slight increase in sum of nested frequency in 2001, while annual grasses and forbs exhibited a 28% decrease in sum of nested frequency due to the extremely dry conditions.

1996 APPARENT TREND ASSESSMENT

Trend for soil appears stable, but is not in as good condition as the site at Pole Hollow Spring. Vegetation and litter cover are fairly abundant and well dispersed. The only erosion occurring is along cattle trails. The browse trend appears stable for the key species, mountain big sagebrush. Some other browse offer additional forage but they occur in small numbers. The herbaceous understory is diverse and fairly abundant. However, the composition of the grasses and forbs is poor. Half of the grass cover is provided by cheatgrass and

Japanese brome. Most of the forbs are annuals or weedy increasers. Future grazing practices will have a major impact on the herbaceous trend.

2001 TREND ASSESSMENT

Trend for soil is stable. Although bare ground slightly increased, the ratio of bare soil to protective ground cover remains nearly unchanged. The erosion condition class was determined to be slight. Trend for browse is stable. The key species, mountain big sagebrush, has a stable density, low decadency, normal vigor, and mostly light use. Young plants are currently adequate to maintain the population. Trend for the herbaceous understory is stable. The composition, especially for forbs, remains less than ideal with a large number of weeds and increasers present. However, sum of nested frequency for perennial grasses and forbs slightly increased. Another positive factor is the 28% decrease in sum of nested frequency for annual grasses and forbs due to drought.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 40

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron spicatum	184	*161	64	57	4.42	4.51
G	Agropyron trachycaulum	7	5	3	2	.18	.04
G	Bromus japonicus (a)	142	*69	40	28	2.75	.65
G	Bromus marginatus	5	*23	2	9	.06	.17
G	Bromus tectorum (a)	156	*42	48	17	3.21	.28
G	Elymus cinereus	5	5	1	1	.38	.03
G	Poa bulbosa	16	23	5	6	.34	.53
G	Poa fendleriana	1	-	1	-	.00	-
G	Poa pratensis	12	14	4	4	.45	.19
G	Poa secunda	4	14	2	4	.01	.09
Total for Annual Grasses		298	111	88	45	5.96	0.93
Total for Perennial Grasses		234	245	82	83	5.85	5.58
Total for Grasses		532	356	170	128	11.82	6.52
F	Achillea millefolium	19	31	8	12	.16	.38
F	Agoseris glauca	-	3	-	1	-	.01
F	Alyssum alyssoides (a)	213	*129	63	53	.96	.41
F	Allium spp.	81	*113	34	43	.25	.35
F	Arabis spp.	-	1	-	1	-	.00
F	Artemisia dracunculus	6	-	2	-	.03	-

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	<i>Aster chilensis</i>	30	32	12	10	.66	.75
F	<i>Astragalus</i> spp.	14	4	4	3	.21	.06
F	<i>Astragalus utahensis</i>	1	1	1	1	.03	.00
F	<i>Balsamorhiza sagittata</i>	15	13	7	8	1.33	1.28
F	<i>Castilleja linariaefolia</i>	1	-	1	-	.00	-
F	<i>Camelina microcarpa</i> (a)	-	3	-	3	-	.01
F	<i>Chaenactis douglasii</i>	10	-	4	-	.04	-
F	<i>Cirsium undulatum</i>	6	5	4	2	.27	.06
F	<i>Collomia linearis</i> (a)	40	*107	19	49	.12	.52
F	<i>Comandra pallida</i>	5	2	2	1	.01	.01
F	<i>Collinsia parviflora</i> (a)	44	46	19	20	.41	.15
F	<i>Crepis acuminata</i>	5	1	3	1	.04	.15
F	<i>Cryptantha</i> spp.	-	5	-	2	-	.01
F	<i>Cymopterus</i> spp.	2	3	1	1	.00	.06
F	<i>Descurainia pinnata</i> (a)	-	2	-	1	-	.01
F	<i>Epilobium brachycarpum</i> (a)	65	54	28	17	.61	.26
F	<i>Galium aparine</i> (a)	5	-	2	-	.15	-
F	<i>Hackelia patens</i>	-	4	-	2	-	.03
F	<i>Helianthus annuus</i> (a)	2	-	1	-	.63	-
F	<i>Helianthella uniflora</i>	-	2	-	2	.00	.21
F	<i>Holosteum umbellatum</i> (a)	1	2	1	1	.00	.00
F	<i>Isatis tinctoria</i>	36	*8	12	3	.45	.06
F	<i>Lactuca serriola</i>	1	8	1	4	.03	.02
F	<i>Linum lewisii</i>	15	22	7	9	.14	.14
F	<i>Lithospermum ruderales</i>	-	*5	-	3	.00	.01
F	<i>Lupinus argenteus</i>	11	5	5	4	.85	.21
F	<i>Machaeranthera canescens</i>	1	1	1	1	.02	.03
F	<i>Machaeranthera grindelioides</i>	-	2	-	1	-	.00
F	<i>Microsteris gracilis</i> (a)	33	*60	15	29	.10	.14
F	<i>Penstemon humilis</i>	-	5	-	3	.00	.06
F	<i>Polygonum douglasii</i> (a)	50	28	18	12	.13	.06
F	<i>Senecio multilobatus</i>	-	3	-	1	-	.03
F	<i>Taraxacum officinale</i>	1	3	1	2	.00	.01
F	<i>Tragopogon dubius</i>	21	18	15	11	.40	.23
F	<i>Veronica biloba</i> (a)	166	*121	55	41	.42	.33
F	<i>Viguiera multiflora</i>	5	-	3	-	.04	-

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Wyethia amplexicaulis	1	1	1	1	.18	.15
Total for Annual Forbs		619	552	221	226	3.56	1.91
Total for Perennial Forbs		287	301	129	133	5.22	4.40
Total for Forbs		906	853	350	359	8.79	6.31

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

BROWSE TRENDS --

Herd unit 02 , Study no: 40

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	3	1	.15	-
B	Artemisia tridentata vaseyana	76	74	14.11	20.20
B	Chrysothamnus nauseosus consimilis	2	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	24	24	1.19	1.91
B	Eriogonum heracleoides	1	0	.63	-
B	Mahonia repens	5	3	.09	.24
B	Prunus virginiana	4	6	.38	.36
B	Purshia tridentata	9	9	1.69	2.79
B	Rosa woodsii	2	1	.63	.03
B	Symphoricarpos oreophilus	26	25	2.10	3.73
Total for Browse		152	144	20.98	29.29

BASIC COVER --

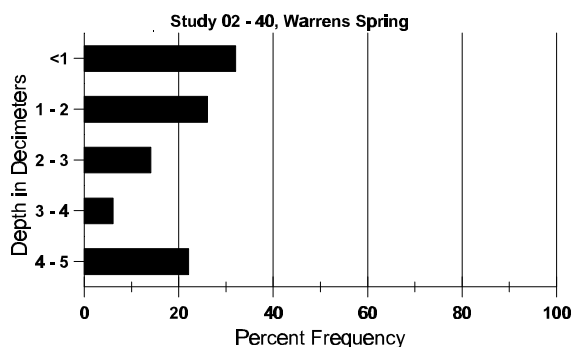
Herd unit 02 , Study no: 40

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	446	394	38.24	41.59
Rock	178	128	5.32	7.12
Pavement	215	201	2.70	2.44
Litter	490	462	48.71	46.20
Cryptogams	12	1	.10	.00
Bare Ground	293	276	19.22	28.33

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 40, Warrens Spring

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.1	59.8 (15.6)	6.8	29.9	35.7	34.4	4.7	12.9	279.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 40

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Rabbit	2	1	-	-
Elk	4	1	148	11 (28)
Deer	22	14	566	44 (107)
Cattle	1	3	113	9 (23)
Moose	-	-	9	<1 (1)

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 40

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Amelanchier alnifolia													
M	'96	-	3	-	-	-	-	-	3	60	36	29	3
	'01	-	1	-	-	-	-	-	1	20	38	41	1
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		100%		00%		00%		-67%					
'01		100%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)						'96	60	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 tridentata vaseyana</i>																		
S	96	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	96	68	18	-	1	3	-	-	-	-	89	1	-	-	1800	23	38	90
	01	100	4	-	-	-	-	-	-	-	104	-	-	-	2080	23	35	104
D	96	7	9	-	-	-	-	-	-	-	13	-	-	3	320		16	
	01	17	2	-	-	-	-	-	-	-	14	-	-	5	380		19	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		24%			00%			02%			+ 4%							
'01		05%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	2460	Dec:	13%				
											'01	2560		15%				
<i>Chrysothamnus nauseosus consimilis</i>																		
M	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40	33	58	2
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	22	18	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		50%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	40	Dec:	-				
											'01	20		-				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	37	-	-	4	-	-	-	-	-	39	-	2	-	820	16	23	41
	01	38	-	-	1	-	-	-	-	-	39	-	-	-	780	13	22	39
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		00%			00%			05%			- 5%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'96	880	Dec:	2%				
											'01	840		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				
<i>Eriogonum heracleoides</i>																		
M	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	2	4	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		-			
<i>Mahonia repens</i>																		
Y	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	96	23	-	-	-	-	-	-	-	-	23	-	-	-	460	5	8	23
	01	31	-	-	-	-	-	-	-	-	31	-	-	-	620	3	5	31
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+21%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	520	Dec:	-			
												'01	660		-			
<i>Prunus virginiana</i>																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
Y	96	3	-	-	1	-	-	-	-	-	1	3	-	-	80			4
	01	2	-	-	3	-	-	9	-	-	14	-	-	-	280			14
M	96	1	-	-	1	-	-	-	-	-	-	2	-	-	40	30	28	2
	01	-	-	-	-	1	-	1	-	-	2	-	-	-	40	32	31	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+63%							
'01		06%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	120	Dec:	-			
												'01	320		-			

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																		
M	96	3	2	1	-	-	1	-	-	-	7	-	-	-	140	24	52	7
	01	1	1	2	-	1	3	-	-	-	8	-	-	-	160	23	49	8
D	96	1	-	-	-	-	-	1	-	-	-	-	-	2	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		22%				22%				22%				+ 0%				
'01		22%				67%				00%								
Total Plants/Acre (excluding Dead & Seedlings)												'96	180	Dec:	22%			
												'01	180		11%			
Rosa woodsii																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
M	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40	14	4	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22	11	0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'96		00%				00%				00%				-50%				
'01		00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			
												'01	20		-			
Symphoricarpos oreophilus																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	1	-	-	-	1	-	-	-	20			1
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
M	96	18	-	-	12	-	-	-	-	-	29	-	1	-	600	21	35	30
	01	23	-	-	10	-	-	2	-	-	35	-	-	-	700	22	36	35
D	96	6	-	-	-	-	-	-	-	-	4	-	1	1	120			6
	01	5	-	-	-	-	-	-	-	-	2	-	-	3	100			5
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'96		00%				00%				08%				+10%				
'01		00%				00%				07%								
Total Plants/Acre (excluding Dead & Seedlings)												'96	760	Dec:	16%			
												'01	840		12%			

Trend Study 2-41-01

Study site name: Boundary Spring.

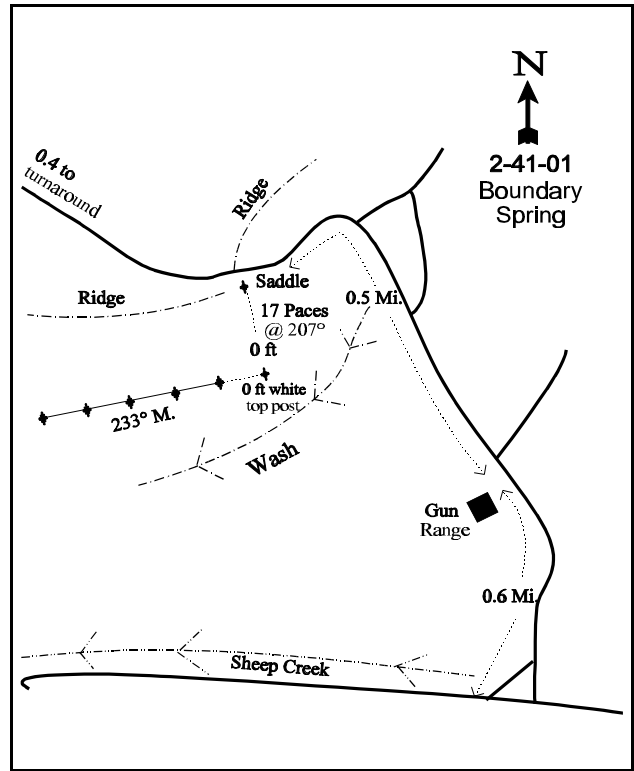
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 233 degrees magnetic.

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

LOCATION DESCRIPTION

From Hardware Ranch, travel south on the Ant Valley Road for 7 miles to the Sheep Creek Ranch. Turn left, go through a gate, and proceed 0.1 miles to a fork in the road. Take a right at the fork and continue on the Sheep Creek Road for 1.1 miles passing by a small reservoir. Go left and continue 0.3. At the next fork go right for 0.5 going past a gun range on the left to a fork in the road. Stay left and continue for 0.6 miles to a witness post on the left hand side of the road. From the witness post, walk 17 paces at a bearing of 207 degrees magnetic. The baseline runs 233 degrees magnetic.



Map Name: Hardware Ranch

Diagrammatic Sketch

Township 9N, Range 3E, Section 13

UTM 4596832 N, 453811 E

DISCUSSION

Trend Study No. 2-41

The Boundary Spring study was established in 1996 to monitor important winter range south of Hardware Ranch. The site is placed on a moderately steep (35%), south-facing slope at an elevation of about 6,700 feet. Even with the higher elevation, the browse on this slope is available for most of the winter due to the aspect and the wind blown nature of the site. The study lies on the eastern edge of the large Sheep Creek Cove development where several large cabins have been built since 1996. Quadrat frequency of deer and elk pellets were abundant in 1996 at 23% and 42% respectively. In 2001, quadrat frequency of deer pellets nearly doubled, while that of elk decreased to 6%. Cattle and domestic sheep also make use of the study site. Pellet group transect data collected in 2001 estimated 52 deer days use/acre (129 ddu/ha), 12 elk days use/acre (30 edu/ha), and less than 1 cow day use/acre (2 cdu/ha). In addition, 44 sheep pellet groups were sampled.

The soil is fairly shallow with effective rooting depth (see methods) estimated at less than 10 inches. Texture is a clay loam with a slightly alkaline soil reaction (pH of 7.4). Rock is common on the surface and throughout the profile. Due to the abundance of vegetation, litter, and rock cover, there is little unprotected bare ground. Erosion is minimal. An erosion condition class assessment completed in 2001 showed soils to be stable.

The site supports a moderate stand of antelope bitterbrush and mountain big sagebrush. Bitterbrush density was estimated at 580 plants/acre in 2001. Mature plants averaged nearly 3 feet in height and over 5 feet in width. Utilization is moderate to heavy, but vigor is normal and decadence is low at 10% or less in both sampling years. The main negative element for bitterbrush is the lack of seedling or young plants in the population. Bitterbrush annual leader growth was relatively good in 2001, averaging almost 5 inches.

Mountain big sagebrush density was estimated at 520 plants/acre in 1996, slightly increasing to 560 in 2001. Some of the shrubs display characteristics of basin big sagebrush. Utilization is mostly light with some plants displaying moderate to heavy use. Like bitterbrush, no reproduction was evident in 1996. However, an estimated 120 young plants/acre were sampled in 2001. The number of dead plants was high in 1996, outnumbering live plants. Vigor has been generally good. Percent decadence decreased in 2001 from 31% to 21%. Annual leader growth on sagebrush was relatively good on a few plants, but overall it was minimal, averaging less than 2 inches over the entire site. Other shrubs found on the site include narrowleaf low rabbitbrush, broom snakeweed, snowberry, and gray horsebrush. A few juniper are also found on the site.

Although grasses dominate the herbaceous component, composition is poor. Cheatgrass is abundant and accounted for nearly 60% of the grass cover in both 1996 and 2001. Nested frequency for cheatgrass remained nearly the same between years even with drought. Common perennial grasses include bluebunch wheatgrass, bulbous bluegrass, and Sandberg bluegrass. In 2001, bluebunch wheatgrass was noted as being large and vigorous. Forbs are severely lacking for a mountain brush community with only 7 perennial species combined being sampled in 1996 and 2001. The only abundant perennial forb is arrowleaf balsamroot which accounts for over half of the forb cover. Low growing annual forbs have a higher sum of nested frequency compared to perennials and provide nearly as much cover in 2001.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the abundance of vegetation and litter cover. There is little exposed bare soil. Browse trend appears to be downward due to a lack of reproduction for bitterbrush and mountain big sagebrush. The sagebrush population may continue to decline. Currently, dead plants outnumber live ones. It is doubtful that sagebrush seedlings can become established when competing with the vigorous herbaceous

understory dominated by winter annuals. Composition of the herbaceous understory is poor with the abundance of cheatgrass, Japanese brome, and annual forbs. Future trends will be dependent on how the composition changes in relation to these key species.

2001 TREND ASSESSMENT

Trend for soil is stable. Cover of bare ground is low and vegetation and litter cover are abundant and well disbursed over the site. Erosion is minimal. Trend for browse is stable. The bitterbrush population shows stable levels of use and decadence compared to 1996. The main negative factor for bitterbrush is the lack of reproduction. The mountain big sagebrush population slightly increased in density due to the emergence of some young in the population in 2001, but whether or not the young will persist will depend in part to precipitation patterns in the future. Decadency decreased on sagebrush, and use remains mostly light. Trend for the herbaceous understory is stable, but remains in poor condition. Cheatgrass still dominates the site, but bluebunch wheatgrass and Sandberg bluegrass remained at stable nested frequencies. Except for arrowleaf balsamroot, perennial forbs remain nearly non-existent. Sum of nested frequency for perennial grasses and forbs slightly increased.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 41

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron spicatum	152	153	50	52	6.18	6.96
G	Bromus japonicus (a)	45	*9	15	3	.37	.06
G	Bromus tectorum (a)	400	404	91	92	13.58	17.43
G	Poa bulbosa	42	*85	13	23	1.92	4.04
G	Poa fendleriana	-	-	-	-	.00	-
G	Poa secunda	138	123	52	45	1.95	1.67
G	Sitanion hystrix	-	3	-	1	-	.00
Total for Annual Grasses		445	413	106	95	13.95	17.50
Total for Perennial Grasses		332	364	115	121	10.06	12.68
Total for Grasses		777	777	221	216	24.02	30.19
F	Achillea millefolium	2	5	1	1	.03	.03
F	Alyssum alyssoides (a)	292	298	83	85	1.50	3.19
F	Astragalus utahensis	3	-	2	-	.04	-
F	Balsamorhiza sagittata	32	45	20	22	5.55	6.32
F	Collinsia parviflora (a)	12	1	4	1	.07	.00
F	Descurainia pinnata (a)	-	5	-	1	-	.00
F	Draba spp. (a)	-	4	-	2	-	.01

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Epilobium brachycarpum (a)	13	*-	7	-	.06	-
F	Erodium cicutarium (a)	-	*36	-	13	-	1.21
F	Eriogonum umbellatum	-	2	-	1	-	.00
F	Galium aparine (a)	3	-	1	-	.00	-
F	Hedysarum boreale	-	1	-	1	-	.03
F	Holosteum umbellatum (a)	40	50	17	19	.11	.09
F	Lactuca serriola	4	-	3	-	.06	-
F	Microsteris gracilis (a)	2	1	1	1	.00	.00
F	Ranunculus testiculatus (a)	27	10	14	6	.09	.03
F	Tragopogon dubius	15	7	7	5	.09	.07
F	Veronica biloba (a)	3	2	1	1	.00	.00
Total for Annual Forbs		392	407	128	129	1.85	4.56
Total for Perennial Forbs		56	60	33	30	5.78	6.46
Total for Forbs		448	467	161	159	7.64	11.02

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

BROWSE TRENDS --

Herd unit 02 , Study no: 41

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	0	1	-	.15
B	Artemisia tridentata vaseyana	18	20	3.36	4.71
B	Chrysothamnus viscidiflorus viscidiflorus	14	13	1.31	1.27
B	Gutierrezia sarothrae	8	12	.36	.15
B	Juniperus osteosperma	0	1	.00	.15
B	Purshia tridentata	27	23	8.30	7.92
B	Symphoricarpos oreophilus	2	1	.03	.15
B	Tetradymia canescens	4	4	.79	.30
Total for Browse		73	75	14.17	14.81

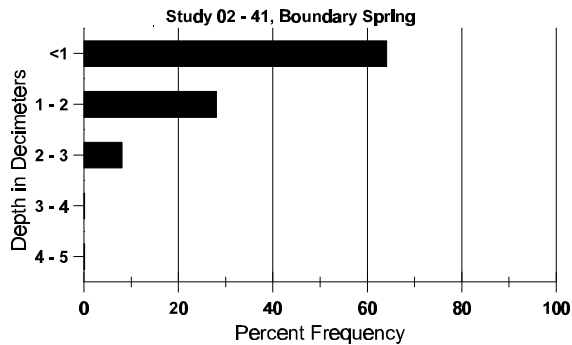
BASIC COVER --
Herd unit 02 , Study no: 41

Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	489	474	45.95	58.81
Rock	339	285	16.20	11.49
Pavement	202	266	3.28	5.13
Litter	495	482	48.12	49.75
Cryptogams	50	31	.42	.66
Bare Ground	128	151	2.49	4.35

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 41, Boundary Spring

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.5	62.8 (11.6)	7.4	42.7	30.0	27.3	3.4	14.2	214.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 41

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
Sheep	5	10	383	N/A
Rabbit	1	1	-	-
Elk	42	6	157	12 (30)
Deer	23	38	679	52 (129)
Cattle	5	-	9	<1 (2)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 41

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>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	-	1	-	-	-	-	-	-	-	-	-	-	20			1	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	0	23	16	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	20		-			
<i>Artemisia tridentata vaseyana</i>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	6	-	-	-	-	-	-	-	-	-	-	-	120			6	
M	96	17	1	-	-	-	-	-	-	-	-	-	-	360	27	41	18	
	01	13	1	1	-	-	-	1	-	-	-	-	-	320	30	42	16	
D	96	-	6	2	-	-	-	-	-	-	-	-	-	160			8	
	01	4	2	-	-	-	-	-	-	-	-	-	-	120			6	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	660			33	
	01	-	-	-	-	-	-	-	-	-	-	-	-	180			9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		27%			08%			00%			+ 7%							
'01		11%			04%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	520	Dec:	31%			
												'01	560		21%			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	96	23	-	-	-	-	-	-	-	-	-	-	-	460	16	24	23	
	01	18	-	-	-	-	-	-	-	-	-	-	-	360	13	22	18	
D	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	01	1	-	-	-	-	-	-	-	-	-	-	-	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-17%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	460	Dec:	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				
<i>Gutierrezia sarothrae</i>																		
S	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320	8	11	16
	01	19	-	-	-	-	-	-	-	-	19	-	-	-	380	7	13	19
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%			+20%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	320	Dec:	0%			
												'01	400		5%			
<i>Juniperus osteosperma</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	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%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
												'01	20		-			
<i>Purshia tridentata</i>																		
M	96	4	27	-	1	-	-	-	-	-	32	-	-	-	640	29	52	32
	01	6	14	4	-	2	-	-	-	-	24	2	-	-	520	35	63	26
D	96	-	-	3	-	-	-	-	-	-	3	-	-	-	60		3	
	01	1	1	1	-	-	-	-	-	-	3	-	-	-	60		3	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		77%			09%			00%			-17%							
'01		59%			17%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	700	Dec:	9%			
												'01	580		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>Symphoricarpos oreophilus</i>																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	17	23	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	20	25	1
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		50%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	50%			
												'01	20		0%			
<i>Tetradymia canescens</i>																		
M	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	12	25	11
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120	9	21	6
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%			-36%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96	220	Dec:	0%			
												'01	140		14%			

SUMMARY

MANAGEMENT UNIT 2 - CACHE

Management unit 2 is large, covering the Wellsville Mountains, the Cache Valley, the Cache National Forest and the extensive rangeland around Woodruff, Randolph, and Bear Lake. Twelve trend studies sample winter ranges in the Wellsville subunit and along the lower winter ranges of the Cache Valley. A common trend on these sites is the poor condition of the herbaceous understories combined with high soil temperatures. Most of these sites support herbaceous understories which are dominated by annual brome grasses and weedy forbs. Annual grasses provide an average of 60% of the grass cover on these 12 study sites. Two sites, Green Canyon Enclosure and Broad Hollow, have low cover values for cheatgrass but are dominated by bulbous bluegrass (52% and 69% of the grass cover respectively). Many of the sites also show an increase in cheatgrass and a decline in Japanese brome between 1996 and 2001. These increasingly weedy understories are in some cases crowding out perennial grasses and limiting shrub reproduction. The increased dominance of annual grasses also increase the amounts of fine fuels which can carry a destructive wildfire.

One factor driving these trends is the high soil temperatures of these sites which average 71° F. With high soil temperatures, the soil profile dries out early in the season which gives winter annuals like cheatgrass a competitive advantage over more preferred perennial grasses. The average browse trend for these 12 winter range studies is stable (3.0) in 2001. The average herbaceous trend is 3.5 or between stable and slightly up. The improvement in the herbaceous understory trends comes primarily from a decline in cheatgrass and other annuals due to the dry conditions of 2001. Trend studies in the Wellsville subunit generally show light use by wildlife and improving browse trends.

Precipitation data from Logan and Richmond show an average of 18.3 inches of precipitation falls in the northern portion of the Cache Valley. From 1980 to 1986, precipitation was above normal averaging 26.3 inches during this 6-year period. A dry period followed between 1987 and 1990. From 1991 to 2000, dry conditions prevailed in 1992, 1994 and 2000, with above normal precipitation in 1991, 1993, and 1995-1998. Precipitation has been below normal during the spring of both 2000 and 2001.

Eleven trend studies sample winter ranges in Rich County. These sites have much lower soil temperatures and contain only small amounts of annual grasses. The average soil temperature of these sites is 58.6° F. The average browse trend is 3.1 or just above stable in 2001. The average herbaceous trend is also 3.1. Precipitation data from Laketown and Woodruff indicate above normal precipitation from 1980- 1987, followed by 3 years of drought, where only about half of the normal precipitation was received. Wet conditions prevailed during the next 8 years from 1991- 1999, with only 1992 being drier than normal. Precipitation was normal in Laketown in 2000, but only 67% of normal in Woodruff. In 2000, spring precipitation (April - June) was below normal for both sites. Spring precipitation (April - June) in 2001 was also poor averaging only 64% of normal at Laketown and 54% of normal at Woodruff.

The remaining higher elevation trend studies in the unit generally show stable browse and herbaceous trends. A summary table of trends on the unit follows.

TREND SUMMARY

	Category	1984	1990	1996	2001
High Creek 2-1	soil	est	3	5	3
	browse	est	3	3	2
	herbaceous understory	est	2	1	3
Mouth of Blacksmith Fork 2-2	soil	est	3	5	3
	browse	est	4	5	3
	herbaceous understory	est	1	1	2
Crow Mountain 2-4	soil	est	3	4	1
	browse	est	3	4	2
	herbaceous understory	est	4	1	3
Smithfield Dry Canyon 2-5	soil	est	3	5	susp
	browse	est	3	4	susp
	herbaceous understory	est	1	1	susp
Green Canyon Exclosure 2-6	soil			est	3
	browse			est	5
	herbaceous understory			est	3
Spawn Creek 2-7	soil	est	3	3	susp
	browse	est	3	3	susp
	herbaceous understory	est	4	3	susp
Millville Canyon 2-8	soil	est	3	4	susp
	browse	est	1	4	susp
	herbaceous understory	est	4	2	susp
Beirdneau 2-9	soil	est	3	3	3
	browse	est	3	3	3
	herbaceous understory	est	4	3	3
Broad Hollow 2-10	soil	est	3	4	susp
	browse	est	1	4	susp
	herbaceous understory	est	5	4	susp

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

	Category	1984	1990	1996	2001
Second Dam Blacksmith Fork 2-12	soil	est	2	5	3
	browse	est	3	2	2
	herbaceous understory	est	3	3	3
Hardware Plateau 2-13	soil	est	3	4	3
	browse	est	1	4	3
	herbaceous understory	est	4	1	3
Dry Canyon 2-14	soil	est	3	4	susp
	browse	est	3	1	susp
	herbaceous understory	est	2	1	susp
Lower Hodges Canyon 2-15	soil	est	3	5	3
	browse	est	4	3	2
	herbaceous understory	est	5	1	5
Garden City Canyon 2-16	soil	est	3	4	2
	browse	est	3	3	3
	herbaceous understory	est	3	3	4
Meadowville 2-17	soil	est	2	5	2
	browse	est	2	1	1
	herbaceous understory	est	4	3	4
Upper Hodges Canyon 2-18	soil	est	3	4	susp
	browse	est	5	3	susp
	herbaceous understory	est	4	4	susp
Right Fork Logan Canyon 2-19	soil		est	5	3
	browse		est	5	3
	herbaceous understory		est	3	3
Richmond WMA 2-20	soil		est	5	2
	browse		est	1	4
	herbaceous understory		est	1	4

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

	Category	1984	1990	1996	2001
Swan Creek 2-21	soil		est	5	2
	browse		est	3	4
	herbaceous understory		est	2	4
Box Elder Canyon 2-22	soil	est	3	3	susp
	browse	est	1	1	susp
	herbaceous understory	est	1	5	susp
Flat Bottom Canyon 2-23	soil	est	1	5	2
	browse	est	1	1	1
	herbaceous understory	est	3	2	4
Calls Fort Canyon 2-24	soil	est	3	4	3
	browse	est	1	5	5
	herbaceous understory	est	3	3	4
Mouth of Two Jump Canyon 2-25	soil	est	3	4	3
	browse	est	1	4	2
	herbaceous understory	est	5	3	5
Wellsville Canyon 2-26	soil		est	4	3
	browse		est	3	3
	herbaceous understory		est	3	4
Lake Town Canyon 2-27	soil	est	2	5	2
	browse	est	1	3	3
	herbaceous understory	est	4	5	2
North Eden 2-28	soil	est	2	5	3
	browse	est	1	2	2
	herbaceous understory	est	5	2	3
Woodruff Creek 2-29	soil	est	3	2	3
	browse	est	3	1	3
	herbaceous understory	est	3	2	3

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	Category	1984	1990	1996	2001
State Line 2-30	soil	est	3	3	3
	browse	est	3	3	3
	herbaceous understory	est	3	3	3
South Crawford Mountains 2-31	soil	est	2	3	3
	browse	est	1	4	4
	herbaceous understory	est	2	3	3
Wood Pass 2-32	soil	est	3	3	2
	browse	est	3	5	3
	herbaceous understory	est	3	3	3
Braizer Canyon 2-33	soil	est	2	3	3
	browse	est	3	3	3
	herbaceous understory	est	2	4	3
Otter Creek 2-34	soil	est	2	3	3
	browse	est	2	3	3
	herbaceous understory	est	3	3	3
Higgin's Hollow 2-35	soil	est	2	3	4
	browse	est	3	4	3
	herbaceous understory	est	4	2	4
Woodruff Co-op 2-36	soil		est	5	3
	browse		est	3	3
	herbaceous understory		est	3	3
Rock Creek Riparian 2-37	soil			est	susp
	browse			est	susp
	herbaceous understory			est	susp
Twin Creeks 2-38	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

	Category	1984	1990	1996	2001
Pole Hollow Spring 2-39	soil			est	3
	browse			est	3
	herbaceous understory			est	3
Warren Spring 2-40	soil			est	3
	browse			est	3
	herbaceous understory			est	3
Boundary Spring 2-41	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

REFERENCES

- Albee, B. J., L. M. Shultz, and S. Goodrich. 1988. Atlas of the Vascular Plants of Utah. Utah Museum of Natural History. Salt Lake City, Utah.
- Campbell, L. B. and C. A. Lacey. 1982. Soil survey of Rich County, Utah. U.S.D.A. Soil Conservation Service. U.S. Gov't Printing Office. Washington, D.C.
- Chadwick, R. S., et. al. 1975. Soil survey of Box Elder County, Utah, eastern part. U.S.D.A. - Soil Conservation Service. U.S. Gov't Printing Office. Washington, D.C.
- Erickson, A. J. and V. L. Mortensen. 1974. Soil survey of Cache Valley area, Utah. U.S.D.A. - Soil Conservation Service. U.S. Gov't. Printing Office. Washington, D.C.
- Jense, G. K., et. al. 1985. Utah big game annual report, 1985. Publ. No. 85-1. Utah Dept. of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah.
- Jense, G. K. et al. 1991. Utah big game annual report. Publ. No. 91-12. Utah Dept. of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah.
- King, S. and S. A. Muir. 1971. Utah big game range inventory, 1970. Publ. No. 71-3. Utah Dept. of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah.
- Mann, D. 1985. Deer winter range needs. August 20, 1985 update. Utah Dept. of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah.
- Pratt, J. 1983. Draft deer herd unit 1 management plan. Utah Dept. of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah.
- Utah Climate Summaries. Dec. 2001. Western regional climate center. Dec. 2001.
<<http://wrcc.sage.dri.edu/summary/climsmut.html>>.
- Welsh, S. L., et al. 1993. A Utah Flora. Brigham Young University. Provo, Utah.