

UTAH BIG GAME RANGE TREND STUDIES 1998 Volume 1



Photo by Tyler Thompson

**PUBLICATION NUMBER 99-03
REPORT FOR FEDERAL AID PROJECT W-135-R-19**

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

**UTAH BIG GAME
RANGE TREND STUDIES
1998 Volume 1**

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Performance Report for Federal Aid Project W-135-R-19

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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.

- Objectives:**
1. Continue to monitor range trend in all key areas within a DWR administrative region annually. This could also include requests for any area of the state that has need of current range trend information because of special habitat needs or concerns regarding big game and livestock interactions.
 2. Classify every trend study site according to ecological site and identify habitat objectives based on site potential.
 3. Prepare an annual report which will include herd unit descriptions, trend study narratives and herd unit evaluations for all herd units in a region annually.
 4. Foster cooperative efforts among interagency personnel with respect to trend study site selection, sharing trend data, development of trend monitoring procedures and data analysis, and the identification of management objectives for study sites.
 5. Monitor vegetation in wildlife habitat improvement projects.
 6. Use the information generated by this project to inform local interagency committees of key habitat areas that are declining in value for big game.
 7. Propose management strategies that are designed to correct habitat limitations in key 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 1997 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Central and Southern Regions. Trend studies surveyed in these management units were established in 1983, 1987, and 1989 with rereads in 1989, 1991, 1992, and 1997. Some new sites were established in 1997 as well.

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

Dixie National Forest

 Powell Ranger District

Wasatch-Cache National Forest

 Salt Lake/Tooele Ranger District

Fish Lake National Forest

 Fillmore Ranger District

 Richfield Ranger District

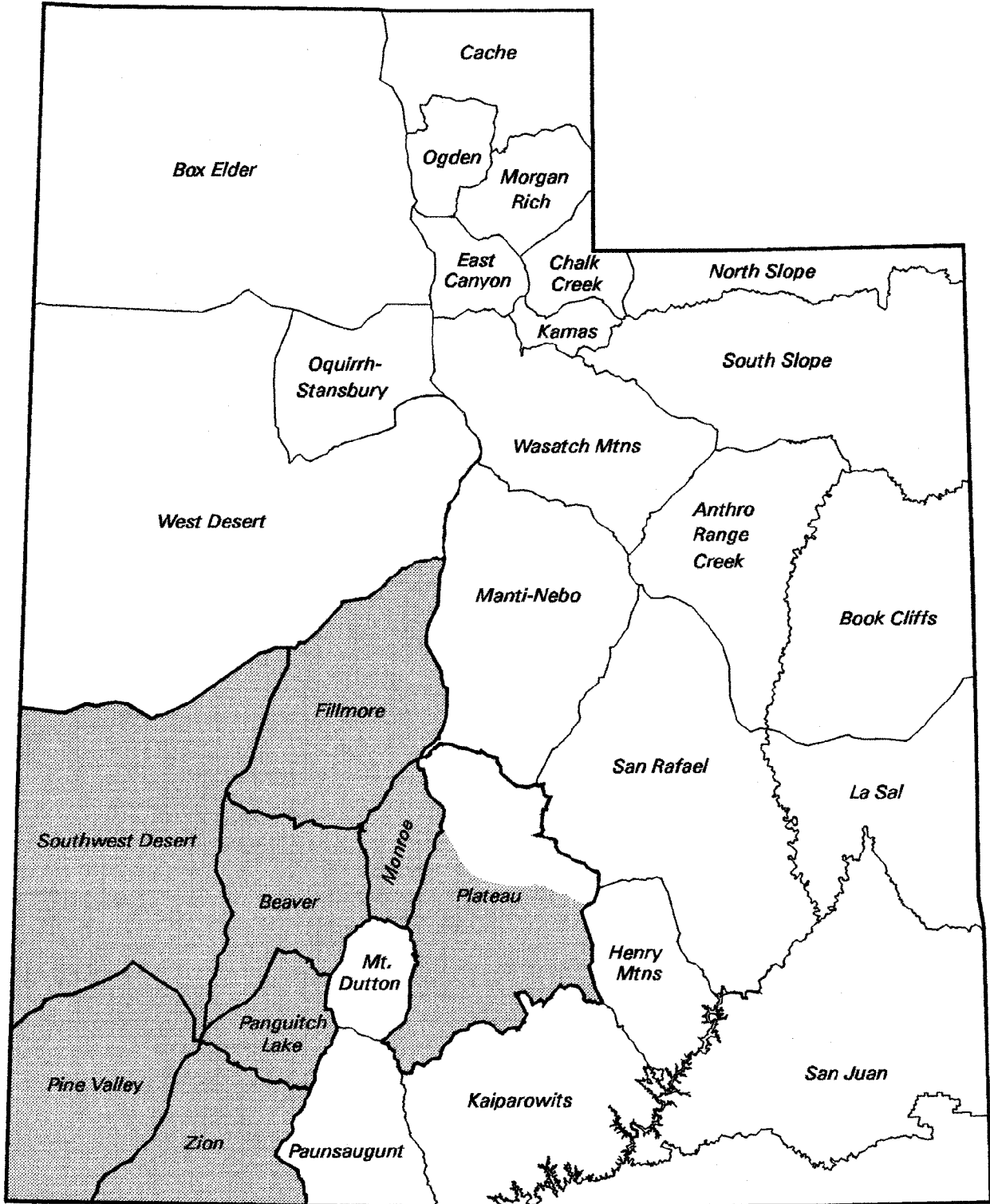
Bureau of Land Management

 House Range Resource Area

 Warm Springs Resource Area

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

Utah Management Units Surveyed in 1998



RANGE TREND STUDY METHODS

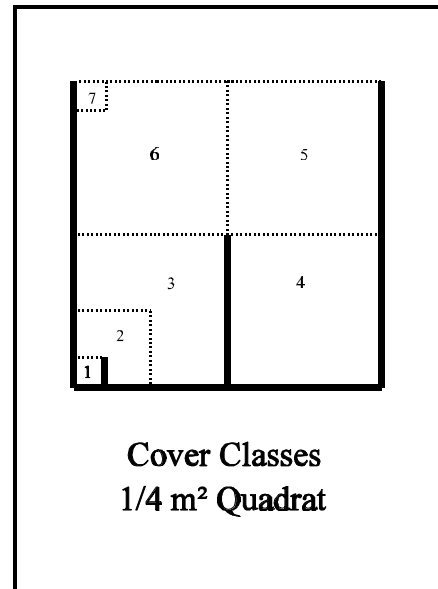
Trend monitoring studies depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetative or habitat types within a unit, it is necessary to concentrate on specific sites and/or “key” areas within distinct plant communities on big game ranges. These “key” areas should be where big-game have demonstrated a definite pattern of use during normal climatic conditions over a long period of time. Trend studies are located within these areas of high use and/or critical habitat as agreed upon by DWR, BLM, and USFS personnel. Often, the range trend studies are established in conjunction with permanently marked pellet group transects. Once a “key” area has been selected, specific placement for sampling is determined. The sampling grid is carefully placed in order to adequately represent the surrounding area. All sampling baselines are permanently marked by half-high steel fence posts. The first or beginning baseline stake is marked with a metal tag for the transects proper identification.

Vegetative composition

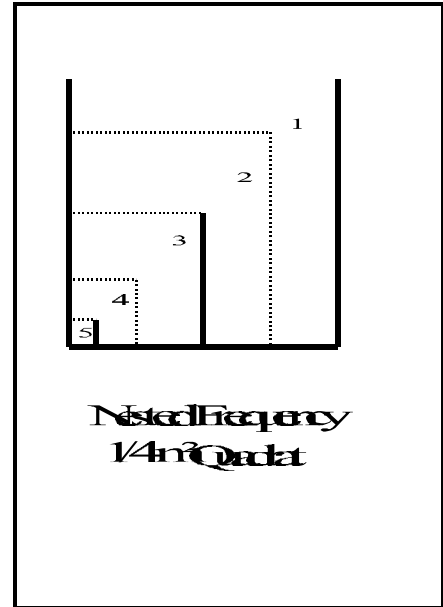
Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 ft base line transects in the area of interest. This 500 ft line is the baseline and one, 100 ft belt is placed perpendicular to each 100 ft section of the base line at random foot marks and centered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

Currently, cover is determined using a slightly modified Daubenmire (1959) cover class method. The seven cover class are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, 7) 95.1-100%. For example, to estimate vegetative cover with this method, an observer would visualize which cover class all the vegetation would fit into if the plants were moved together until they were touching. To quantify percent cover for bare ground, litter, rock, pavement, and cryptogams, the observer would visually estimate which cover class could accommodate all of the specified cover type within the quadrat. These numbers are then recorded. To determine percent cover for each belt, the midpoint for each cover class value observed is summed and divided by the number of sampling quadrats (20). The mean for the five belts is the average for a given site.

Canopy cover of shrubs or trees above eye level is estimated using the line intercept method. The distance along each belt covered by a particular species of tree or shrub is divided by the total length of the line to give percent canopy cover.



Nested frequency values for the quadrat range from 1-5 according to which area or which sub-quadrat the plant species is rooted in. The notation for each sub-quadrat is as follows: 5 = 1% of the area, 4 = 5% of the area, 3 = 25% of the area, 2 = 50% of the area, and 1 = the remainder of the quadrat. Each time a particular plant species or cover type occurs within the quadrat, it is scored relative to which of the smallest nested quadrats it is rooted in (in the case of vegetation) or where it first occurs (for all other cover types). The highest possible score is 5 for each quadrat occurrence and 100 per belt for a possible score of 500 for each species or cover type.



Higher nested frequency scores represent a higher abundance for that plant species. These summed values are used to help determine changes in trend and composition through time. Nested frequency has been found to be a more sensitive measurement for changes taking place within plant communities than quadrat frequency (Mosley and others 1986). Plant cover and density values are not reliable indicators of trend for herbaceous species and can fluctuate greatly with precipitation and time of season sampled. Therefore, plant cover and density values can be misleading if used by themselves and do not necessarily indicate changes in composition and/or distribution of key plant species. Quadrat frequency is used to give another quantitative, but less sensitive measure to help corroborate the trends being illustrated by the sum of nested frequency values.

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

Shrub densities are estimated using five, 1/100th acre strips centered over the length of each 100 foot belt. All shrubs rooted within each strip are counted and placed in the following 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 each end of the 5, 100 ft base lines. 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 with low numbers. Each 1/100 acre shrub strip is divided into 20, 5 foot segments. Presence or absence is now determined in these strip segments to give a more accurate measure of shrub frequency. This larger sample will better reflect changing trends in the shrub populations. This data along with shrub cover is recorded in the browse trends table. For example, if a species was rooted in 25 of the shrub 100 strips, strip frequency for this species would be 25%.

TREND DETERMINATION

The methods described above rely on relative and absolute measurements of plant composition as determined from the frequency and density data. In addition, estimates of plant vigor, height, crown diameter, form class, and age class are utilized to characterize 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 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 dying
- 3) biotic potential or proportion of seedlings in population
- 4) proportion of young plants in population
- 5) proportion of individuals heavily browsed
- 6) proportion of plants in poor vigor
- 7) changes in height and crown diameter measurements
- 8) changes in browse composition
- 9) strip frequency values

Trends in herbaceous plants as a group or as a single “key” species can be determined by comparing the sum of nested and quadrat frequency values between readings. Attention is also given to changes in species composition of grasses and forbs through time. A non-parametric statistical test (Friedman test which is analogous to analysis of variance) (Conover 1980) is conducted on nested frequencies of each species to determine significant changes at $\alpha = .10$. Ground cover parameters are analyzed and compared in the discussions of the reread studies. Trends for soil are determined by comparing these basic ground cover measurements and cover composition (herbs vs shrubs) between years as well as comparing photos and observer observations between readings. On newly established studies, a more subjective or apparent assessment is made from qualitative comparisons.

The following tables and partial tables are taken from study number 23-1 to help illustrate some basic comparisons that can be made with the data. The “vegetative trends” table summarizes average cover, quadrat frequency, and nested frequency data for individual grass and forb species. The table contains all the grass species found on site 23-1. Readings prior to mid-1992 include only nested and quadrat frequency data for *perennial* species. Beginning in mid-1992, all trend studies have data for perennial and annual species as well as cover estimates for individual species.

In the following example, grasses have a combined total cover of 11.39%. In 1985, *Agropyron spicatum* had a sum of nested frequency value of 227. In 1991, the sum of nested frequency value did not change and is still 227. By 1998, sum of nested frequency declined to 183. The subscript letters indicate that the sum of

nested frequency value between 1985 and 1991 were not statistically different. Although, the 1998 sum of nested frequency for *A. spicatum* shows a significant decrease compared to 1985 and 1991. Quadrat frequency showed a slight increase from 1985 to 1991 and then a marked decrease in 1998. Cover was estimated at 7.78% for *A. spicatum* in 1998. Trend for this grass is down due to a significant decline in nested frequency.

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

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 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>Chaenactis douglasii</i>	-	-	1	-	-	1	.03
F	<i>Comandra pallida</i>	-	-	3	-	-	1	.03
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>Physaria chambersii</i>	1	4	-	1	2	-	-
F	<i>Phlox longifolia</i>	_a 8	_b 27	_a 16	4	14	6	.20
Total for Forbs		15	84	55	8	41	27	0.84

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

The following browse trends table summarizes strip frequency and cover for all shrub species occurring on this site. All of the shrubs encountered at study number 23-1 are listed. For example, mountain big sagebrush

had a strip frequency of 40 out of a possible 100. Cover is determined using the 1/4m² quadrat and estimating the percent of the quadrat covered below eye level (~6 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 '98	Average Cover % '98
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, the line intercept method is used along each 100' belt. This data is reported in the canopy cover table which follows. For example, *Juniperus osteosperma* has an estimated average cover of 7%.

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

Species	Percent Cover '98
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:

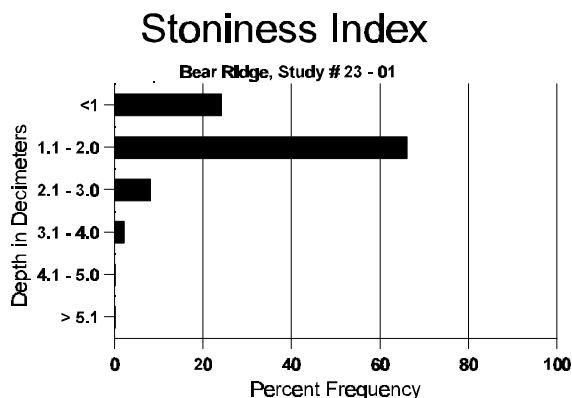
Ultra acid	<3.5
Extremely acid	3.5-4.4
Very strongly acid	4.5-5.0
Strongly acid	5.1-5.5
Moderately acid	5.6-6.0
Slightly acid	6.1-6.5
Neutral	6.6-7.3
Slightly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strongly alkaline	>9.1

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 may be limiting to vegetation growth.

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 '98
Rabbit	25
Elk	4
Deer	36

It was determined additional information on pellet-groups was needed. Therefore, a larger sample distributed over a larger area is now read in conjunction with the vegetative transects. The pellet-group transect has a minimum of 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 trend transect. 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 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 may all die by late fall causing great fluctuations in population estimates from year to year. Since mid-1992, a larger shrub sample is used to better characterize the shrub populations. Therefore, changes in density may not necessarily indicate changes in trend, especially those populations that characteristically are clumped and/or have discontinuous distributions. Earlier smaller sample sizes could easily either over estimate or under estimate shrub populations. Other characteristics like percent decadency, vigor, percent heavy hedging, biotic potential, etc. should be given more weight in determining shrub trend when comparing years where sample sizes are different.

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

percentage of dying plants in the decadent age class indicate there has been a large shrub dieoff in the past and this might continue into the future.

BROWSE CHARACTERISTICS --

Herd unit 23, Study no: 1

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

Management background information, photographs, and knowledgeable plant identification add to the data base for each site. Management and background information for each site is obtained from the administering agency. Permanently located photographs are taken; a general view down line and a close-up picture of a quadrat from each belt are used to further characterize individual sites. Correct plant identification is critical for a complete and accurate site analysis. Species identification mostly follows "A Utah Flora" (Welsh et al. 1987). In some cases, most notably *Agropyron* and *Purshia*, the species names used by the Range Trend Study Plant Species List (Giunta 1983) and the Intermountain Flora (Cronquist et al. 1977) are retained to maintain continuity and alleviate confusion with earlier published reports.

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

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- ²U.S. Department of Interior Bureau of Land Management. 1996. Sampling vegetation attributes, Interagency Technical Reference, BLM/RS/ST-96/002+1730.
- Welsh, S. L., N.D. Atwood, S. Goodrich and L. C. Higgins. 1987. A Utah Flora. Great Basin Naturalist Memoirs No. 9. Brigham Young University. 894 pp.

REPORT FORMAT

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

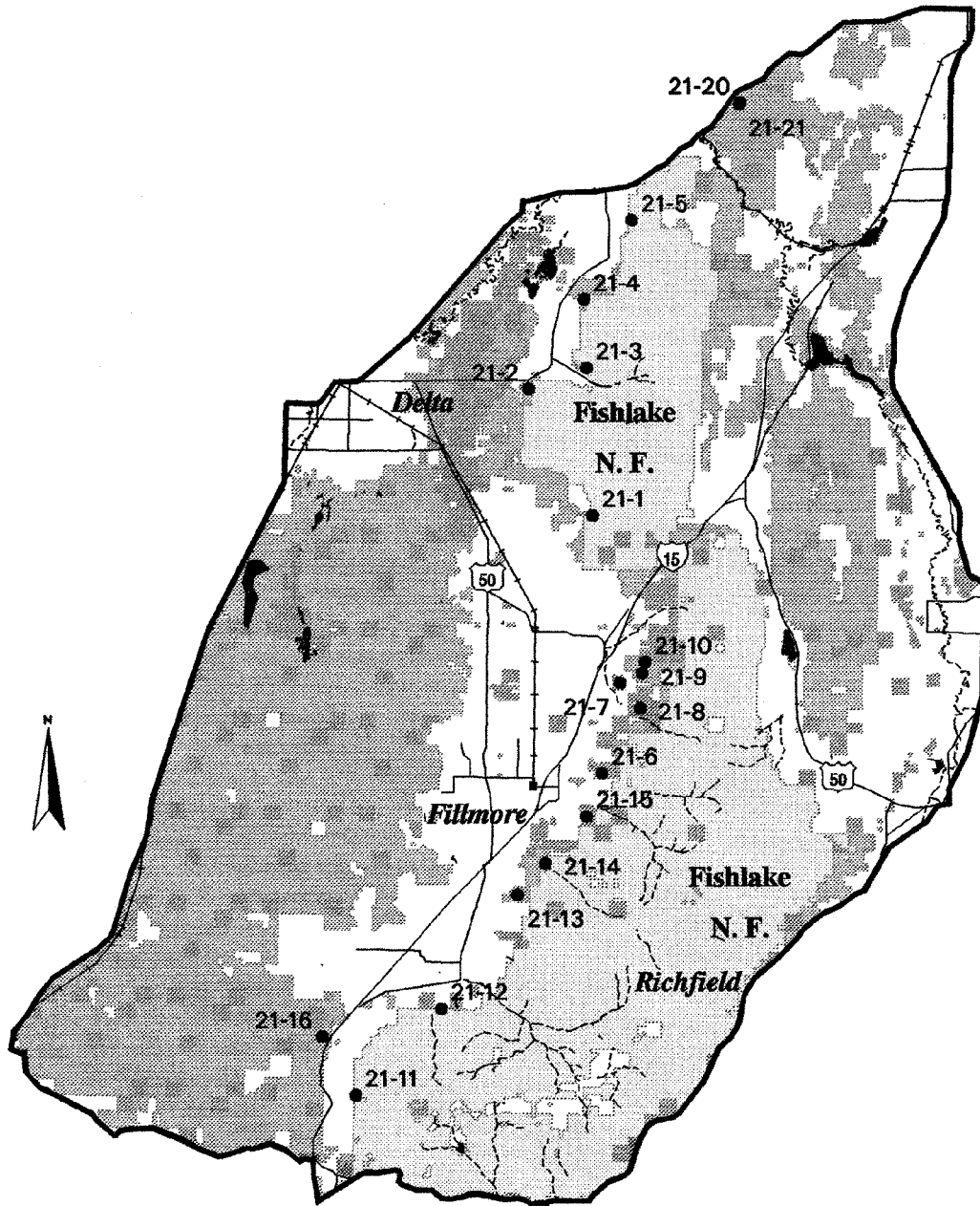
The name of the site and directions for locating the site are given on the location page. Due to many changes in management unit boundaries, trend studies have been renumbered. The previous trend study number is found in parenthesis following the trend study number currently being used. Also included on this page are the range type, arrangement and diagrammatic sketch of the baseline, and the location on a topographical map. The 7.5 minute topographical map name and public land survey description are located below the map. In addition, UTM coordinates follow the public land survey location. Compass bearings are in degrees relative to magnetic north, unless specified as true north (T).

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

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

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

Management Unit 21

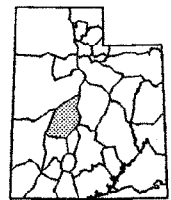


Map Scale 1:700,000 (1" = 11 miles)

Legend

- | | |
|---|---|
|  Forest Service |  Water Body |
|  BLM |  Transect Location |
|  State of Utah |  Road |
|  Native American Reservation |  Railroad |
|  Private Land |  Perennial Stream |

Unit Location



UDAF GIS March, 1999

WILDLIFE MANAGEMENT UNIT - 21 (53,54,55) - FILLMORE

Boundary Description

Millard, Sevier, Sanpete, and Juab counties - Boundary begins at Interstate 70 and Interstate 15; then north on I-15 to Black Rock Road; then west on Black Rock Road to Highway SR-257; then north on SR-257 to Highway US-50 & 6; then east on US-50 & 6 to US-6, then north on US-6 to Highway SR-132; then east on SR-132 to Highway SR-28; then south on SR-28 to Highway US-89; then south on US-89 to I-70; then southwest on I-70 to I-15 and beginning point.

Management Unit Description

The newly enlarged Fillmore unit now includes the old Oak Creek (53), Kanosh (55), and Fillmore (54) Units. Total usable range is now up 1,126,800 acres. Yearlong range only makes up 1% of the area. Summer range is confined usually to elevations above 7,000 feet and would be limiting as it only makes up 30% of the range. Most winter range would be below this elevation and it presently contributes to the majority of the range, about 69%. The Fillmore unit includes the Canyon Mountains northeast of Scipio, the Valley Mountains east of Scipio, and the Pahvant Range east of Fillmore. Elevation ranges from approximately 5,000 feet near Fillmore to 10,129 feet on Pioneer Peak, 9,711 feet at Fool Creek Peak in the Canyon Mountains, and 8,240 feet in the Valley Mountains. The Valley Mountains are relatively dry and have no continuous flowing drainages. The Canyon Mountains drain mostly to the west by way of Oak Creek and Fools Creek, and to the east down Little Oak Creek. The major Pahvant drainages are Chalk Creek, Pioneer Creek, Maple Hollow, and Wild Goose Creek on the west side, and only Maple Creek on the east side.

The major vegetative types that make up the summer range are mountain brush, conifer, aspen, and dry meadow. A history of severe overgrazing of these steep mountain ranges has resulted in poor ground cover and related soil disturbances. This in turn resulted in problems of periodic flash flooding and soil erosion which necessitated a great deal of costly watershed work by the U.S. Forest Service. Contour trenching, seeding, grazing reductions, and other management practices have largely eliminated the flash flooding problems. However, the land will still take a long time to recover. Meanwhile, production rates of desirable forage, especially forbs, remains relatively low.

A number of events have resulted in changes in the character of the winter range, especially for the Valley Mountains. In 1981, two large wildfires burned approximately 60,000 acres, mostly in pinyon-juniper areas of the winter range resulting in a significant reduction of important escape and thermal cover. Portions of these burns have been seeded resulting in increased production of forbs and grasses in some areas, but it will take several more years to reach maximum production for browse species. In addition to these burns, approximately 6% of the winter range was chained and seeded. Also, a deer-proof fence built along I-15 has severely limited the interchange of deer between the Oak Creek and Fillmore units which was common before the construction. The three underpasses built near Scipio Pass are receiving little use and it will apparently take a long time for the deer to learn to use these structures. The unit is also receiving an increase in recreational use, especially in the Oak Creek area.

The poor quality of both summer and winter ranges and depredation on private lands are the major problems within the Oak Creek area. Additional revegetation projects are needed on the winter ranges. Emphasis should be placed on seeding or planting nursery stock of browse species for winter use and forbs for spring forage. Reductions in livestock grazing in the oakbrush and cutting or burning mature stands to encourage resprouting could improve fawning and summer habitat. The driest portions of the summer range could also be improved by developing water sources and fencing existing water sources to protect them from livestock. These range improvements should also lessen depredation problems by providing alternate food sources to deer which feed in the orchards and fields near Oak Creek.

The Kanosh area is divided in half by I-15. The eastern half includes the southern two-thirds of the Pahvant Mountain range, virtually all of the unit's deer summer range and most of the winter range. The western half is in the Black Rock Desert and contains only 40,000 acres of deer winter range. Deer habitat spans a range in elevation from above 10,000 feet on the summer range of the Pahvant Mountains down to 5,000 feet on the winter range in the Black Rock desert. The topography is steep and rugged between 6,000 and 8,000 feet, but more gentle with rolling slopes, hills, and flats above and below these elevational contours. Meadow and Corn Creeks on the west side and Clear Creek along the southern boundary are the most important drainages. Other springs and intermittent streams are common throughout the summer range. The majority of the deer range is on public land under BLM and Forest Service management. Recreation, wood cutting, geothermal, gas, oil and mineral exploration and livestock grazing are the most important land uses. Cattle and sheep are grazed under rest-rotation and deferred use programs. Overgrazing in the past has resulted in decreased production on both the summer and winter ranges, as well as increased flooding and soil losses. Stocking rates have been reduced in most allotments but overgrazing is still a problem in some local areas. Concentrations of deer on the winter range have also overgrazed key browse species in several areas where livestock have already heavily utilized the browse species because of already existing poor range conditions. With these localized exceptions, both the summer and winter range are generally in good condition. Pinyon-juniper covers about 67% of the normal winter range. Dense pinyon-juniper stands between 5,000 and 6,000 feet have few plants in the understory and have relatively low forage production rates. The browse-shrub type, which is generally found above the pinyon-juniper zone and above the upper limits of severe winter range, usually have the highest rates of forage production. The treated sagebrush and seeded types are most abundant in the lower severe wintering areas. These are critically important to deer during severe winters. While forage production is still good in most areas, a growing percentage of increasers and undesirable plants (especially cheatgrass) indicates overuse in many places and creating high fire hazards and loss of sagebrush.

Herd Unit Management Objectives

Current management objectives for wildlife are to achieve a target population of 13,500 wintering deer with a post season buck to doe ratio of 15:100. Thirty percent of these bucks are to be three point or better. The target winter herd size for elk is to be 1,400 with a post season composition of 20 bulls to 100 cows. Ten of these bulls are to be 2 ½ years of age or older. Buck harvests have ranged between 2,000 and 1,500 between 1988 and 1992. Numbers dropped in 1992 to only 630, but by 1995, the harvest had rebounded to 773 bucks. The elk herd on the Pahvant elk unit was estimated at 400 to 500 animals in 1993. The winter count of 1996 estimated 625 elk, still well below the objective. Between 1988 and 1994, an average of 14 bulls were harvested from the unit, 91% to 100% of which were mature bulls. Antlerless permits were first issued in 1990 and have steadily increased from 9 in 1990 to 49 in 1993.

Trend Study 21-1-98

Study site name: Long Canyon .

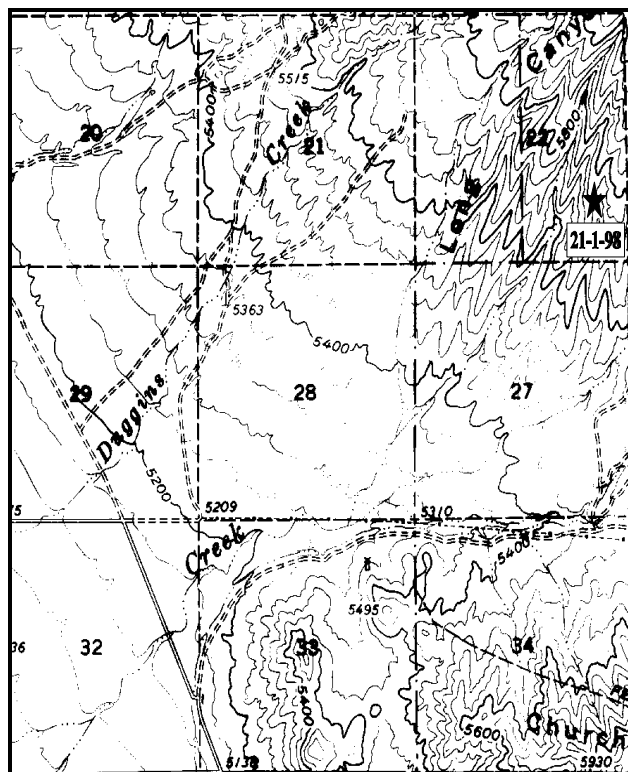
Range type: Stansbury Cliffrose .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

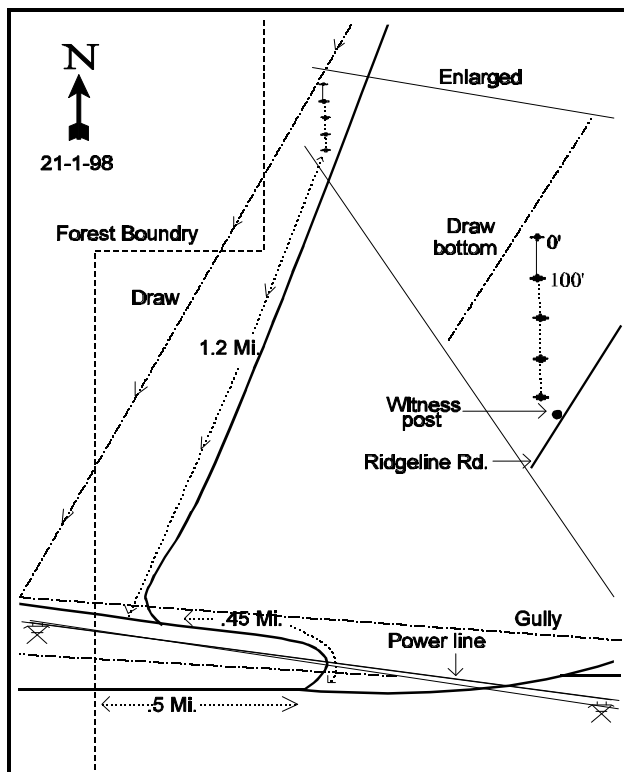
LOCATION DESCRIPTION

From the Oak City cemetery, go southwest on Rt. 125 for 1.7 miles to a paved road to the left. Go 4.8 miles south to a road marked Clay Springs. Turn left and go 0.8 miles. Pass the turnoff to Clay Springs and continue on the main road for 6.1 miles to a powerline. Turn left under the powerline and parallel it for 1.4 miles to the Forest Service boundary. Continue 0.5 miles east up the main road to a road on the left which angles off behind you, then crosses a gully and turns to parallel the powerline. Follow this road 0.45 miles to another road, turn right, cross the wash and go 1.2 miles through a reseeding to the top of a small ridge. There is a witness post 3 feet off the left side of the road. It is a 2-foot rebar tagged #7068. The 400' stake is down the hill 50 feet bearing 0 degrees. The frequency baseline 0-foot stake is 400 feet north of the 400' stake and is tagged #7069.



Map Name: Holden, Utah

Township 18S , Range 4W , Section 22



Diagrammatic Sketch

UTM 4342673.507 N , 389096.953 E

DISCUSSION

Trend Study No. 21-1 (39-1)

The Long Canyon study is located on the southern end of the Canyon Mountains on Forest Service land. The transect is located on a west-northwest facing slope (10%) at an elevation of 5,700 feet. Some of the surrounding area was burned by wildfires in 1981, with a large area to the west having been chained and seeded. The ridge where the trend study is located supports an open stand of mature Utah junipers and Stansbury cliffrose, with sagebrush and grass in the understory. The site location is questionable. The original baseline is located on a southwest aspect near the bottom of a draw. Juniper density is higher near the bottom of the draw and the key browse species, cliffrose and Wyoming big sagebrush, are not as abundant. The old density plots were placed near the top of the ridge on a more westerly aspect where juniper is more scattered and density of big sagebrush and cliffrose is higher. A better location for the study is along the ridge top where deer likely spend more time during the winter and key browse is found at higher densities. In 1998, the original one hundred foot frequency baseline was left in place and extended to 400 feet. Three of the 5 belts sample the more northwestern slope with a higher juniper density while the last 2 belts sample the more open ridge top.

The study area falls within the Whisky Creek allotment. Cattle grazing is managed under a rest-rotation system. Trends in deer use are monitored by a pellet group transect located nearby. The transect has a history of low counts between 1980 and 1991 (Jense et al. 1985, 1991). Pellet group data from the site in 1998 indicate only 10 deer days use/acre. Cattle use was estimated at 24 cow days use/acre. Much of this use appears to have been from the late 1997 season.

Soil on the site is very rocky and moderately shallow. Effective rooting depth (see methods) is estimated at almost 11 inches. Soil texture is a loam with a neutral pH (7.0). Phosphorus may be limiting to plant growth at only 3.2 ppm where 10 ppm is thought to be the minimum required for normal growth. Due to the rocky nature of the soil, average soil temperature is moderately high at 72°F at a depth of 14 inches. There is evidence of erosion on the scattered exposed patches of bare soil, but it is not currently a major problem due to the high level of rock and pavement cover.

Utah juniper and Stansbury cliffrose dominate the ridge. Point quarter data estimate a density of 260 juniper trees/acre with an average diameter of 5 inches. Juniper are more numerous along the original baseline than on the ridge top, but overhead canopy cover averages only 5% over the whole site. Many of the junipers are largely unavailable due to height, although there are a fair number of young plants present. Some of the juniper on the ridge top have been chained with some tipped trees still alive. Cliffrose and big sagebrush are the key browse species. Population density of cliffrose has remained steady since 1985 at around 330 plants/acre. The cliffrose showed good annual growth and seed production in 1985, but there were also a high percentage of dead twigs. Browsing by deer has been mostly light during all readings. Some plants are partly unavailable due to height with an average height of mature shrubs at 5 to 6 feet. Vigor is generally good but percent decadence has increased from 0% in 1985 to 33% in 1998. However, some reproduction was noted in 1998. Density of Wyoming big sagebrush has declined by 84% between 1991 and 1998. Dead plants are rare, and only can explain about 8% of the decline. Therefore, the change is primarily due to the much larger sample giving more accurate density estimates for populations that have discontinuous and/or clumped distributions. Use of the sagebrush has been moderate since 1985, but vigor is normal on most plants and percent decadence is moderately low at 22% ('98). The only other common species of browse are narrowleaf low rabbitbrush, broom snakeweed, and prickly phlox.

The herbaceous understory is relatively abundant for a Wyoming big sagebrush type. Common perennial grasses include bluebunch wheatgrass and Sandberg bluegrass which combine to produce 72% of the grass cover. Cheatgrass is also fairly abundant. Utilization of the grasses is light. None of the forbs are very abundant or provide much forage value. The most numerous forbs encountered during the 1998 reading were the increaser rock goldenrod and hoods phlox.

1985 APPARENT TREND ASSESSMENT

Soil trend is stable, erosion is localized and ground cover is good over most of the area. Soil loss could be accelerated by an increase in junipers, which tend to exclude other more desirable species. The vegetative trend is stable to slightly declining. The key species, Wyoming big sagebrush and cliffrose, have little reproduction and only fair vigor. Junipers, prickly phlox, broom snakeweed, and rock goldenrod all appear to be increasing.

1991 TREND ASSESSMENT

Soil trend is slightly downward at this time, because pavement and litter cover values are decreasing while rock and bare ground cover values have doubled. This trend should be closely monitored. The key browse are Wyoming big sagebrush and Stansbury cliffrose. The Wyoming big sagebrush population has increased by 6%, with an accompanying increase for decadency which should turn around with the end to the extended drought. Stansbury cliffrose has basically stayed the same, but percent decadency has gone from 0% to 20%. This should also turn around with normal precipitation. The trend here would be considered stable. There are only two perennial grass species which have remained at similar nested frequencies since 1985. There are at least 12 species of forbs, most of which have increased in nested frequency. Trend for the herbaceous understory is considered up slightly.

TREND ASSESSMENT

soil - slightly downward

browse - stable for key species

herbaceous understory - up slightly

1998 TREND ASSESSMENT

Trend for soil appears to be stable. Percent bare ground has declined slightly from 15% to 10%, but litter cover has also declined. Erosion does not currently present a serious problem. Trend for the key browse species, cliffrose, is stable. Density estimates have remained similar since 1985 with mostly light use. Percent decadence has increased from 0% in 1985, to 20% in 1991, and 33% by 1998. In addition, mature cliffrose are becoming increasingly less available due to height. However, reproduction is evident this year as seedling and young plants were encountered in adequate densities to maintain the population. Density of Wyoming big sagebrush has declined 84%, due mostly to the larger sample size giving more accurate density estimates. The original frequency baseline sampled a northwest facing slope which supported a greater density of juniper and few sagebrush plants. The three old density plots were placed along the top of the ridge which had a greater density of big sagebrush. The new sample estimates sagebrush density along a 400 ft baseline which includes the original 100 foot frequency baseline and extends to the top of the ridge where the old density plots were located. In addition, dead sagebrush are rare and percent decadence is moderately low at only 22%. The whole study should have been placed on the more open ridge top in 1985. Trend for sagebrush is considered stable at this time. Trend for the herbaceous understory appears stable with similar sum of nested frequency values for perennial grasses which account for 85% of the herbaceous cover. Sum of nested frequency of forbs declined since 1991 but some of the change is likely due to the larger sample used in 1998.

TREND ASSESSMENT

soil - stable

browse - stable for key species

herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	-	-	3	-	-	2	.03
G	Agropyron spicatum	181	169	173	70	69	75	4.38
G	Bromus tectorum (a)	-	-	95	-	-	31	4.27
G	Poa secunda	218	265	247	77	90	83	6.96
Total Annual Grasses		0	0	95	0	0	31	4.27
Total Perennial Grasses		399	434	423	147	159	160	11.39
F	Arabis spp.	11	13	10	8	9	4	.02
F	Arenaria fendlerii	a-	b12	ab6	-	8	3	.06
F	Astragalus spp.	a6	b42	a2	3	23	1	.00
F	Calochortus nuttallii	5	-	-	3	-	-	-
F	Collinsia parviflora (a)	-	-	1	-	-	1	.00
F	Cryptantha spp.	-	4	-	-	1	-	-
F	Draba spp. (a)	-	-	15	-	-	6	.03
F	Eriogonum spp.	-	1	-	-	1	-	-
F	Lactuca serriola	-	3	-	-	1	-	-
F	Petradoria pumila	ab47	b69	a25	23	31	11	.91
F	Phlox hoodii	a4	c99	b68	2	44	31	1.31
F	Phlox longifolia	4	-	-	2	-	-	-
F	Physaria chambersii	b19	b15	a-	9	9	-	-
F	Ranunculus testiculatus (a)	-	-	2	-	-	1	.00
F	Streptanthus cordatus	a11	b41	ab24	5	18	12	.30
Total Annual Forbs		0	0	18	0	0	8	0.03
Total Perennial Forbs		107	299	135	55	145	62	2.63

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

BROWSE TRENDS --
Herd unit 21 , Study no: 1

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	2	-
B	Artemisia tridentata wyomingensis	7	.57
B	Chrysothamnus viscidiflorus stenophyllus	24	1.11
B	Cowania mexicana stansburiana	16	4.29
B	Gutierrezia sarothrae	22	.45
B	Juniperus osteosperma	10	4.38
B	Leptodactylon pungens	13	-
B	Mahonia repens	1	.47
Total for Browse		95	11.28

CANOPY COVER --
Herd unit 21 , Study no: 1

Species	Percent Cover '98
Juniperus osteosperma	5

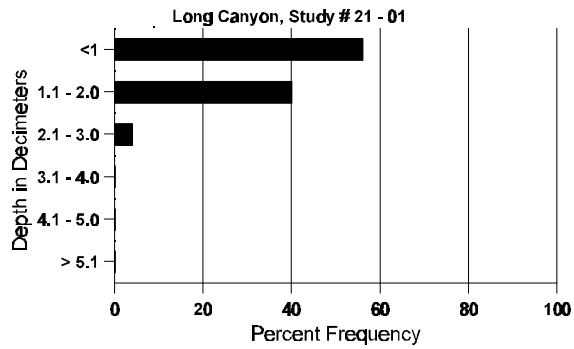
BASIC COVER --
Herd unit 21 , Study no: 1

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	336	7.25	6.50	34.20
Rock	187	5.50	13.00	6.01
Pavement	348	27.75	18.00	26.99
Litter	386	51.50	45.50	39.52
Cryptogams	210	1.00	2.50	5.43
Bare Ground	243	7.00	14.50	10.39

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 01, Study Name: Long Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.6	72.0 (14.0)	7.0	45.3	29.4	25.3	3.0	3.2	99.2	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 1

Type	Quadrat Frequency '98
Rabbit	27
Deer	6
Cattle	5

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 1

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total			
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.					
Artemisia nova																					
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0			
	'91	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	66	14	21	1
	'98	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	40	29	37	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>										
'85		00%			00%			00%													
'91		100%			00%			00%			-39%										
'98		00%			00%			00%													
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-						
												'91	66		-						
												'98	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>															
Y	85	1	-	-	-	-	-	-	1	-	-	-	66		1
	91	3	1	-	-	-	-	-	4	-	-	-	266		4
	98	-	-	-	-	-	-	-	-	-	-	-	0		0
M	85	9	5	-	-	-	-	-	12	-	2	-	933	32 27	14
	91	-	2	-	3	4	-	-	9	-	-	-	600	31 32	9
	98	5	2	-	-	-	-	-	7	-	-	-	140	25 35	7
D	85	-	1	-	-	-	-	-	1	-	-	-	66		1
	91	-	1	-	-	3	-	-	2	-	1	1	266		4
	98	1	1	-	-	-	-	-	1	-	-	1	40		2
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	80		4
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'85		38%		00%		13%		+ 6%							
'91		65%		00%		12%		-84%							
'98		33%		00%		11%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	1065	Dec:	6%		
										'91	1132		23%		
										'98	180		22%		
<i>Chrysothamnus viscidiflorus stenophyllus</i>															
M	85	2	-	-	-	-	-	-	2	-	-	-	133	8 13	2
	91	5	-	-	3	-	-	-	6	-	2	-	533	15 18	8
	98	27	-	-	2	-	-	-	29	-	-	-	580	14 17	29
D	85	12	-	-	-	-	-	-	9	-	2	1	800		12
	91	14	1	1	1	-	-	2	10	-	1	8	1266		19
	98	3	-	-	-	-	-	-	3	-	-	-	60		3
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	100		5
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'85		00%		00%		21%		+48%							
'91		04%		04%		41%		-64%							
'98		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	933	Dec:	86%		
										'91	1799		70%		
										'98	640		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		5	6		7	8	9						
<i>Cowania mexicana stansburiana</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	5	-	-	-	-	-	-	-	-	5	-	-	-	333	55	37	5
	91	1	1	-	2	-	-	-	-	-	4	-	-	-	266	63	59	4
	98	3	1	-	3	-	-	3	-	-	10	-	-	-	200	73	78	10
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	98	2	1	-	1	-	-	2	-	-	5	-	-	1	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			- 0%							
'91		20%			00%			00%			+ 8%							
'98		11%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)										'85	333	Dec:	0%					
										'91	332		20%					
										'98	360		33%					
<i>Gutierrezia sarothrae</i>																		
S	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400	9	7	6
	91	11	-	-	-	-	-	-	-	-	10	1	-	-	733	10	9	11
	98	36	-	-	-	-	-	-	-	-	36	-	-	-	720	12	15	36
D	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	3	-	-	-	-	-	-	-	-	2	-	-	1	200		3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+20%							
'91		00%			00%			07%			-26%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)										'85	799	Dec:	17%					
										'91	999		20%					
										'98	740		0%					

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133	64	41	2
	91	-	-	-	2	-	-	-	-	-	2	-	-	-	133	90	64	2
	98	-	-	-	-	-	-	6	-	-	6	-	-	-	120	-	-	6
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+ 0%							
'91		00%			00%			00%			+34%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	133	Dec:	-				
											'91	133		-				
											'98	200		-				
Leptodactylon pungens																		
S	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	25	-	1	-	-	-	-	-	-	26	-	-	-	1733		26	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	52	-	-	-	-	-	-	-	-	52	-	-	-	3466	3	5	52
	91	2	-	-	-	-	-	-	-	-	1	-	1	-	133	10	14	2
	98	14	-	-	3	-	-	-	-	-	17	-	-	-	340	7	9	17
D	85	15	4	3	-	-	-	-	-	-	20	-	2	-	1466		22	
	91	-	-	-	1	-	-	-	-	-	-	-	-	1	66		1	
	98	9	-	-	-	-	-	-	-	-	3	-	-	6	180		9	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	180		9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		04%			04%			02%			-97%							
'91		00%			00%			67%			+64%							
'98		00%			00%			21%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	6665	Dec:	22%				
											'91	199		33%				
											'98	560		32%				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Mahonia repens																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	-	-	-	-	2	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
	'85	00%			00%			00%										
	'91	00%			00%			00%										
	'98	00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	40		-			

Trend Study 21-2-98

Study site name: Lovell Hollow .

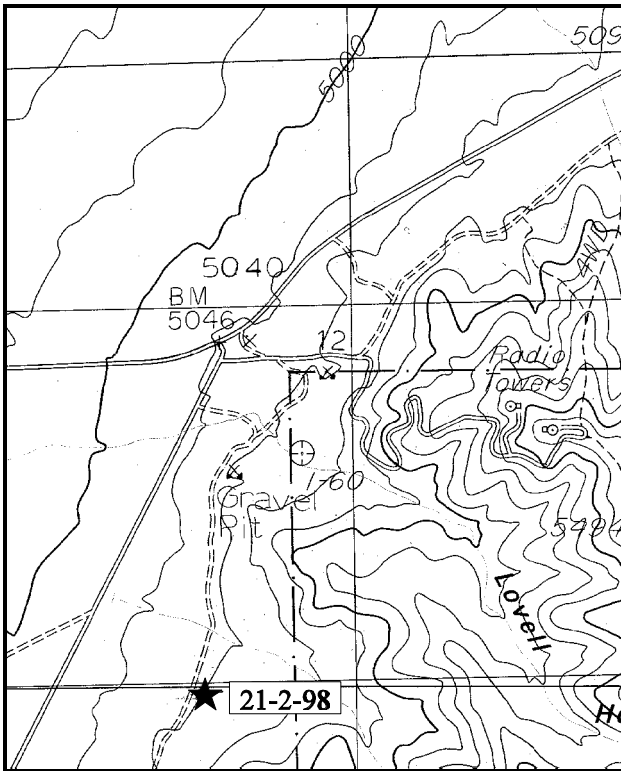
Range type: Chained, Cabled-Reseeded P-J .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

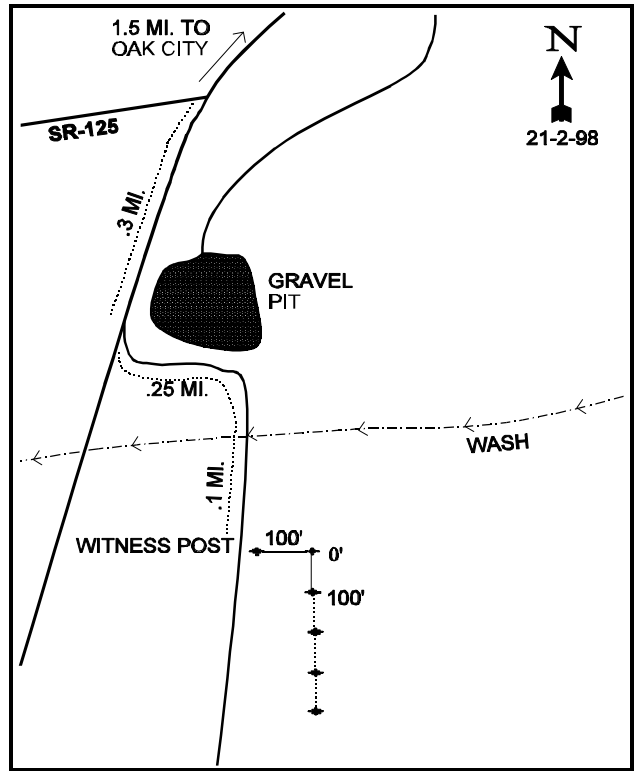
LOCATION DESCRIPTION

From the southern limit of Oak City, proceed 1.5 miles southwest on SR 125. Turn left on an improved road and go 0.3 miles. Turn left, then turn right at the south end of the borrow pit. Proceed 0.25 miles to a fork in the bottom of a wash. Continue south 0.1 miles (550 feet) to a short green fencepost 5 feet off the left side of the road. The baseline starts 100 feet due east of the witness pose. The 0-foot baseline stake is a green fencepost tagged #7115.



Map Name: Oak City South, Utah

Township 17S , Range 5W , Section 12



Diagrammatic Sketch

UTM 4355987.779 N, 382594.689 E

DISCUSSION

Trend Study No. 21-2 (39-2)

The Lovell Hollow trend study samples severe winter range on the juniper-big sagebrush foothills of the Canyon Mountains. Located at the base of the hills, the site has a slight slope (5-10%), northwest aspect, and an elevation of 5,200 feet. The site was burned in 1981, when wildfires consumed several thousand acres of winter range to the east. Another fire burned this area prior to the 1991 reading which eliminated all of the sagebrush on the site. The site was seeded after the fire with crested wheatgrass, intermediate wheatgrass, smooth brome, and fourwing saltbush. Pellet group data indicates light deer use at 8 deer days use/acre in 1998. The pellet group data also indicated the cattle use on the site was 30 cow days use/acre.

The soil is a very deep, well-drained sandy soil with no rocks in the profile. Effective rooting depth (see methods) is estimated at almost 31 inches. Soil texture is a loamy sand with a neutral pH (7.2). Organic matter is very limited at less than 1%. Phosphorus is also limiting at just 2.2 ppm which would be limiting to plant growth where 10 ppm is considered the minimum needed for normal plant development. The soil profile appeared dry on the surface down to a depth of 8 to 10 inches, but then moist beyond 10 inches. There may be a clay horizon lower down which helps hold moisture in the soil. Due to the sandy nature of the soil, average soil temperature is moderately high at 76°F at a depth of nearly 18 inches. Permeability is moderately rapid, runoff is slow, the terrain is gentle, and therefore the potential for water erosion is slight. Most soil movement appears to be by the wind, with some soil pedestaling around shrubs and bunch grasses apparent. Percent bare ground is moderately high and has averaged about 43% since 1985.

Due to the fire, the previously existing browse composition of basin big sagebrush and bitterbrush were effectively eliminated from the site. The area was apparently chained and seeded with crested, slender, and intermediate wheatgrass, smooth brome, and fourwing saltbush. Fourwing density is estimated at only 20 plants/acre in 1998, consisting of scattered large plants measuring 4 feet in height. Abundant leader growth and seed production was noted in 1998. There are a few bitterbrush still in the area, but not abundant enough to be sampled. All bitterbrush show moderate to heavy use. Some of the rubber rabbitbrush encountered were totally stripped of leaves in 1998 apparently due to crickets or grasshoppers. Although there were no crickets on site during the reading on 8/25/98, there were signs of crickets on other sites in the unit in 1998.

The herbaceous understory is moderately abundant but totally dominated by cheatgrass and Russian thistle which provide 77% of the herbaceous ground cover. Cheatgrass and most other annual species were not included in the previous sampling dates (1985 and 1991), but photos show abundant cheatgrass and other annual weeds in 1991. Seeded grasses are found scattered through the site in almost inconsequential numbers and include: crested, slender, and intermediate wheatgrass, and smooth brome. Indian rice grass is currently the most abundant perennial grass as would be expected on this sandy site. Perennial forbs are lacking.

1985 APPARENT TREND ASSESSMENT

Soil trend is stable and possibly improving. The continued development of cryptogamic soil is very desirable, but it is fragile and care should be taken to avoid off-road vehicle use and trampling by livestock and firewood gatherers. The lack of desirable herbaceous species combined with inadequate reproduction in sagebrush, the key species, indicates a slow downward trend. However, the bitterbrush may be slowly increasing, and if weather conditions favor sagebrush seedling establishment in the near future, the trend may be reversed.

1991 TREND ASSESSMENT

Basic cover for basal vegetation cover is very low at only 2%, but shows improvement since 1985 due to the increase in grasses and forbs. Litter cover has also increased due to the increase in herbaceous vegetation, but

percent bare ground has slightly increased. Soil trend is stable to slightly declining due to the loss of cryptogamic plants. Due to the fire, there are no key browse species, so trend for browse is down. Herbaceous trend has improved with the seeding of desirable grasses, however the site is still dominated by cheatgrass and weedy forbs.

TREND ASSESSMENT

soil - stable

browse - down due to fire

herbaceous understory - improved, but dominated by cheatgrass

1998 TREND ASSESSMENT

Trend for soil is stable. Litter cover has declined partly due to the decomposition of churning debris, however percent bare soil has declined slightly from 45% to 42%. Water erosion is minimal due to the sandy nature of the soil, yet some wind erosion does occur. The browse trend is up slightly due to the appearance of some seeded fourwing saltbush. These plants occur in low densities but they are large, vigorous and producing abundant seed. Small numbers of coin buckwheat were also encountered this year. Trend for the herbaceous understory is up slightly for perennial grasses but down for forbs. Cheatgrass still dominates the site by producing 79% of the grass cover. Forb composition is dominated by Russian thistle which grows in dense patches. Overall, trend for the herbaceous understory is stable.

TREND ASSESSMENT

soil - stable

browse - up slightly, but limited with less than 3% cover

herbaceous understory - stable, but dominated by cheatgrass and other annuals

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	a-	b14	a1	-	6	1	.03
G	Agropyron intermedium	-	17	17	-	7	7	.99
G	Agropyron spicatum	3	-	4	2	-	1	.00
G	Agropyron trachycaulum	a-	b18	b26	-	6	14	.36
G	Bromus inermis	-	2	-	-	1	-	-
G	Bromus tectorum (a)	-	-	365	-	-	100	18.14
G	Oryzopsis hymenoides	a3	a9	b52	1	4	23	3.13
G	Stipa comata	-	-	7	-	-	2	.30
Total Annual Grasses		0	14	366	0	6	101	18.17
Total Perennial Grasses		6	46	106	3	18	47	4.80
F	Arabis spp.	-	-	3	-	-	1	.00
F	Eriogonum cernuum (a)	19	-	-	8	-	-	-
F	Lactuca serriola	-	1	7	-	1	3	.04
F	Lygodesmia grandiflora	-	1	-	-	1	-	-
F	Machaeranthera canescens	b19	c189	a-	11	78	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	Oenothera pallida	a-	a-	b71	-	-	29	.93
F	Phlox longifolia	a-	b36	a-	-	14	-	-
F	Salsola iberica (a)	-	-	32	-	-	15	2.26
F	Sisymbrium altissimum (a)	-	-	3	-	-	2	.01
F	Stephanomeria exigua	a-	b14	a-	-	5	-	-
F	Unknown forb-perennial	-	-	5	-	-	2	.18
Total Annual Forbs		19	0	35	8	0	17	2.27
Total Perennial Forbs		19	241	86	11	99	35	1.17

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

BROWSE TRENDS --

Herd unit 21 , Study no: 2

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata tridentata	0	-
B	Atriplex canescens	1	2.24
B	Chrysothamnus nauseosus	0	-
B	Chrysothamnus viscidiflorus	4	.41
B	Eriogonum nummularre	1	-
B	Gutierrezia sarothrae	0	-
B	Juniperus osteosperma	0	-
Total for Browse		6	2.65

BASIC COVER --

Herd unit 21 , Study no: 2

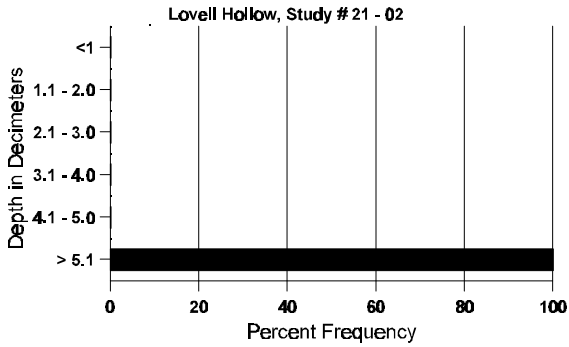
Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	371	.50	2.00	33.58
Rock	-	0	0	0
Pavement	59	.50	.25	.44
Litter	395	48.50	52.50	38.68
Cryptogams	44	9.25	0	.79
Bare Ground	330	41.25	45.25	41.95

SOIL ANALYSIS DATA --

Herd Unit 21, Study # 02, Study Name: Lovell Hollow

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
30.9	76.0 (17.7)	7.2	85.3	6.4	8.3	.6	2.2	137.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 2

Type	Quadrat Frequency '98
Rabbit	12
Deer	11
Cattle	10
Antelope	2

BROWSE CHARACTERISTICS --
Herd unit 21 , 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 tridentata</i>																		
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	13	-	-	-	-	-	-	-	-	13	-	-	-	866	33 32	13	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	85	8	-	-	-	-	-	-	-	-	5	-	3	-	533		8	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	600		30		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			14%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	1465	Dec:	36%				
											'91	0		0%				
											'98	0		0%				
<i>Atriplex canescens</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	51 76	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-				
											'91	0		-				
											'98	20		-				
<i>Chrysothamnus nauseosus</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21 54	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-				
											'91	0		-				
											'98	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																																																																												
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M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0																																																																								
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0																																																																								
	98	2	-	-	-	-	-	-	-	-	1	1	-	-	40	25	40	2																																																																							
D	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0																																																																								
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0																																																																								
	98	-	-	1	-	-	-	-	-	1	1	-	-	1	40			2																																																																							
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	91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																																																																						
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																																																																						
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	98	-	-	-	-	-	-	-	-	-	-	-	-	0	11	19	0																																																																								
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Total Plants/Acre (excluding Dead & Seedlings)														'85	0	Dec:	-																																																																								
														'91	0		-																																																																								
														'98	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			
Juniperus osteosperma																	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'85	00%			00%			00%									
	'91	00%			00%			00%									
	'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	0		-		

Trend Study 21-3-98

Study site name: Cascade Spring

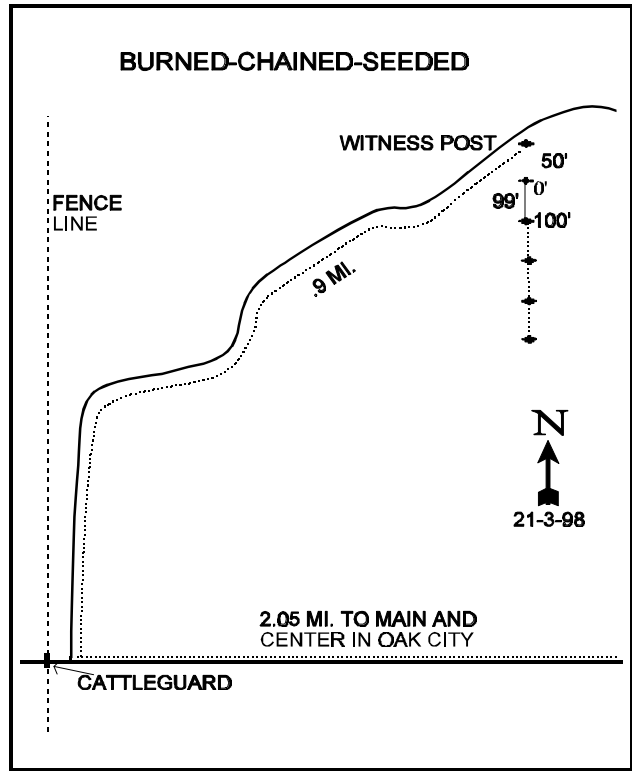
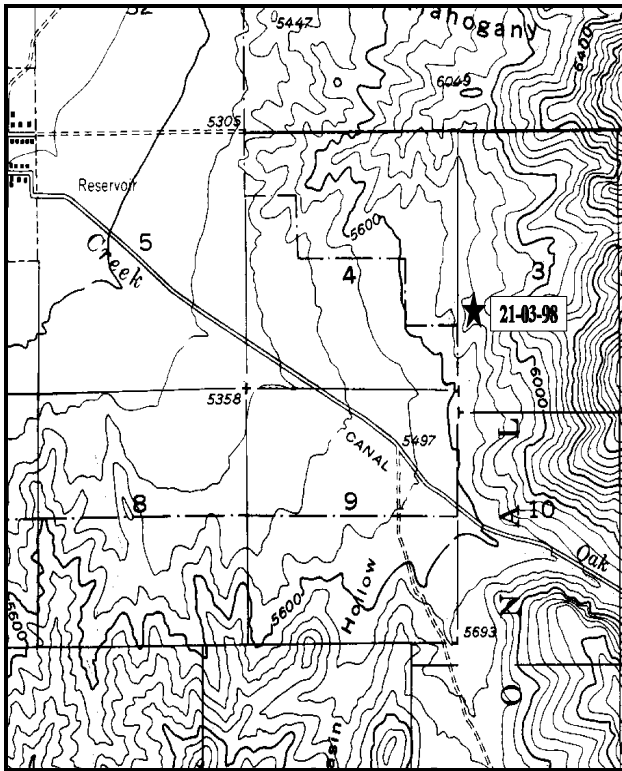
Range type: Perennial Grass

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Main Street and Center in Oak City, go east up Center 0.35 miles around an "S" bend to an intersection. Stay left and continue 1.7 miles to a cattleguard. Just beyond the cattleguard turn left up the road to Cascade Spring. Follow this road around several bends for 0.9 miles to a 5/8" rebar 10 feet off the right side of the road. The baseline starts 55 feet true south of this witness post. The 0-foot baseline stake is tagged #7114. The 100-foot end of the baseline is marked by a rebar that is actually only 99 feet south of the 0-foot baseline stake.



Map Name: Oak City South, Utah

Diagrammatic Sketch

Township 17 S, Range 4 W, Section 4

UTM 4358164.525 N, 388570.701 E

DISCUSSION

Trend Study No. 21-3 (39-3)

The Cascade Spring trend study is located near the Cascade Spring pellet group transect, two miles east of Oak City. The area was burned by wildfire in 1981 and the lower slopes were seeded then chained the following year. The vegetative composition is now dominated by annuals and seeded grasses. As far as the Forest Service is concerned, the project was successful in establishing range suited for cattle, although the value of the range is limited for wintering deer because of the lack of browse and cover. Even with these limitations, deer days use/acre averaged 14 between 1985 and 1991, which is the highest of any of the permanent pellet group transects on the unit (Jense 1991). Between 1993 and 1996, however, an average of only 3 deer use days/acre were estimated (Evans et al. 1996). Pellet group data from the site taken in 1998 indicate 12 deer days use/acre. Cattle use was heavy this year at it was estimated at 62 cow day use/acre. There was a well worn cattle trail near the study site baseline which appears to be heading northeast to Cascade spring. Grass species identification was difficult in 1998 due to the very heavy cattle use.

The soil is very rocky on the surface and throughout the profile. In some places, it is only 10 to 20 inches to solid limestone bedrock. Effective rooting depth (see methods) is estimated at just under 11 inches. Soil texture is a loam with a neutral pH (6.8). Rocks and pavement cover a large portion of the ground surface (33% in 1985, 28% in 1991 and 18% in 1998). Due to the rocky nature of the soil, average soil temperature is moderately high averaging 73°F at an average depth of nearly 13 inches. Erosion was a severe problem on these slopes in the early 1900's, but the wide gully through the study area now supports perennial vegetation. Erosion increased after the fire, but increasing vegetative cover and litter buildup now gives the soil adequate protection.

No browse was found during the 1985 reading. The only browse species encountered in 1991 was a few (200 plants/acre) broom snakeweed. By 1998, broom snake had increased to 740 plants/acre, but no other shrubs besides a few cactus were found. According to the Forest Service revegetation report, bitterbrush and fourwing saltbush were included in the seed mix, but no seedlings could be found on the site during any of the readings. In many places the herbaceous vegetation appeared dense enough to successfully out compete browse seedlings. In addition, the high soil temperatures may make it difficult for young seedling shrubs to survive a summer without significant amounts of precipitation. Since there are no seed sources nearby, natural establishment of browse species will take a long time.

Seeded perennial grasses dominate the vegetative community. Crested (standard and fairway) and intermediate wheatgrass are established over the whole area. Smooth brome is also fairly common and combined with crested and intermediate wheatgrass, account for 56% of the grass cover. Sandberg bluegrass and bulbous bluegrass are also common. Annual cheatgrass, occurs in patches and provides 17% of the herbaceous cover.

Forbs are nearly absent. Storksbill, prickly lettuce, *Conyza spp*, *Polygonum spp*, and annual sunflowers were prevalent in 1985. During the 1991 reading, the only noticeable forb was prickly lettuce. Storks bill and some of the other previously abundant forbs no longer occur on the site. The seeded forb alfalfa was abundant in 1985 with a quadrat frequency of 30%. Most of those plants were small and almost entirely eaten by grasshoppers. As of 1991, alfalfa was still found on the site but at a quadrat frequency of only 3%, a 90% drop. During the 1998 reading, the only forb encountered was a few Louisiana sagebrush with a quadrat frequency of just 2%.

1985 APPARENT TREND ASSESSMENT

After the fire and seeding, the area appears to be quickly changing. The percentage of annuals should decrease through time as the perennials become better established. Before the fire, this was an important deer

winter range and the lack of browse is a very real problem. Interseeding with browse species should be considered. The soil has stabilized and trend appears to be improving.

1991 TREND ASSESSMENT

Overall, the soil trend is improving. Vegetation and litter cover are increasing while rock, pavement, and bare ground are all decreasing. Browse trend here is not applicable because there is no browse except for broom snakeweed. Herbaceous understory trend is mixed, the grasses are doing well, but the forbs are not. The grasses are stabilizing, with some increasing, while others are decreasing. Overall, they have slightly increased in nested frequency. The major seeded forb, alfalfa, has decreased greatly due to the extended drought. The overall trend for herbaceous understory is stable.

TREND ASSESSMENT

soil - up

browse - not applicable, no browse after fire

herbaceous understory - stable

1998 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1991. There is still no browse species on the site with the exception of broom snakeweed. Trend for the herbaceous understory is up for grasses with a major increase in the sum of nested frequency for perennial grasses. Nested frequency of intermediate wheatgrass nearly tripled. Forbs are represented by a few Louisiana sagebrush. Livestock utilization of the grasses in 1998 was very heavy (75-85%) making identification difficult.

TREND ASSESSMENT

soil - stable

browse - not applicable, no browse after fire

herbaceous understory - up for grasses, but forbs nearly absent

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	_b 111	_a 76	_{ab} 88	44	38	35	4.55
G	Agropyron intermedium	_a 33	_b 73	_c 202	16	28	64	11.82
G	Agropyron spicatum	1	4	-	1	1	-	-
G	Bromus inermis	34	32	26	15	12	10	.73
G	Bromus tectorum (a)	-	-	191	-	-	63	5.32
G	Poa bulbosa	a-	_a 8	_b 77	-	3	25	4.05
G	Poa secunda	_a 31	_b 86	_b 122	13	37	38	4.02
G	Vulpia octoflora (a)	-	-	1	-	-	1	.00
Total Annual Grasses		0	0	192	0	0	64	5.32
Total Perennial Grasses		210	279	515	89	119	172	25.19
F	Artemisia ludoviciana	-	-	4	-	-	2	.06
F	Erodium cicutarium (a)	54	-	-	20	-	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	Erigeron spp.	_b 13	_a -	_a -	5	-	-	-
F	Lactuca serriola	_a -	_b 10	_a -	-	6	-	.03
F	Medicago sativa	_b 76	_a 4	_a -	30	3	-	-
F	Stephanomeria spp.	11	-	-	5	-	-	-
F	Tragopogon dubius	-	1	-	-	1	-	-
F	Unknown forb-annual	-	3	-	-	1	-	-
F	Unknown forb-perennial	-	4	-	-	1	-	-
Total Annual Forbs		54	0	0	20	0	0	0
Total Perennial Forbs		100	22	4	40	12	2	0.09

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

BROWSE TRENDS --

Herd unit 21 , Study no: 3

Type	Species	Strip Frequency '98	Average Cover % '98
B	Echinocereus spp.	1	-
B	Gutierrezia sarothrae	11	.69
Total for Browse		12	0.69

BASIC COVER --

Herd unit 21 , Study no: 3

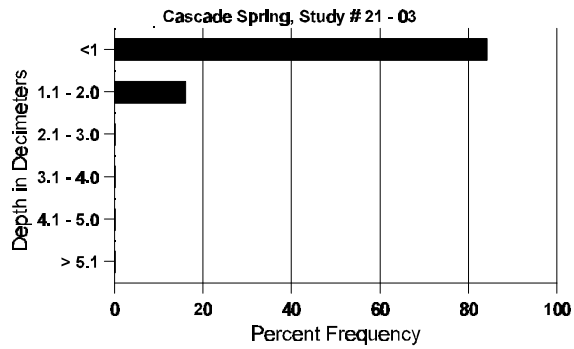
Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	369	7.25	10.75	35.95
Rock	181	24.25	22.00	14.15
Pavement	213	9.00	6.25	3.32
Litter	395	40.75	44.00	41.01
Cryptogams	20	.75	1.00	.14
Bare Ground	233	18.00	16.00	16.66

SOIL ANALYSIS DATA --

Herd Unit 21, Study # 03, Study Name: Cascade Spring

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.5	73.2 (12.8)	6.8	50.9	29.8	19.3	2.2	13.8	140.8	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 3

Type	Quadrat Frequency '98
Rabbit	5
Deer	7
Cattle	26

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 3

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Echinocereus spp.																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	1	-	-	-	-	-	-	-	-	-	-	-	1	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	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				
Gutierrezia sarothrae																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	3	-	-	-	-	-	-	-	-	3	-	-	-	200	10	15	3
	'98	37	-	-	-	-	-	-	-	-	37	-	-	-	740	8	15	37
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'85	00%			00%			00%										
	'91	00%			00%			00%			+73%							
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	200		-			
												'98	740		-			

Trend Study 21-4-98

Study site name: Horse Hollow .

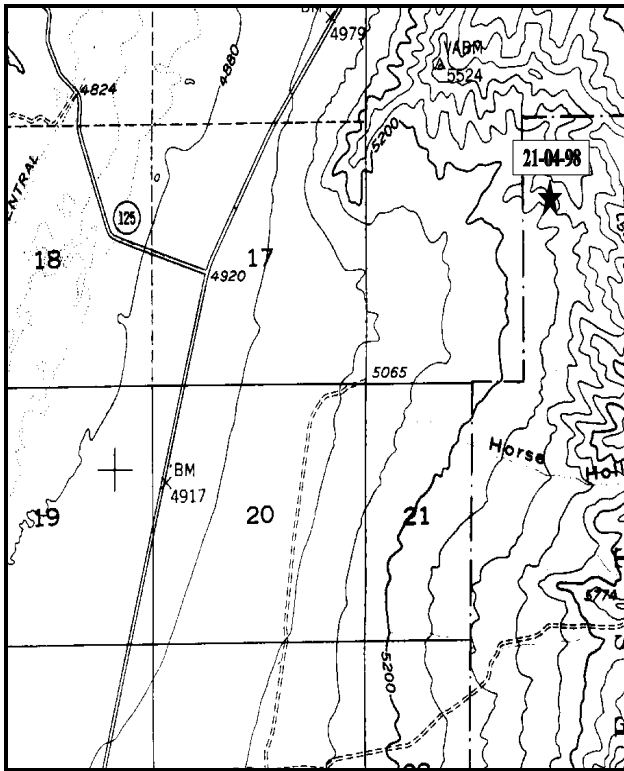
Range type: Juniper .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

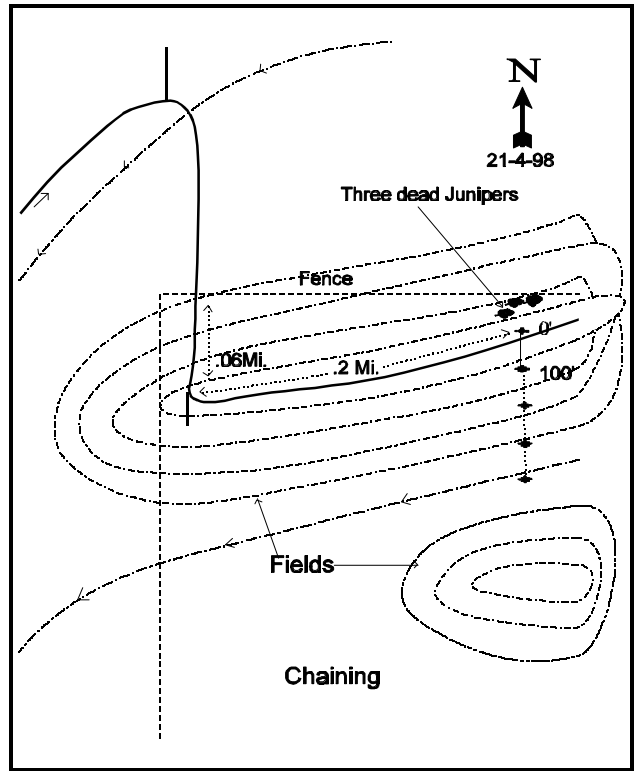
LOCATION DESCRIPTION

Proceed north from Oak City on SR 125. At mile marker 13 turn right through a gate. Drive up the road 0.6 miles through a wheat field (you will parallel a fence on your right) to another fence. Just through the gate the road turns left and parallels the north-south fence for a short distance, then winds up through the 4 fields. Follow the road 0.9 miles to a right curve and a fence. Go up through the gate onto Forest Service land. From the gate proceed 0.05 miles up a steep hill. At the top of the hill turn left and drive 0.2 miles on a faint road up the ridge line. Look for a green and white fencepost 18 feet off the right side of the road. The fencepost marks the 0-foot end of the frequency baseline. It is marked with a browse tag #7067.



Map Name: Oak City, Utah

Township 16S , Range 4W , Section unsurveyed



Diagrammatic Sketch

UTM Coordinates: 4365352.038 N, 388333.927 E

DISCUSSION

Trend Study No. 21-4 (53-4)

This study, Horse Hollow, is located on juniper-sagebrush winter range in the foothills above privately owned wheatfields. The transect runs down the south side of rocky ridge and across a small wash. The slope is 20% with a south-southwest aspect and an elevation of 5,400 feet. Adjacent areas to the north and south were burned, seeded, then chained prior to study establishment in 1985. The land is managed by the Forest Service and is grazed by cattle. The lack of a nearby water source may effect livestock distribution in the area. Big game use appears to be light, as pellet groups are relatively few and the browse shows only light to moderate hedging. Pellet group transect data from 1998 estimate only 7 deer use days/acre with cattle lower at 2 days use/acre. Cattle pats appeared old, possibly from earlier in the year or late last year.

Soil on the site is moderately shallow and very rocky. Gravel and rock are abundant on the surface and throughout the profile. Pavement and rock combine to produce nearly half of the ground cover. Effective rooting depth (see methods) is estimated at just over 11 inches. A thin hardpan is located at a depth of 6 to 8 inches in depth, but it does not appear to be a barrier to roots. Soil texture is a sandy loam with a neutral pH (7.1). Phosphorus is very low at only 3.3 ppm which may be limiting to plant growth, for 10 ppm is considered minimal for normal plant development. Average soil temperature is high at 74°F at a depth of just over 12 inches. Soil erosion is not a serious problem on the site, although a small wash at the bottom of the hill shows some sedimentation.

The overstory is dominated by large Utah juniper averaging 15 feet in height. There are few young trees present. Point quarter data from 1998 estimate 82 juniper trees/acre with an average diameter of 8.5 inches. Overhead canopy cover averages 14%. This amount of juniper cover, especially with the high amount of rock in the profile, will normally decrease understory production by 40% to 50%. The key browse species is Wyoming big sagebrush which has had a stable density of between 800 and 900 plants/acre since 1985. Reproduction is very limited with young plants comprising only 8% of the population in 1985, no young or seedlings were encountered in 1991. Currently, only 4% of the population consists of young plants and no seedlings were sampled. Utilization was mostly moderate in 1985 and 1998, but light in 1991. Percent decadency was relatively high at 50% in 1991, however it was down to 39% in 1998. This is still a relatively high number for sagebrush. Trend for sagebrush is still downward, but only slightly. Vigor is good on most plants. Broom snakeweed is the most numerous shrub on the site with a current density of 2,500 plants/acre ('98). The population appears stable with 93% of the shrubs being classified as mature. Vigor was considered poor on most snakeweed in 1998 as plants were severely dried up and losing leaves. Other browse species include: Stansbury cliffrose (mature & vigorous), Nevada ephedra (moderately hedged), and narrowleaf low rabbitbrush, which all occur in small numbers. Grasshoppers were numerous on the site and Mormon crickets had been on the site earlier in the season. Some coyote scat found on the site contained numerous cricket remains. In addition, the rabbitbrush had been stripped of all leaves by insects.

The herbaceous understory is poor and dominated by cheatgrass which provides 81% of the grass cover. Several native perennial grasses occur on the site, but only bluebunch wheatgrass and Sandberg bluegrass are fairly common. Forbs are rare with only three species encountered in 1998. All together they provide less than 1/10th of 1% cover.

1985 APPARENT TREND ASSESSMENT

Overall, range trend is probably declining. Soil is eroding faster than it is being formed, leaving an unstable rocky surface. The population of Wyoming big sagebrush (the key species) is composed mainly of older plants and there is little sign of reproduction. The increasing prevalence of broom snakeweed in the community is also a warning sign that the range condition is deteriorating.

1991 TREND ASSESSMENT

Soil condition is continuing on a slightly downward trend, largely due to a loss of vegetative cover, and a substantial increase in rock cover. The key browse, Wyoming big sagebrush, has a fairly stable population, although percent decadency increased from 42 to 50%. Broom snakeweed has increased slightly during this same period. Trend for browse would be slightly downward. The herbaceous understory is going in two different directions, the grasses are increasing and the forbs are decreasing. The grasses make up the majority of the understory with high quadrat frequencies. The forbs are basically nonexistent with poor vigor. Trend here is slightly upward, but only because of the grasses.

TREND ASSESSMENT

soil - slightly downward

browse - slightly downward

herbaceous understory - slightly upward

1998 TREND ASSESSMENT

Trend for soil appears to be stable with similar ground cover characteristics compared to 1991. Trend for the key browse species, Wyoming big sagebrush appears to be slightly down at the moment, with a lack of adequate reproduction and a high number of dead plants (45%). Percent decadence is down from 50% to 39% and vigor has improved slightly, however there appears to be some more of the population that will continue to be lost in the future. Utilization is mostly light to moderate. Another cause for concern is the continued increase in broom snakeweed. The current population is mostly mature (93%), and it appears stable. The herbaceous understory is depleted of perennial grasses and forbs. Cheatgrass currently dominates the site by providing 80% of the herbaceous cover. Trend is considered down with all perennial grasses declining in nested frequency since 1991.

TREND ASSESSMENT

soil - stable

browse - slightly down

herbaceous understory - down for grasses, forbs rare

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron spicatum	_b 73	_b 77	_a 19	30	33	13	.65
G	Bromus tectorum (a)	-	-	337	-	-	95	12.65
G	Hilaria jamesii	_a 8	_b 34	_a 6	4	14	4	.10
G	Oryzopsis hymenoides	_{ab} 29	_b 31	_a 12	12	16	4	.12
G	Poa secunda	54	47	75	21	22	26	2.06
G	Secale cereale (a)	-	-	5	-	-	4	.02
G	Sitanion hystrix	-	5	2	-	3	2	.06
Total Annual Grasses		0	0	342	0	0	99	12.67
Total Perennial Grasses		164	194	114	67	88	49	3.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	<i>Arabis drummondi</i>	1	-	-	1	-	-	-
F	<i>Astragalus</i> spp.	_b 19	_{ab} 8	_a 4	10	4	2	.01
F	<i>Cirsium</i> spp.	-	-	7	-	-	3	.04
F	<i>Cryptantha</i> spp.	5	1	-	3	1	-	-
F	<i>Erigeron eatonii</i>	-	4	-	-	2	-	-
F	<i>Eriogonum ovalifolium</i>	-	2	-	-	2	-	-
F	<i>Phlox austromontana</i>	_b 15	_a -	_a -	6	-	-	-
F	<i>Phlox longifolia</i>	2	-	3	1	-	1	.00
F	Unknown forb-perennial	3	-	-	1	-	-	-
F	<i>Zigadenus paniculatus</i>	-	1	-	-	1	-	-
Total Annual Forbs		0	0	0	0	0	0	0
Total Perennial Forbs		45	16	14	22	10	6	0.05

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

BROWSE TRENDS --

Herd unit 21 , Study no: 4

Type	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata wyomingensis</i>	34	2.07
B	<i>Chrysothamnus nauseosus</i>	0	-
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	22	.21
B	<i>Cowania mexicana stansburiana</i>	1	-
B	<i>Ephedra nevadensis</i>	3	.94
B	<i>Gutierrezia sarothrae</i>	41	1.49
B	<i>Juniperus osteosperma</i>	4	6.22
B	<i>Opuntia</i> spp.	1	-
Total for Browse		106	10.94

CANOPY COVER --

Herd unit 21 , Study no: 4

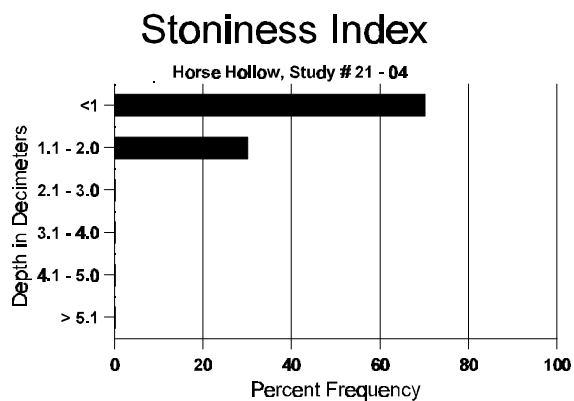
Species	Percent Cover '98
<i>Juniperus osteosperma</i>	14

BASIC COVER --
Herd unit 21 , Study no: 4

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	359	3.25	1.00	25.25
Rock	244	7.00	18.00	12.65
Pavement	328	37.50	31.00	30.39
Litter	386	33.25	30.50	34.54
Cryptogams	175	2.75	3.25	3.94
Bare Ground	247	16.25	16.25	14.71

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 04, Study Name: Horse Hollow

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.4	74.0 (12.6)	7.1	54.9	25.8	19.3	1.3	3.3	105.6	.5



PELLET GROUP FREQUENCY --
Herd unit 21 , Study no: 4

Type	Quadrat Frequency '98
Rabbit	25
Deer	19

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 4

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	2	-	-	-	-	-	-	-	-	2	-	-	40		2	
M	85	3	3	-	-	-	-	-	-	-	6	-	-	-	400	15 18	6	
	91	5	-	-	1	-	-	-	-	-	3	-	3	-	400	15 28	6	
	98	12	12	2	-	-	-	-	-	-	17	9	-	-	520	22 35	26	
D	85	1	4	-	-	-	-	-	-	-	3	-	2	-	333		5	
	91	6	-	-	-	-	-	-	-	-	4	1	1	-	400		6	
	98	12	6	-	-	-	-	-	-	-	7	5	-	6	360		18	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	800		40	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		58%			00%			17%			+ 0%							
'91		00%			00%			33%			+13%							
'98		43%			04%			13%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	799	Dec:	42%			
												'91	800		50%			
												'98	920		39%			
<i>Chrysothamnus nauseosus</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18 33	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	0		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	4	-	-	-	-	-	-	-	-	-	-	-	266	9	14	4
	98	-	5	3	-	-	2	-	-	15	-	19	5	1	500	10	17
D	85	5	-	-	-	-	-	-	-	-	-	4	1	333			5
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	2	-	-	-	-	-	-	1	-	1	2	60			3
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	140			7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			100%			-20%						
'91		00%			00%			00%			+53%						
'98		25%			75%			29%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	333	Dec:	100%		
												'91	266		0%		
												'98	560		11%		
<i>Cowania mexicana stansburiana</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	17	20
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	20		-		
<i>Ephedra nevadensis</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	5	-	-	-	-	-	-	-	5	-	-	-	100	17	41
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		100%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	100		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total							
		1	2	3	4		1	2								
<i>Gutierrezia sarothrae</i>																
Y	85	6	-	-	-	-	-	-	4	-	2	-	400		6	
	91	1	-	-	-	-	-	-	1	-	-	-	66		1	
	98	4	-	-	-	-	-	-	-	-	4	-	80		4	
M	85	11	-	-	-	-	-	-	9	-	2	-	733	6	9	11
	91	18	-	-	1	-	-	-	19	-	-	-	1266	9	13	19
	98	104	8	4	-	-	-	-	2	1	113	-	2320	8	10	116
D	85	2	-	-	-	-	-	-	2	-	-	-	133		2	
	91	1	-	-	-	-	-	-	-	-	-	1	66		1	
	98	4	1	-	-	-	-	-	-	-	5	-	100		5	
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	200		10	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>					<u>%Change</u>					
'85		00%		00%		21%					+ 9%					
'91		00%		00%		05%					+44%					
'98		07%		03%		96%										
Total Plants/Acre (excluding Dead & Seedlings)										'85	1266	Dec:	11%			
										'91	1398		5%			
										'98	2500		4%			
<i>Juniperus osteosperma</i>																
S	85	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	1	-	-	-	2	-	-	-	40		2	
Y	85	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	1	1	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>					<u>%Change</u>					
'85		00%		00%		00%										
'91		00%		00%		00%										
'98		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-			
										'91	0		-			
										'98	80		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4	5	6	7	8	9	1	2	3	4							
Opuntia spp.																					
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0			
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0			
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	20	11	26	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>										
'85		00%			00%			00%													
'91		00%			00%			00%													
'98		00%			00%			00%													
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-						
												'91	0		-						
												'98	20		-						

Trend Study 21-5-98

Study site name: Wood Canyon .

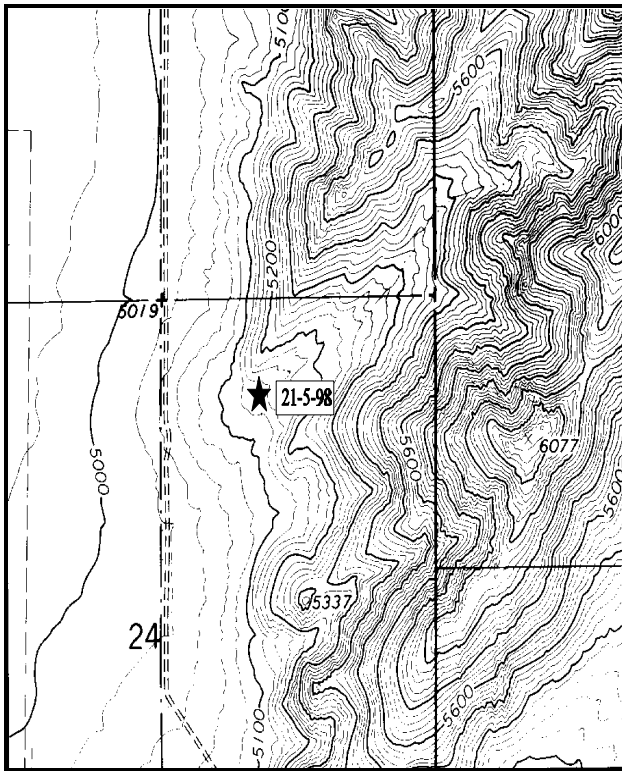
Range type: Big Sagebrush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft).

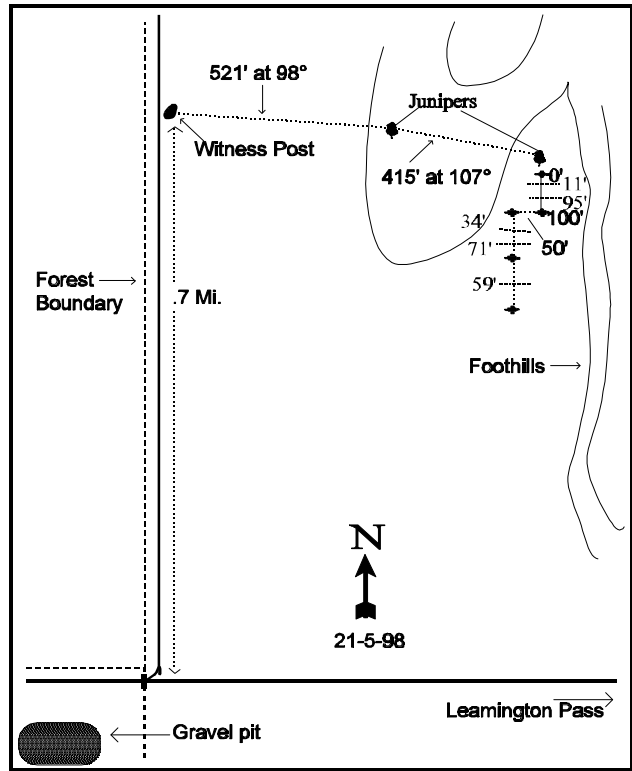
LOCATION DESCRIPTION

From mile marker 19 north of Oak City on SR 125, proceed north 0.4 miles to the Leamington Pass Road. Turn right (east) and go 1.3 miles to the Forest Service boundary. Cross the cattleguard and immediately turn left. Follow the road along the fence for 0.7 miles to a red rebar witness stake 12 feet off the left side of the road (2 feet from the fence) at the top of the rise. From the witness stake, walk approximately 512 feet at 125 degrees M to a mature Juniper. From this tree continue on over a hill at 120 degrees M for 414 feet to another, larger Juniper. The baseline starts 8 feet south if this tree. The 0-foot stake has a red browse tag #7183 attached.



Map Name: Champlin Peak, Utah

Township 15S, Range 4W, Section 24



Diagrammatic Sketch

UTM 4373651.789 N, 393284.062 E

DISCUSSION

Trend Study No. 21-5 (39-5)

The Wood Canyon range trend study is located at the mouth of a small canyon that drains the rather steep Canyon Mountains to the east. The study is on a gentle (5-10%), open southwest slope at an elevation of 5,150 feet. A fire burned through the area sometime after the 1985 reading which eliminated all of the Wyoming big sagebrush, leaving grasses and forbs. The area is no longer useful as winter range for deer and this study should be dropped or moved to a better location. Livestock have grazed this area since the fire, but there is little sign of wildlife use. Pellet group data from 1998 estimate 25 cow use days/acre and less than one deer use day/acre.

The soil is Heist fine sandy loam, a deep well-drained soil of alluvial fans. The parent material is largely conglomerate, limestone and quartzite (unpublished soil survey). The soil at the site is very rocky on the surface and throughout the profile. Effective rooting depth (see methods) is estimated at just over 11 inches. Soil texture is a sandy loam with a neutral pH (7.2). Due to the high rock content on the surface and in the profile, soil temperature is very high averaging 78.6°F at a depth of almost 15 inches. These hot dry soils give a competitive advantage to winter annuals like cheatgrass, tumble mustard, and Russian thistle.

In 1985 the site supported a dense stand of Wyoming big sagebrush. The sagebrush was mostly mature, lightly utilized and in good vigor. Since the fire, the site is now dominated by cheatgrass and weedy forbs. Annual species currently make up 83% of the total vegetative cover. The only browse remaining is a small population of broom snakeweed (1,120 plants/acre).

The herbaceous understory is abundant with grasses and forbs producing nearly 50% total ground cover (48%). However, composition is extremely poor with annual cheatgrass providing 79% of the grass cover. The most numerous perennial grasses present are Sandberg bluegrass and purple three-awn. Forbs were very scarce before the fire, but they have since increased in diversity and nested frequency. The problem is that the composition is dominated by annual weedy increasers. Native grasses are more common on the nearby rocky slopes.

1985 APPARENT TREND ASSESSMENT

The soil trend is currently stable. In the past, this area received a heavy amount of soil and rock deposition due to erosion from the steeper slopes above, but that appears to have stabilized. Erosion from the study site has also been slowed. Grazing seems to have favored the cheatgrass, and there are few perennial herbaceous species left. The age composition of the sagebrush would also indicate a slow downward trend unless reproduction improves.

1991 TREND ASSESSMENT

The amount of basal vegetation cover didn't change as a result of the fire, but it is very low at only 1%. Percent rock and bare ground cover increased substantially, while litter cover went down. These changes all indicate a downward soil trend. The key browse species was Wyoming big sagebrush, which by 1991, does not exist in the immediate area. The fire had to have been very hot for there are no stems or sign that sagebrush was ever here. This area can no longer be considered critical winter range for all browse species have been totally eliminated. There were no pellet groups found on the site. The trend is obviously down. With the inspection of the 1985 and 1991 photo's, it appears that the major species is cheatgrass. Because it is an annual, it was not inventoried. One of the major perennial grass species was Sandberg bluegrass which has decreased considerably in nested frequency. Three-awn has increased slightly. The forbs were almost nonexistent in 1985, yet have increased somewhat. Trend for grasses is down slightly due to decreases in Sandberg bluegrass, while the trend for forbs is slightly up due to increased diversity and nested frequency values.

TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - stable

1998 TREND ASSESSMENT

Trend for soil is up slightly with a decline in percent bare ground, rock, and pavement cover. Erosion is not a problem due to the abundance of protective ground cover. There are no useful browse species on the site and broom snakeweed increased 97% since the last reading. Trend is considered down. The herbaceous understory trend is up. However, composition is poor with cheatgrass and annual forbs accounting for 83% of the herbaceous cover. This site is no longer useful as deer winter range and the study site should be dropped or relocated in the future.

TREND ASSESSMENT

soil - up slightly

browse - down with no useful browse left on site

herbaceous understory - up, but dominated by annuals

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 5

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron spicatum	1	2	-	1	1	-	-
G	Aristida purpurea	_a 16	_a 20	_b 33	8	10	17	2.83
G	Bromus tectorum (a)	-	-	370	-	-	99	24.87
G	Oryzopsis hymenoides	-	-	7	-	-	3	.09
G	Poa secunda	_a 57	_a 31	_b 105	27	16	38	3.07
G	Sporobolus cryptandrus	3	3	6	2	1	2	.38
G	Stipa comata	1	4	4	1	2	1	.15
Total Annual Grasses		0	0	370	0	0	99	24.87
Total Perennial Grasses		78	60	155	39	30	61	6.53
F	Calochortus nuttallii	1	2	-	1	1	-	-
F	Euphorbia spp.	-	-	2	-	-	2	.04
F	Lactuca serriola	_a -	_b 40	_a 3	-	21	2	.76
F	Phlox longifolia	-	1	-	-	1	-	-
F	Salsola iberica (a)	_a -	_b 7	_c 46	-	5	19	3.00
F	Sisymbrium altissimum (a)	-	-	24	-	-	11	.26
F	Sphaeralcea parvifolia	_a -	_{ab} 4	_b 18	-	3	8	.81
F	Tragopogon dubius	-	-	2	-	-	1	.03
F	Unknown forb-annual	-	-	176	-	-	68	11.29
F	Unknown forb-perennial	3	9	12	1	4	5	.15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
	Total Annual Forbs	0	7	70	0	5	30	3.26
	Total Perennial Forbs	4	56	213	2	30	86	13.09

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

BROWSE TRENDS --

Herd unit 21 , Study no: 5

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	0	-
B	Ephedra nevadensis	0	-
B	Gutierrezia sarothrae	20	1.46
Total for Browse		20	1.46

BASIC COVER --

Herd unit 21 , Study no: 5

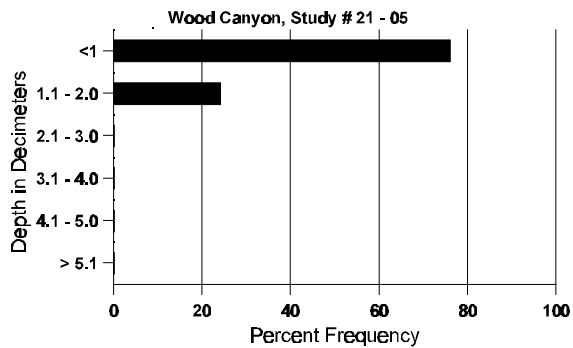
Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	379	1.00	1.00	46.70
Rock	154	13.00	20.00	12.26
Pavement	182	9.75	8.50	3.49
Litter	389	63.00	54.00	49.37
Cryptogams	86	3.00	0	.97
Bare Ground	241	10.25	16.50	11.80

SOIL ANALYSIS DATA --

Herd Unit 21, Study # 05, Study Name: Wood Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.6	78.6 (14.6)	7.2	60.9	23.8	15.3	2.2	11.6	201.6	.9

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 5

Type	Quadrat Frequency '98
Sheep	1
Deer	2
Cattle	6

BROWSE CHARACTERISTICS --

Herd unit 21 , 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 wyomingensis</i>																		
Y	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	30	1	-	-	-	-	-	-	-	31	-	-	-	2066	26 32	31	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	85	21	-	-	-	-	-	-	-	-	16	-	4	1	1400		21	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		02%			00%			09%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	3599	Dec:	39%			
												'91	0		0%			
												'98	0		0%			
<i>Ephedra nevadensis</i>																		
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	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												
Gutierrezia sarothrae																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33	9	11
	98	38	15	-	-	-	-	-	-	2	-	-	55	-	1100	11	14
D	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%			-75%						
'91		00%			00%			00%			+97%						
'98		27%			05%			98%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	132	Dec:	50%				
										'91	33		0%				
										'98	1120		0%				

Trend Study 21-6-98

Study site name: "M" Hill .

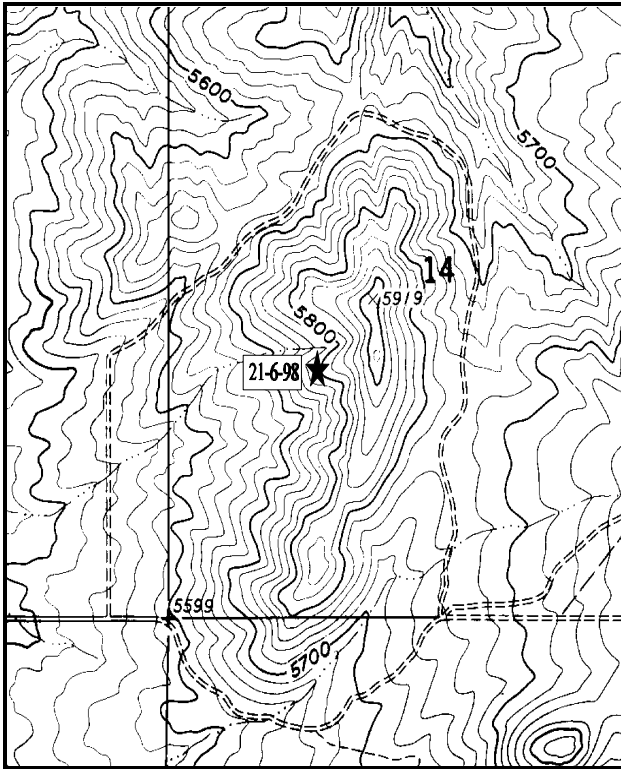
Range type: Chained, Cabled-Seeded P-J .

Compass bearing: frequency baseline 180 degrees.

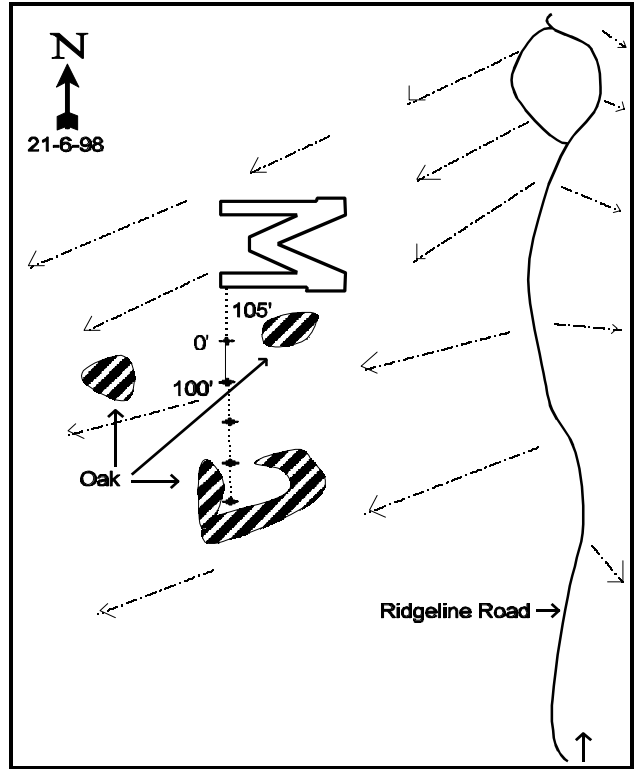
Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

The transect is located near the "M" on the hill northeast of Fillmore. Starting at the junction of 500 North and Main in Fillmore, go east 3.0 miles, staying on the main road past the dump and east of "M" Hill. Turn left through a cattleguard and left again after 100 feet. Go 0.25 miles. Turn left and go 0.2 miles up to the top of the hill. Turn right. Drive 0.25 miles to the top of the ridge above the "M". The frequency baseline starts 105 feet true south of the bottom of the south leg of the concrete "M". The baseline and the density plots are marked by 2 ½ foot tall steel rebar. The 0-foot baseline stake is tagged #7112.



Map Name: Fillmore, Utah



Diagrammatic Sketch

Township 21S, Range 4W, Section 14

UTM 4315599.441 N, 389878.181 E

DISCUSSION

Trend Study No. 21-6 (41-1)

The "M" Hill trend study is located on DWR land on the first large hill east of Fillmore. Further east, there is about two miles of rolling juniper-covered foothills below the 7,000 foot winter range limit. There is some development of homes on private land in the foothills above the transect. Elevation of the study site is 5,800 feet with a slope of 30% and an aspect to the west. The site was chained more than 30 years ago and is now dominated by a mixture of shrubs. Cattle grazing was heavy in the past, but current pressure is light. Deer use appeared to be moderate to heavy in the past. Pellet group data from 1998 estimate 23 deer, 6 elk, and 6 cow use days/acre. Ample cover is available on the site from oak and juniper.

Soil on the site is moderately deep with an effective rooting depth (see methods) estimated at almost 14 inches. Texture is a loam with a neutral pH (6.9). Phosphorus is 8.4 ppm, which is below what is thought necessary for normal plant development (10 ppm). Rock and especially pavement are abundant on the surface averaging about 30% cover between 1985 and 1998. Rocks and gravel are also common through the profile. There is some soil movement down slope, but erosion is low due to the abundant protective ground cover.

The browse composition is dominated by Gambel oak and Utah juniper with smaller amounts of true mountain mahogany, Stansbury cliffrose, Antelope bitterbrush, and mountain big sagebrush. The dense patches of oak, averaging over 4 feet in height, have a high percentage of young plants and appear to be increasing. Deer have moderately hedged the outer boundary of the oak clones and 21% of the plants were severely defoliated by grasshoppers in 1985. Herbaceous understory species and mountain mahogany were also heavily impacted by grasshoppers that year. Density of oak remained similar between 1985 and 1991, but declined 62% by 1998 primarily due to the much larger sample used giving improved accuracy for estimating shrub densities. Point quarter data from 1998 estimate a density of 121 juniper trees/acre with an average diameter of nearly 7 inches. Overhead canopy cover averages 11% for juniper and 6% for oak. Usually as little as 10% juniper canopy cover can reduce understory production by as much as 35-40%.

True mountain mahogany and cliffrose are the most preferred deer forage, although they occur in relatively low densities (260 and 160 plants/acre respectively). Both species receive browsing use were available, but they are slowly growing out of reach. Understory shrubs include small numbers of mountain big sagebrush, rubber rabbitbrush, and prickly pear cactus. Broom snakeweed is also present and has increased from only 66 plants/acre in 1985 to 1,740 plants/acre by 1998. Prickly phlox is also abundant and displays the same increasing trend from very few in 1985 to 3,400 plants/acre in 1998. Much of the increase for both of these species is due to the much larger sampling design picking up more of the plants. However, age class composition indicates they have increasing populations.

The herbaceous understory is diverse and moderately abundant. Perennial grasses are dominated by bluebunch wheatgrass which accounts for 72% of the grass cover. Other common grasses include annual cheatgrass and Sandberg bluegrass. Forbs are very abundant with 20 species encountered in 1998. However, composition is dominated by poor forage species which includes: pale alyssum, rock goldenrod, and desert phlox. These species provide 81% of the forb cover. There are few desirable forbs present, but penstemon, lobeleaf groundsel, and heartleaf twistflower receive some use from wildlife.

1985 APPARENT TREND ASSESSMENT

Soil erosion is ongoing and there appears to be heavy losses in some open spots in the past. Presently, there is a variety of desirable browse species, but the spreading oak brush, lack of young plants, and increasing unavailability due to height of the key species indicates a downward trend in terms of deer winter range.

1991 TREND ASSESSMENT

None of the basic cover measurements changed significantly since 1985. Vegetative basal cover has decreased slightly, down to 6%. Rock/pavement cover has decreased from 30% to 27%. Litter cover has increased to 47%, while percent bare ground has increased slightly from 20% to 21%. Soil trend for the site is considered stable, but percent bare ground should be monitored closely. Key browse for the area is Gambel oak and true mountain mahogany. Because of its high density (7,932 plants/acre), oak is the most important browse which has decreased by 5% since 1985, while percent decadency has increased to 17%. The more highly preferred browse, mahogany, is in such low numbers (266 plants/acre) that it would be utilized well before winter has set in. Trend for browse is stable. There are not many grass species on the site. The most abundant species is bluebunch wheatgrass with a quadrat frequency of 75%. Of the 13 species of forbs, only five have quadrat frequencies that exceed 10%. Surprisingly, the forbs also demonstrated an increase in sum of nested frequency values. Trend for herbaceous understory is slightly improving.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly improving

1998 TREND ASSESSMENT

Trend for soil is up with a major decline in cover of bare ground from 21% to 9%. Rock and pavement cover also increased as did litter cover. Erosion does not appear to be a serious problem on this site at this time. Trend for browse is stable. The preferred species, true mountain mahogany and cliffrose have small but stable populations. Mahogany displays light use and low decadence while cliffrose is moderately utilized. Gambel oak is the dominant browse on the site. Density has declined since 1991, but most of the change is due to the larger sample size used in 1998. Density of mature plants has remained similar (1,866 vs 1,600) but the number of young has declined by four fold (5,600 in 1991 to 1,400 in 1998). Utilization is light to moderate, vigor good, and percent decadence low at only 1%. Trend for the herbaceous understory is stable with similar sum of nested frequency values for grasses and forbs compared to 1991. However, forb cover is dominated by poor value species including: rock golden rod, desert phlox, and pale alyssum.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron spicatum	169	207	198	63	75	67	8.30
G	Bromus japonicus (a)	-	-	14	-	-	5	.19
G	Bromus tectorum (a)	-	-	175	-	-	64	1.99
G	Oryzopsis hymenoides	-	1	2	-	1	2	.38
G	Poa fendleriana	-	-	-	-	-	-	.00
G	Poa secunda	33	17	37	15	11	16	.52
G	Sitanion hystrix	-	5	7	-	3	3	.06
Total Annual Grasses		0	0	189	0	0	69	2.18
Total Perennial Grasses		202	230	244	78	90	88	9.29

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	<i>Agoseris glauca</i>	-	-	7	-	-	3	.01
F	<i>Alyssum alyssoides</i> (a)	-	-	234	-	-	75	1.81
F	<i>Arabis</i> spp.	-	3	1	-	1	1	.01
F	<i>Astragalus</i> spp.	-	22	19	-	11	9	.16
F	<i>Cirsium</i> spp.	-	-	3	-	-	2	.06
F	<i>Cryptantha</i> spp.	12	14	6	9	10	4	.08
F	<i>Descurainia pinnata</i> (a)	-	-	24	-	-	9	.07
F	<i>Draba</i> spp. (a)	-	-	3	-	-	1	.00
F	<i>Erodium cicutarium</i> (a)	-	-	1	-	-	1	.01
F	<i>Galium multiflorum</i>	-	-	44	-	-	17	.50
F	<i>Lactuca serriola</i>	-	1	11	-	1	5	.05
F	<i>Linum lewisii</i>	-	5	4	-	2	2	.06
F	<i>Machaeranthera canescens</i>	_a 3	_b 24	_a -	2	11	-	.00
F	<i>Microsteris gracilis</i> (a)	-	-	26	-	-	9	.12
F	<i>Penstemon eatoni</i>	-	-	-	-	-	-	.00
F	<i>Penstemon</i> spp.	9	5	9	5	2	4	.04
F	<i>Petradoria pumila</i>	_{ab} 94	_b 119	_a 70	38	49	30	2.92
F	<i>Phlox austromontana</i>	_a 13	_b 53	_{ab} 40	8	24	15	1.94
F	<i>Physaria chambersii</i>	-	-	4	-	-	2	.03
F	<i>Phlox longifolia</i>	_a -	_a -	_b 22	-	-	8	.14
F	<i>Ranunculus testiculatus</i> (a)	-	-	8	-	-	3	.01
F	<i>Senecio multilobatus</i>	10	-	-	8	-	-	-
F	<i>Streptanthus cordatus</i>	6	9	14	2	5	6	.21
F	<i>Tragopogon dubius</i>	-	2	-	-	1	-	.00
F	Unknown forb-perennial	-	2	-	-	1	-	-
Total Annual Forbs		0	0	296	0	0	98	2.02
Total Perennial Forbs		147	259	254	72	118	108	6.27

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

BROWSE TRENDS --
Herd unit 21 , Study no: 6

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata vaseyana	8	1.05
B	Cercocarpus montanus	11	3.50
B	Chrysothamnus nauseosus hololeucus	0	-
B	Cowania mexicana stansburiana	8	1.56
B	Gutierrezia sarothrae	23	1.33
B	Juniperus osteosperma	8	6.07
B	Leptodactylon pungens	19	1.27
B	Opuntia spp.	0	-
B	Quercus gambelii	24	8.83
Total for Browse		101	23.63

CANOPY COVER --
Herd unit 21 , Study no: 6

Species	Percent Cover '98
Cercocarpus montanus	.40
Juniperus osteosperma	11
Quercus gambelii	6

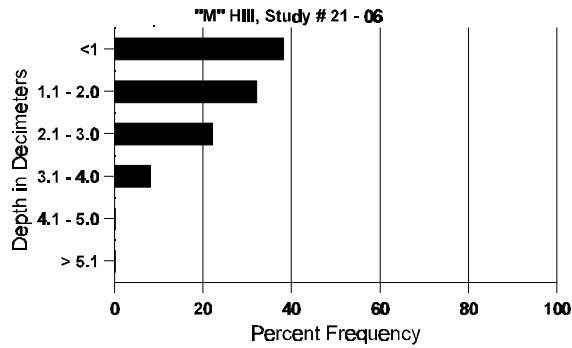
BASIC COVER --
Herd unit 21 , Study no: 6

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	360	7.75	6.00	41.14
Rock	249	13.50	14.00	11.11
Pavement	251	15.75	12.75	22.61
Litter	394	43.50	46.75	53.05
Cryptogams	14	0	0	.10
Bare Ground	152	19.50	20.50	9.09

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 06, Study Name: "M" Hill

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.9	54.0 (16.9)	6.9	51.2	27.4	21.3	4.0	8.4	89.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 6

Type	Quadrat Frequency '98
Rabbit	16
Elk	3
Deer	16

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 6

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia tridentata vaseyana</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	4	1	-	2	-	-	2	-	-	9	-	-	-	180	31	38	9
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		09%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	0		0%			
												'98	220		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					
Cercocarpus montanus													
S	85	1	-	-	-	-	-	-	1	66		1	
	91	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	1	-	-	80		4	
Y	85	1	-	-	-	-	-	-	-	66		1	
	91	-	1	-	-	-	-	-	-	66		1	
	98	6	-	-	-	-	1	-	-	140		7	
M	85	1	1	-	1	-	-	-	-	200	69 35	3	
	91	-	-	-	-	2	-	1	-	200	87 70	3	
	98	3	-	-	1	-	-	1	-	100	56 55	5	
D	85	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'85		25%		00%		25%		+ 0%					
'91		75%		00%		00%		- 2%					
'98		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	266	Dec:	0%
										'91	266		0%
										'98	260		8%
Chrysothamnus nauseosus hololeucus													
M	85	-	-	-	-	-	-	-	-	0	- -	0	
	91	-	-	-	-	-	-	-	-	0	- -	0	
	98	-	-	-	-	-	-	-	-	0	12 15	0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'85		00%		00%		00%							
'91		00%		00%		00%							
'98		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-
										'91	0		-
										'98	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>Cowania mexicana stansburiana</i>											
S	85	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	20		1
M	85	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	0	-	-	0
	98	1	3	-	-	-	-	1	5	-	5
D	85	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	0		0	
	98	-	3	-	-	-	-	-	3	-	3
X	85	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'85		00%		00%		00%					
'91		00%		00%		00%					
'98		75%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'85	0	Dec:	0%	
							'91	0		0%	
							'98	160		38%	
<i>Gutierrezia sarothrae</i>											
S	85	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	0		0	
	98	4	-	-	-	-	-	-	80		4
Y	85	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	66		1	
	98	11	-	-	-	-	-	220		11	
M	85	-	-	-	-	-	-	0	-	-	0
	91	3	-	-	-	-	-	200	12	10	3
	98	76	-	-	-	-	-	1520	11	11	76
D	85	1	-	-	-	-	-	66		1	
	91	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'85		00%		00%		00%		+75%			
'91		00%		00%		00%		+85%			
'98		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'85	66	Dec:	100%	
							'91	266		0%	
							'98	1740		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				
Juniperus osteosperma												
S	85	1	-	-	-	-	-	-	1	66		1
	91	1	-	-	-	-	-	-	1	66		1
	98	-	-	-	-	-	-	-	-	0		0
Y	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	1	-	-	-	2	40		2
M	85	2	-	-	-	-	-	-	2	133	69 71	2
	91	1	-	-	1	-	-	-	2	133	157 197	2
	98	4	-	-	-	-	-	1	5	100	- -	5
D	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	1	20		1
X	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	80		4
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		00%		00%		00%		+ 0%				
'91		00%		00%		00%		+17%				
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'85	133	Dec:	0%			
						'91	133		0%			
						'98	160		13%			
Leptodactylon pungens												
S	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	1	20		1
Y	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	14	-	-	-	-	-	-	14	280		14
M	85	-	-	-	-	-	-	-	-	0	- -	0
	91	7	-	-	-	-	-	-	7	466	8 10	7
	98	134	-	-	1	-	-	-	135	2700	2 6	135
D	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	21	-	-	-	-	-	-	21	420		21
X	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		00%		00%		00%		+86%				
'91		00%		00%		00%						
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	0%			
						'91	466		0%			
						'98	3400		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				
Opuntia spp.																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	15	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	0		-			
Quercus gambelii																		
S	85	57	-	-	-	-	-	-	-	-	40	17	-	-	3800			57
	91	3	-	-	-	-	-	3	-	-	6	-	-	-	400			6
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	85	79	-	-	-	-	-	-	-	-	72	7	-	-	5266			79
	91	65	7	-	5	-	-	7	-	-	84	-	-	-	5600			84
	98	27	-	-	14	-	-	29	-	-	70	-	-	-	1400			70
M	85	46	-	-	-	-	-	-	-	-	31	15	-	-	3066	35	17	46
	91	15	7	-	5	-	-	1	-	-	28	-	-	-	1866	60	33	28
	98	45	29	-	1	-	-	5	-	-	80	-	-	-	1600	51	41	80
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	5	1	-	1	-	-	-	-	-	2	-	-	5	466			7
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	660			33
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			- 5%							
'91		13%			00%			04%			-62%							
'98		19%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	8332	Dec:	0%			
												'91	7932		6%			
												'98	3020		1%			

Trend Study 21-7-98

Study site name: Bennet Field .

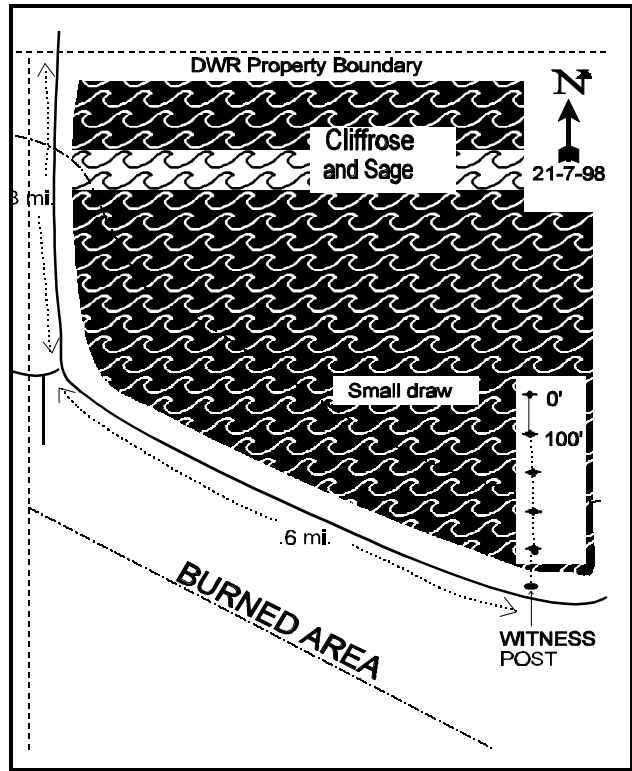
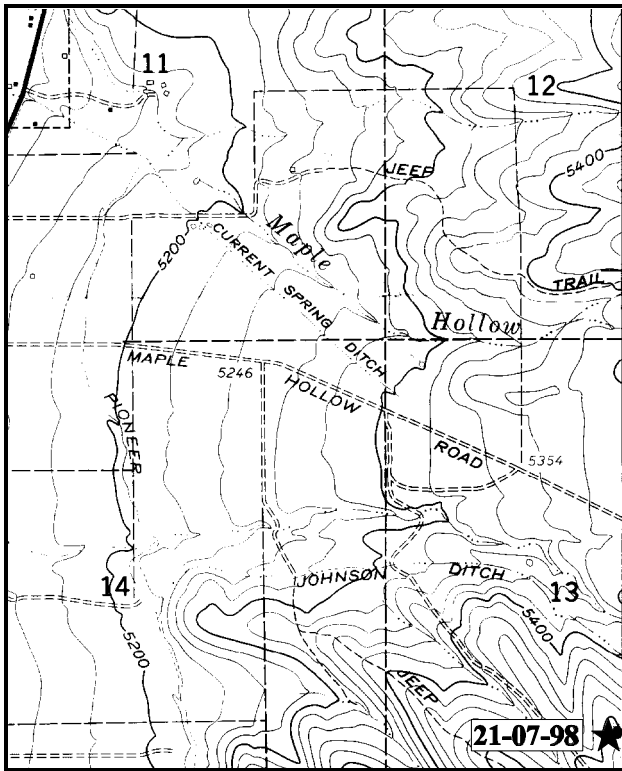
Range type: Chained, Railed Shrubland .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Take the I-15 exit #174 south of Holden. From the interchange proceed 0.9 miles straight east on a dirt road (towards Maple Canyon). Just after the cattle guard, turn right. Go 0.1 miles to a gate to DWR property. Proceed 0.3 miles down across a wash and over to a 3-way split. Follow the main road which bends to the left. Go 0.6 miles near the top of a small ridge. There is a witness post (steel rebar 3 feet tall) on the left side of the road. The 400- foot stake is 30 feet away from the witness post, bearing 360 degrees true. The frequency baseline starts 400 feet further north and the 0-foot stake is tagged #7184.



Map Name: Holden, Utah

Diagrammatic Sketch

Township 20S, Range 4W, Section 13

UTM 4325075.102 N, 39179.389 E

DISCUSSION

Trend Study No 21-7 (41-2)

The Bennet Field study is located on Division land two miles southeast of Holden. The slope is 10%-15% with a west aspect and elevation of 5,500 feet. It was chained in 1958 and is now dominated by basin big sagebrush, cliffrose, and scattered juniper. Much of the land to the south and west was burned by a wildfire several years ago and now the understory is dominated by cheatgrass. Livestock grazing was heavy in the past, but forage for livestock is quite limited at present except for cheatgrass in the spring. Deer use is heavy during the winter and spring. Pellet groups are abundant on the site, and especially dense around the cliffrose where they literally cover the ground. Pellet group data from 1998 estimate a very high level of deer use at 131 deer days use/acre. A few elk pellet groups were encountered but there were no signs of cattle use in 1998. A thick stand of juniper 1/4 mile to the northeast provides escape and thermal cover. On the site, point quarter data estimates juniper density at 24 trees/acre with an average diameter of 3.5 inches.

Soil on the site is moderately shallow with an effective rooting depth (see methods) estimated at just over 10 inches. Due to the presence of basin big sagebrush, a deep rooted species, effective rooting depth estimates are most likely underestimated because of rock and a hardpan. It was reported in 1985 that a hard pan was present about 1½ feet in depth. This layer must not be a rooting barrier but it obviously obstructed soil penetrometer readings. Rock and pavement are not particularly abundant on the surface, averaging only 8% cover, but rock is abundant throughout the profile. Presently, erosion is negligible due to the high amounts of vegetation and litter cover.

The site supports a variety of shrubs. Overstory species include Stansbury cliffrose and Utah juniper with a moderately dense stand of basin big sagebrush found in the understory. Density of sagebrush has remained around 3,000 plants/acre in 1985 and 1991. Currently, there is an estimated 1,960 plants/acre which provide just over 10% cover, or 67% of the browse cover. The change in density is partly due to the much larger sample size used in 1998. Sagebrush is vigorous and lightly to moderately browsed. Individual plants adjacent to cliffrose have sustained heavier use. There are very few young sagebrush and no seedlings encountered during any of the readings. Percent decadence has also risen with each reading to its highest value ever recorded (41%).

The cliffrose is definitely the preferred species. It has been heavily hedged to the height that deer can reach. Many are tall (over 8 feet) trees, and much of the new growth would be unavailable to deer. Utilization was extremely heavy in 1985 when 86% of the cliffrose were classified as heavily hedged. Grasshoppers did a lot of damage that year to the new growth on the cliffrose, completely stripping the twigs of leaves. Current use is light to moderate. Broom snakeweed was also totally defoliated in 1985 and a majority of the plants were classified as decadent. Snakeweed increased in density by 68% in 1991, with 80% of the plants classified as mature. It currently numbers 1,080 plants/acre.

The herbaceous understory is dominated by cheatgrass which accounts for 86% of the grass cover. There is very little perennial herbaceous vegetation. Sandberg bluegrass is the most abundant perennial grass but as the plants are very small, forage production is low. Forbs consist almost entirely of pale alyssum which provides 93% of the forb cover ('98). No perennial forbs were found in 1985, but a few were encountered in 1991 and 1998. Grasshopper damage on the grasses was very heavy in 1985. Eighty-eight percent of the herbaceous understory cover is contributed by two annuals, cheatgrass and pale alyssum, making the composition very poor for the herbaceous understory.

1985 APPARENT TREND ASSESSMENT

The soil is moderately deep and has a low water holding capacity because of its coarseness, but erosion is minimal. Soil is building under the junipers and other browse species. Overall, the soil trend is stable with a declining vegetative trend. Basin big sagebrush is vigorous, but there is little reproduction. The cliffrose has sustained heavy hedging and insect damage. It is largely unavailable due to height and reproduction is low. Forage production by herbaceous species is negligible. The absence of productive grasses and forbs and the declining productivity of the browse species makes this site a leading candidate for revegetation work in the future.

1991 TREND ASSESSMENT

Basic cover characteristics have changed, but not all changes are improvements. Basal vegetative cover decreased substantially from 6% down to only about 2%. Rock and pavement cover decreased from 15% to 11%. Percent litter has increased, mostly from cheatgrass, from 62% to 74%. Percent bare ground has decreased to 10%. Even though vegetative cover has decreased, this is more than compensated for by increases in litter cover and decreases in percent bare ground. Trend for soils is stable at this time, but a wildfire could change this dramatically in a very short time because of the high amounts of cheatgrass in the community. Browse trend would be considered downward because both the sagebrush and cliffrose populations decreased through this period with accompanying increases in percent decadency. Broom snakeweed increased by 68% since 1985. There are not many species found in the understory and only two perennial grass species, bluebunch wheatgrass and Sandberg bluegrass, were encountered. Sandberg bluegrass is the only common species (91% quadrat frequency). Bluebunch wheatgrass was not found on this site until 1991. This situation has been noted in many other communities with bluebunch wheatgrass increasing on many sites during this extended drought. There were no perennial forbs sampled in 1985, but now there are six species on the site. Trend for herbaceous understory is slightly improving, but still in poor condition with very few perennial species and in very low numbers.

TREND ASSESSMENT

soil - stable

browse - downward

herbaceous understory - slightly improving, but still poor condition because of the domination of annuals, especially cheatgrass

1998 TREND ASSESSMENT

Trend for soil is stable. Percent cover for bare ground has declined from 10% to 6%, but litter cover has also decreased from 74% to 70%. Trend for browse is down slightly. Basin big sagebrush shows a steady increase in decadence and a lack of adequate reproduction. In addition, dead sagebrush which were first counted in 1998, are abundant at 660 plants/acre with a dead to live ratio of 1:3, or 25% are dead. The cliffrose is more stable but recruitment is limited and mature plants are becoming increasingly less available to browsing due to height. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency of perennial grasses and forbs. Nested frequency of Sandberg bluegrass declined significantly. Cheatgrass and pale alyssum dominate the understory by providing 88% of the herbaceous cover. Perennial forbs are rare.

TREND ASSESSMENT

soil - stable

browse - down slightly

herbaceous understory - down slightly, totally dominated by cheatgrass and annual forbs

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron spicatum	a-	b17	c39	-	6	19	.96
G	Bromus japonicus (a)	-	-	3	-	-	1	.00
G	Bromus tectorum (a)	-	-	321	-	-	89	27.62
G	Poa bulbosa	a-	a-	b4	-	-	4	.04
G	Poa secunda	b241	a251	a165	91	91	70	3.45
G	Secale cereale (a)	-	-	2	-	-	1	.00
G	Sitanion hystrix	a-	a-	b9	-	-	4	.09
Total Annual Grasses		0	0	326	0	0	91	27.92
Total Perennial Grasses		241	268	217	91	97	97	4.27
F	Alyssum alyssoides (a)	-	-	341	-	-	98	12.89
F	Allium spp.	-	-	4	-	-	1	.15
F	Calochortus nuttallii	a-	b17	a-	-	10	-	-
F	Castilleja spp.	-	-	2	-	-	1	.03
F	Cirsium spp.	-	2	-	-	2	-	-
F	Crepis acuminata	-	3	-	-	1	-	-
F	Erodium cicutarium (a)	-	-	51	-	-	21	.13
F	Lactuca serriola	-	-	2	-	-	1	.00
F	Linum lewisii	a-	a1	b6	-	1	4	.10
F	Lomatium spp.	-	5	-	-	4	-	-
F	Petradordia pumila	-	-	4	-	-	2	.41
F	Phlox longifolia	a-	b13	a1	-	7	1	.01
F	Tragopogon dubius	-	-	6	-	-	3	.21
Total Annual Forbs		0	0	392	0	0	119	13.02
Total Perennial Forbs		0	41	25	0	25	13	0.91

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

BROWSE TRENDS --
Herd unit 21 , Study no: 7

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata tridentata	71	10.39
B	Chrysothamnus viscidiflorus viscidiflorus	1	-
B	Cowania mexicana stansburiana	14	4.11
B	Gutierrezia sarothrae	32	.81
B	Juniperus osteosperma	2	.15
Total for Browse		120	15.47

CANOPY COVER --
Herd unit 21 , Study no: 7

Species	Percent Cover '98
Cowania mexicana stansburiana	3
Juniperus osteosperma	1

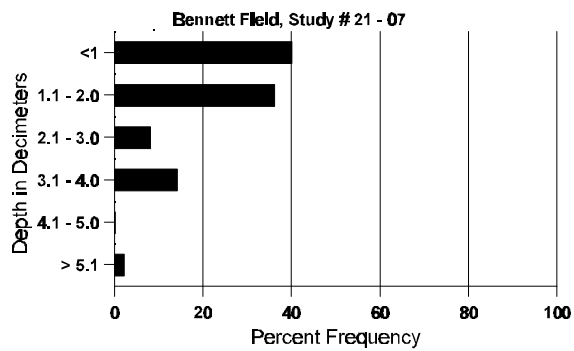
BASIC COVER --
Herd unit 21 , Study no: 7

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	392	6.00	2.25	54.45
Rock	108	2.50	4.25	2.92
Pavement	142	11.75	7.25	5.23
Litter	396	62.00	74.25	70.33
Cryptogams	87	0	2.25	2.04
Bare Ground	168	17.75	9.75	5.70

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 07, Study Name: Bennet Field

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.6	59.8 (11.4)	6.9	48.7	27.7	23.6	3.2	7.5	140.8	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 7

Type	Quadrat Frequency '98
Rabbit	20
Elk	1
Deer	57
Cattle	3

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 7

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 tridentata																		
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	85	22	15	1	-	-	-	-	-	-	37	-	1	-	2533	33	32	38
	91	15	10	1	2	1	-	-	-	-	28	-	1	-	1933	28	27	29
	98	40	13	1	1	-	-	-	-	-	53	2	-	-	1100	35	42	55
D	85	3	7	1	-	-	-	-	-	-	11	-	-	-	733			11
	91	7	4	-	3	-	-	-	-	-	11	-	-	3	933			14
	98	26	12	2	-	-	-	-	-	-	28	-	4	8	800			40
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	660			33
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		44%			04%			02%			-10%							
'91		33%			02%			09%			-35%							
'98		26%			03%			12%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	3332	Dec:	22%			
												'91	2999		31%			
												'98	1960		41%			
Chrysothamnus viscidiflorus viscidiflorus																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	18	31	1
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	8	10	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%			- 9%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	66		-			
												'98	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		1	2									
<i>Cowania mexicana stansburiana</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	1	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	85	-	-	2	-	-	1	-	-	2	-	1	-	200	60	46	3
	91	2	-	-	-	-	-	-	-	2	-	-	-	133	26	21	2
	98	11	4	-	1	-	-	-	2	18	-	-	-	360	77	69	18
D	85	-	1	3	-	-	-	-	-	2	1	1	-	266		4	
	91	1	-	1	-	-	-	2	-	4	-	-	-	266		4	
	98	1	1	-	-	-	-	-	1	3	-	-	-	60		3	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		14%		86%		29%		-14%									
'91		00%		17%		00%		+17%									
'98		21%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	466	Dec:	57%				
										'91	399		67%				
										'98	480		13%				
<i>Gutierrezia sarothrae</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	5	-	-	-	-	-	-	-	5	-	-	-	333		5	
	98	12	-	-	-	-	-	-	-	12	-	-	-	240		12	
M	85	2	-	-	-	-	-	-	-	-	2	-	-	133	9	7	2
	91	20	-	-	-	-	-	-	-	20	-	-	-	1333	10	9	20
	98	41	-	-	-	-	-	-	-	41	-	-	-	820	10	10	41
D	85	6	-	-	-	-	-	-	-	-	6	-	-	400		6	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		00%		00%		+68%									
'91		00%		00%		00%		-35%									
'98		00%		00%		02%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	533	Dec:	75%				
										'91	1666		0%				
										'98	1080		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				
Juniperus osteosperma																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1
D	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	0		0%			
												'98	40		50%			

Trend Study 21-8-98

Study site name: Smiths Ridge .

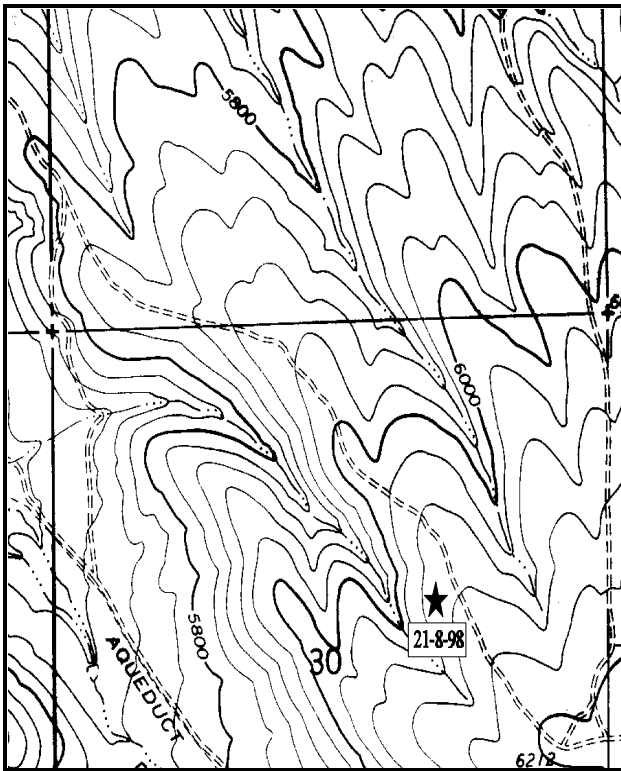
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

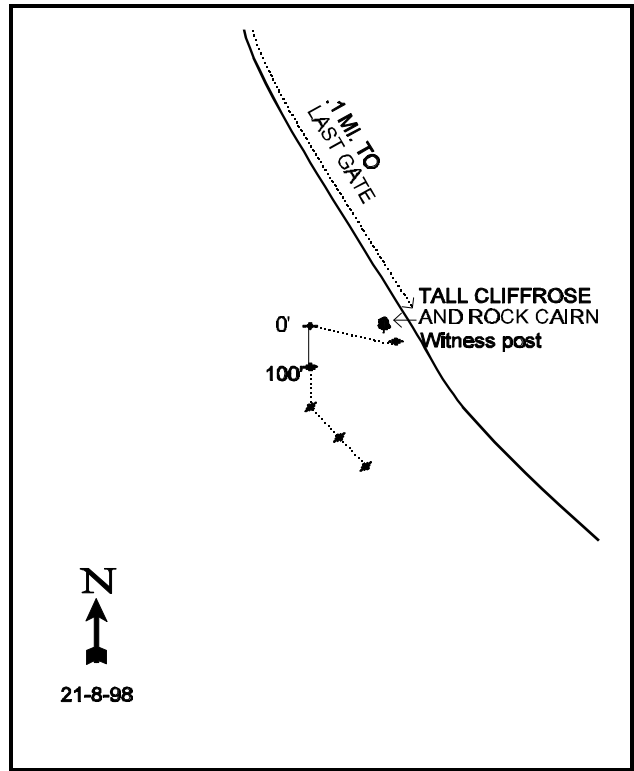
LOCATION DESCRIPTION

From exit #174 on I-15 south of Holden, proceed to the east side of the freeway, then east on the Maple Canyon Road for 0.9 miles to a cattleguard. Just beyond the cattle guard turn right and go 0.1 miles to DWR property. Proceed 0.3 miles across a wash and to a 3-way split in the road. Stay left and go 0.6 miles to the Bennet Field transect. Continue 0.4 miles from there to a gate at the eastern boundary of DWR property. Go another 0.7 miles through 2 more gates to a fork. Turn left and go 0.9 miles to a gate. Go 0.1 mile past the gate and stop by a large cliffrose 6 feet off the right side of the road. The cliffrose has a small rock pile under it, which marks the start of a pellet group transect, and a witness post next to it. The frequency baseline starts 100 feet due west of the cliffrose. The 0-foot stake is a 3 foot rebar with a browse tag #7072 attached.



Map Name: Coffee Peak, Utah

Township 20S, Range 23W, Section 30



Diagrammatic Sketch

UTM 4322424.366 N, 393869.639 E

DISCUSSION

Trend Study No. 21-8 (41-3)

The Smith's Ridge study is located on the gently sloping foothills of the Pahvant Range. Slope is 8-10% with a west aspect and an elevation of 6,100 feet. This area is part of the extensive Division chainings completed in the late 1950's and early 1960's. It is now classified as a mixed browse type. Herbaceous vegetation has been depleted by heavy early season cattle grazing. AUMs were reduced from 143 in 1977 to 124 in 1984. Currently, there is no sign of livestock grazing on the site. Winter deer use is moderately heavy. The Upper Smith pellet transect, which is located nearby, shows a fairly consistent trend with an average of 63 deer days use/acre between 1981 and 1985 (Jense et al. 1985). Between 1986 and 1991, average deer days use/acre had gone down to 43 (Jense 1991). Pellet group data taken in 1998 estimate 70 deer and 28 elk use days/acre. Most of these pellet groups were from winter or early spring.

Soil on the site is relatively shallow with an estimated effective rooting depth (see methods) of only 9 inches. Texture is a sandy loam with a moderately acid pH (5.7). The soil is very rocky throughout the profile. In the shrub interspaces, there are areas of exposed rock and soil. Pavement and rock currently combine to produce 13% cover on the soil surface ('98). Due to the rocky nature of the soil, combined with the high sand content and west aspect, the average soil temperature is relatively high at 74°F at an average depth of just over 10 inches. This dry hot soil condition gives the competitive advantage to winter annuals like cheatgrass and pale alyssum. Some limited erosion occurs, but is confined by adequate amounts of protective ground cover combined with the gentle terrain.

The mixed mountain brush type on Smith's Ridge is composed of a limited number of desirable species. Key browse species include: mountain big sagebrush, bitterbrush, and cliffrose. Sagebrush currently number an estimated 2,040 plants/acre ('98). Utilization has been light to moderate since 1985. Vigor is good and percent decadence has declined from a high of 60% in 1985 to 14% in 1998. Reproduction is currently adequate to maintain the stand. Bitterbrush numbers are estimated at 600 plants/acre in 1998. Mature plants are large averaging nearly 4 feet in height with a crown diameter of over 7 feet. Utilization has been mostly moderate in 1985 and 1991, but more classified as heavy in 1998. Vigor is currently good with no decadent plants sampled in 1998. Reproduction is limited with few young plants and no seedlings sampled. Density of cliffrose is relatively low at only 220 plants/acre in 1998. Some of the mature plants are growing out of reach to deer. Utilization has been mostly moderate since 1985, yet vigor continues to be good and percent decadence low. Reproduction is and has been poor since study establishment in 1985. The cliffrose and bitterbrush were reported to be hybridizing in 1985. This is commonly observed in the Holden area.

Though not as visually prominent as the larger species, broom snakeweed has the highest browse density currently at 3,160 plants/acre ('98), however it only provides 6% of the browse cover. Density of this shrub has increased with each reading, and age structure would indicate a slightly expanding population.

With the exception of cheatgrass, the herbaceous understory is depleted. Perennial grasses are limited to a small number of Sandberg bluegrass, bluebunch wheatgrass, and bottlebrush squirreltail. These grasses have been heavily grazed by cattle in the past. Forbs are also scarce producing less than 1% cover and are dominated by annuals which make up the majority of the forb cover (70%).

1985 APPARENT TREND ASSESSMENT

In spite of poor vegetative cover, the soil appears to have minimal erosion and is basically stable. Because of the low density of plants and because few were sampled, it is difficult to assess trend for browse from the data. However, the site appears stable at present but is leaning toward a downward trend unless reproduction of the browse species improves. Browsing pressure from big game is moderate and sustainable, but a deferment or rest from cattle grazing would be very beneficial to the site. It is good winter range, with

adequate browse and cover, but it has a definite lack of herbaceous vegetation for spring green-up and erosion control.

1991 TREND ASSESSMENT

Basic cover features have shown positive improvements since 1985. Basal vegetative cover has gone from a low of 1% up to 5%. Rock-pavement cover has remained about the same at 10% with litter cover increasing to 75%. Percent bare ground is half what it was in 1985 (22% to 11%). Trend for soil is up. Key browse species in order of abundance are: mountain big sagebrush, antelope bitterbrush, and cliffrose. Mountain big sagebrush has actually increased in density with a decrease in number of decadent plants, while both cliffrose and bitterbrush demonstrated lower densities and increased rates of decadency. Trend for browse is slightly downward even with the increases for sagebrush and with a 50% reproductive potential for cliffrose. The herbaceous understory is mostly made up of grass species. Bluebunch wheatgrass has gone from 10% to 24% quadrat frequency. Sandberg bluegrass and bottlebrush squirreltail also demonstrated increases in their quadrat frequencies. There are few perennial forb species and all occur infrequently. Trend for herbaceous understory is slightly improving.

TREND ASSESSMENT

soil - up

browse - slightly downward

herbaceous understory - slightly improving, but still poor condition

1998 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has remained similar to 1991 estimates. Litter cover shows a significant decline, but this appears to be due to dried up cheatgrass being classified as litter instead of vegetation in 1991. Erosion is not a serious problem on the site. Trend for browse overall is up slightly. Mountain big sagebrush is receiving heavier use, but vigor is normal on most plants and percent decadence is down from 60% in 1985 to 30% in 1991, and only 14% in 1998. Dead plants, first sampled in 1998, are numerous at 600 plants/acre and it appears that the reduction in decadence is due to a die-off of decadent plants since 1985. Recruitment is currently good with enough young plants to replace decadent/dying plants. Bitterbrush are more heavily utilized in 1998, yet vigor has improved and percent decadence has declined from 50% to 0%. Cliffrose appears to have a relatively steady population with mostly moderate use and good vigor. Decadence has also declined from 50% in 1991 to 0% in 1998. Recruitment is currently adequate. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency of perennial grasses. All perennial grasses found on the site increased in nested frequency since 1991. Cheatgrass is still abundant however, making up 51% of the grass cover. Forbs are still limited and consist mostly of annuals.

TREND ASSESSMENT

soil - stable

browse - up slightly

herbaceous understory - slightly improving, but still poor condition because of the domination of annuals, especially cheatgrass

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron spicatum	a ₂₁	b ₆₁	b ₉₇	10	24	31	4.71
G	Bromus tectorum (a)	-	-	304	-	-	90	9.32
G	Poa bulbosa	a ₋	ab ₁	b ₁₄	-	1	4	.48
G	Poa secunda	a ₇₂	b ₁₁₉	b ₁₃₈	35	49	51	2.62
G	Sitanion hystrix	a ₁₃	a ₂₃	b ₅₇	5	10	24	1.20
Total Annual Grasses		0	0	304	0	0	90	9.32
Total Perennial Grasses		106	204	306	50	84	110	9.03
F	Agoseris spp.	a ₋	b ₁₆	a ₋	-	7	-	-
F	Alyssum alyssoides (a)	-	-	60	-	-	22	.28
F	Arabis spp.	a ₋	b ₉	ab ₇	-	4	3	.09
F	Astragalus spp.	-	-	3	-	-	1	.00
F	Calochortus nuttallii	-	4	2	-	3	1	.00
F	Chaenactis douglasii	b ₂₄	a ₋	a ₋	9	-	-	-
F	Erodium cicutarium (a)	-	-	4	-	-	2	.06
F	Lactuca serriola	a ₋	b ₉	a ₋	-	4	-	-
F	Linum lewisii	-	-	8	-	-	3	.04
F	Lomatium spp.	a ₋	b ₁₃	a ₋	-	6	-	-
F	Ranunculus testiculatus (a)	-	-	12	-	-	4	.04
F	Tragopogon dubius	-	-	3	-	-	1	.00
F	Zigadenus paniculatus	4	2	-	2	1	-	-
Total Annual Forbs		0	0	76	0	0	28	0.38
Total Perennial Forbs		28	53	23	11	25	9	0.16

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

BROWSE TRENDS --
Herd unit 21 , Study no: 8

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata vaseyana	55	6.17
B	Cowania mexicana stansburiana	8	5.19
B	Gutierrezia sarothrae	41	1.73
B	Juniperus osteosperma	5	5.94
B	Opuntia spp.	1	-
B	Purshia tridentata	18	8.60
B	Quercus gambelii	0	.53
B	Rhus glabra cismontana	3	-
B	Ribes spp.	1	-
Total for Browse		132	28.19

CANOPY COVER --
Herd unit 21 , Study no: 8

Species	Percent Cover '98
Cowania mexicana stansburiana	.80
Juniperus osteosperma	15

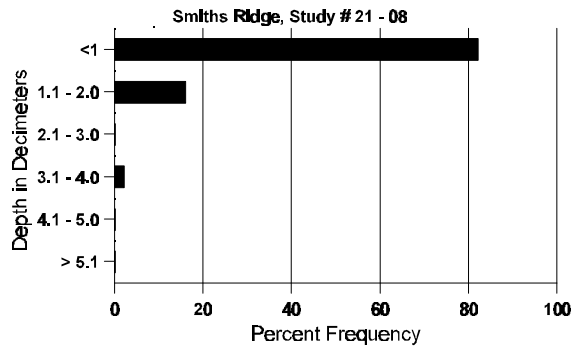
BASIC COVER --
Herd unit 21 , Study no: 8

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	360	1.00	4.75	45.84
Rock	135	5.25	6.75	5.48
Pavement	187	5.25	3.00	7.62
Litter	393	66.75	74.50	52.99
Cryptogams	111	.25	0	4.07
Bare Ground	177	21.50	11.00	11.92

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 08, Study Name: Smiths Ridge

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.9	74.0 (10.3)	5.7	62.0	19.4	18.6	3.5	12.0	76.8	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 8

Type	Quadrat Frequency '98
Rabbit	8
Elk	11
Deer	15

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 8

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Artemisia tridentata vaseyana</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	4	-	-	-	-	-	-	-	-	-	-	-	4	-	266	4
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	85	2	-	-	-	-	-	-	-	-	-	-	2	-	133		2
	91	8	-	-	-	-	-	1	-	-	-	9	-	600		9	
	98	14	-	-	-	-	-	-	-	-	-	14	-	280		14	
M	85	5	1	-	-	-	-	-	-	-	-	5	-	400	28 25	6	
	91	4	2	-	1	-	-	-	-	-	-	7	-	466	16 17	7	
	98	33	39	1	1	-	-	-	-	-	-	69	-	1480	20 27	74	
D	85	8	4	-	-	-	-	-	-	-	-	11	-	800		12	
	91	4	1	-	-	-	1	1	-	-	-	4	-	466		7	
	98	4	10	-	-	-	-	-	-	-	-	7	-	280		14	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	600		30	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		25%			00%			10%			+13%						
'91		13%			04%			13%			+25%						
'98		48%			.98%			12%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	1333	Dec:	60%		
												'91	1532		30%		
												'98	2040		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				
<i>Cowania mexicana stansburiana</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	-	3	-	1	-	-	-	-	-	4	-	-	-	266	68 81	4	
	91	-	-	-	-	1	-	-	1	-	2	-	-	-	133	142 53	2	
	98	1	7	-	1	-	-	-	-	-	9	-	-	-	180	56 106	9	
D	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	2	-	-	-	-	2	-	-	-	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		80%			00%			00%			-20%							
'91		75%			00%			00%			-17%							
'98		64%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	332	Dec:	20%			
												'91	266		50%			
												'98	220		0%			
<i>Gutierrezia sarothrae</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	98	31	-	-	-	-	-	-	-	-	31	-	-	-	620		31	
M	85	30	-	-	-	-	-	-	-	-	22	-	8	-	2000	13 12	30	
	91	34	-	-	-	-	-	-	-	-	34	-	-	-	2266	12 11	34	
	98	127	-	-	-	-	-	-	-	-	127	-	-	-	2540	10 13	127	
D	85	6	-	-	-	-	-	-	-	-	3	-	3	-	400		6	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			30%			+ 8%							
'91		00%			00%			00%			+16%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	2466	Dec:	16%			
												'91	2666		0%			
												'98	3160		0%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	85	1	-	-	1	-	-	-	-	-	2	-	-	-	133	69	109	2
	91	1	-	-	1	-	-	-	-	-	2	-	-	-	133	144	111	2
	98	2	-	-	2	-	-	-	1	-	5	-	-	-	100	-	-	5
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+ 0%							
'91		00%			00%			00%			-25%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	133	Dec:	-			
												'91	133		-			
												'98	100		-			
Opuntia spp.																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	17	0
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	0		0%			
												'98	20		100%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4		1	2	
Purshia tridentata									
Y	85	2	-	-	-	-	-	-	2
	91	-	-	-	-	-	-	-	0
	98	-	1	-	-	-	-	-	1
M	85	-	5	-	-	-	-	-	5
	91	-	-	-	2	-	-	-	2
	98	4	19	6	-	-	-	-	29
D	85	-	1	-	-	-	-	-	1
	91	1	-	-	1	-	-	1	2
	98	-	-	-	-	-	-	-	0
X	85	-	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	-	0
	98	-	-	-	-	-	-	-	20
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>				
'85		75%	00%	00%	-50%				
'91		75%	00%	25%	+56%				
'98		67%	20%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'85	532	Dec:	12%	
					'91	266		50%	
					'98	600		0%	
Quercus gambelii									
M	85	-	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	-	0
	98	-	-	-	-	-	-	-	0
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>				
'85		00%	00%	00%					
'91		00%	00%	00%					
'98		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'85	0	Dec:	-	
					'91	0		-	
					'98	0		-	
Rhus glabra cismontana									
D	85	-	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	-	0
	98	-	3	-	-	-	-	2	3
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>				
'85		00%	00%	00%					
'91		00%	00%	00%					
'98		100%	00%	67%					
Total Plants/Acre (excluding Dead & Seedlings)					'85	0	Dec:	0%	
					'91	0		0%	
					'98	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				
Ribes spp.																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	10	-	-	-	-	-	-	-	-	10	-	-	-	200	11	14	10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	200		-			

Trend Study 21-9-98

Study site name: Wide Canyon BLM .

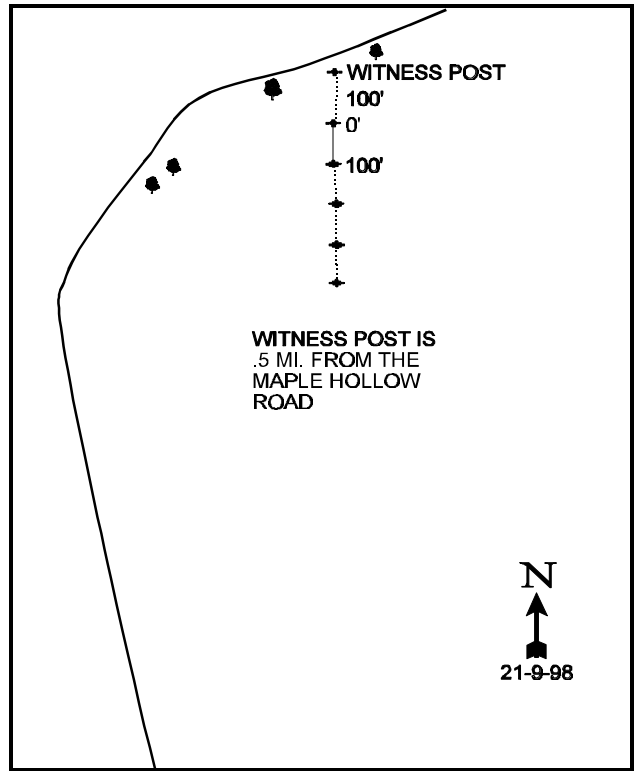
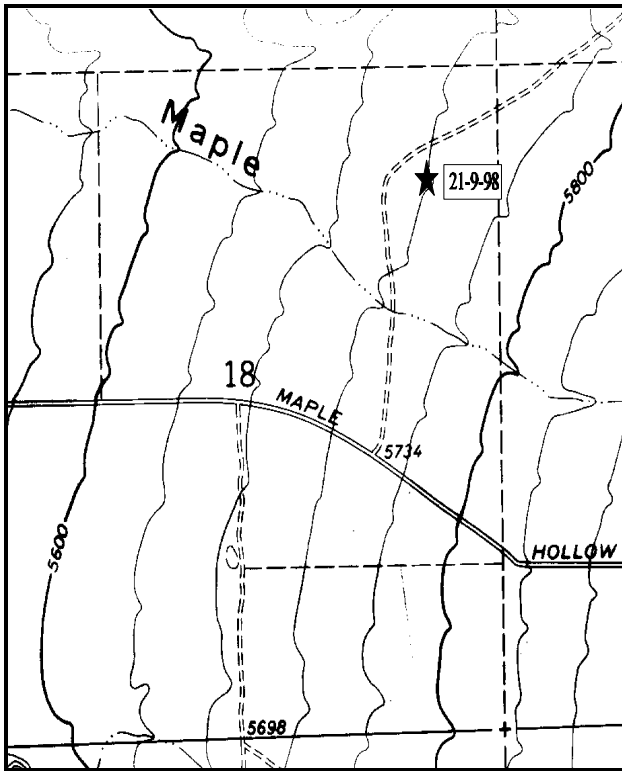
Range type: Big Sagebrush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From exit #174 on I-15 south of Holden, go 0.9 miles east to a cattleguard. Continue 1.9 miles to a dirt road turning off to the left. Follow this dirt road 0.5 miles to a witness post (rebar) 3 feet off the right side of the road, about 10 feet beyond a juniper. The frequency baseline starts 100 feet south of the witness post. The 0-foot stake is a rebar with browse tag #7107 attached.



Map Name: Coffee Peak, Utah

Diagrammatic Sketch

Township 20S, Range 3W, Section 18

UTM 4326074.487 N, 394090.831 E

DISCUSSION

Trend Study No. 21-9 (41-4)

The Wide Canyon BLM study samples important deer winter range managed by the BLM in the Maple Hollow and Wide Canyon area. The study has a slight slope (2-5%) to the west and an elevation of 5,700 feet. An extensive area of this relatively flat bench was chained about 30 years ago and is now dominated by Wyoming big sagebrush and Stansbury cliffrose. Deer trend use is thought to be similar to that of nearby Lower Maple Hollow, Wild Goose pellet group transect. Over the five year period 1981-85, deer days use/acre averaged 87 (Jense et al. 1985). Between 1986 and 1991, the average deer days use/acre increased to 95 (Jense 1991). A pellet group transect read along the study site baseline in 1998 estimated 155 deer and 12 cow days use/acre. Cattle pats were old and possibly from last season. Livestock use appeared very heavy on this BLM land when compared to Division land during past readings.

The soil is very rocky, sandy, and shallow. There appears to be a hardpan at a depth of around 12 inches. Effective rooting depth (see methods) is estimated at only about 6 inches. The hardpan is likely not a rooting barrier due to the presence of deeper rooted shrubs including Wyoming big sagebrush and cliffrose. Soil texture is a sandy loam with a neutral pH (6.9). Due to the rocky nature of the soil profile, average soil temperature is extremely high at 89.6°F at a depth of almost 7 inches. A good amount of litter is found under the vegetation, but the soil cover is disjointed between shrubs leaving 24% of the surface as bare soil in 1985 and 32% in 1991. Bare ground cover declined to only 9% in 1998 primarily due to increased cheatgrass cover in the shrub interspaces. Soil movement has occurred on trails and shrub interspaces, but is minimized because of the level terrain.

The key browse species are Wyoming big sagebrush and Stansbury cliffrose. Sagebrush is the most abundant shrub at a comparatively low density of about 1,400 plants/acre estimated in 1985 and 1991. The much larger sample size used in 1998 estimated the population at 2,420 plants/acre. It is a robust sagebrush with light to moderate use. It also displays good vigor and low decadence. Young plants are common indicating the possibility of an expanding population in the future.

The cliffrose is important on this site because of its preference displayed by deer, however it only contributes 17% of the browse cover. A majority of the plants have been moderately hedged in the past. The cliffrose are vigorous and healthy with no decadent plants sampled in 1998. Population density declined since 1991 due to the larger, more representative sample utilized in 1998. Furthermore, the number of dead plants in the population can only explain 6% of the decrease. This sample better estimates shrub populations which often have aggregated and/or discontinuous populations. Young plants were common in 1985, but no young were encountered in 1998. Cliffrose will be competing in the future with the increasing broom snakeweed population and encroaching juniper which currently number 33 trees/acre. Average trunk diameter of juniper is 7 inches. Juniper overhead canopy cover averaged 6% in 1998. Actually, cheatgrass will provide much greater competition for the establishment of sagebrush and cliffrose seedlings, especially with the very high soil temperatures. Mature cliffrose have increased steadily in height and now average nearly 7 feet in height making more of these shrubs unavailable to browsing.

Herbaceous vegetation is in very poor condition. Frequency of perennial grass species is low, excluding the small Sandberg bluegrass. During past readings most of the grasses appeared to have been heavily utilized and vigor was very poor except for individuals under the protection of sagebrush crowns. Cheatgrass dominates the herbaceous understory by providing 85% of the grass cover and 78% of the total herbaceous cover. Except for a few annuals, forbs are nearly nonexistent.

1985 APPARENT TREND ASSESSMENT

Soil trend is essentially stable with low levels of erosion. Vegetative trend is stable to declining, as the key species compete with increasers. As far as deer winter range is concerned, the site provides good browse. However, herbaceous vegetation is severely depleted. An increase in perennial grasses and forbs would be desirable in terms of ground cover and soil protection, as well as diversity and total production of forage for livestock use. It probably will not improve significantly without reductions in grazing and/or seeding.

1991 TREND ASSESSMENT

Basic cover features have experienced two major downward trends: a decrease in litter cover and an increase in percent bare ground. Vegetative basal cover is still basically unchanged at 2%, which is low. These changes can most likely be attributed to the extended drought we have been experiencing since 1985, but trend for soil is still considered down. The key browse species, Wyoming big sagebrush and cliffrose show a stable trend with the exception of poor recruitment for cliffrose, which is not as critical because of its characteristics of a long life. Broom snakeweed is increasing. The trend for browse is regarded as stable. The herbaceous understory trend is stable, but still in poor condition because of poor species diversity and abundance of the annuals, cheatgrass, and bur buttercup.

TREND ASSESSMENT

soil - down

browse - stable

herbaceous understory - stable, but still in very poor condition

1998 TREND ASSESSMENT

Trend for soil is up with a decline in percent bare ground from 32% in 1991 to 9% in 1998. This decline, however, appears to be due to an increase in cheatgrass cover. Litter cover has remained at similar levels while rock/pavement cover have doubled from 6% to 12%. Erosion is not currently a problem. Trend for browse is mixed. Wyoming big sagebrush appears to have a slightly upward trend due to improved recruitment, good vigor, light to moderate use and relatively low decadence. Stansbury cliffrose appears to have a slightly downward trend due to the increasing height of mature plants and lack of recruitment. Due to the lack of large numbers of dead plants, the dramatic change in density since 1991 (865 plants/acre to 180) is mostly due to the larger sample used in 1998 which better estimates shrub populations. Trend for browse is considered stable since sagebrush provides 45% of the browse cover (73% of the preferred browse) on the site and cliffrose only 17%. Trend for the herbaceous understory is stable but very poor condition. Cheatgrass and annual forbs dominate the site by providing 85% of the total herbaceous cover. Perennial grasses are depleted and growing mostly in the protection of shrub crowns.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - stable, but still in very poor condition

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	19	36	24	11	15	9	.90
G	Bromus tectorum (a)	-	-	370	-	-	100	15.22
G	Poa bulbosa	-	-	3	-	-	1	.00
G	Poa secunda	_b 130	_{ab} 114	_a 102	60	53	43	1.32
G	Sitanion hystrix	_a 11	_{ab} 15	_b 34	5	7	14	.39
Total Annual Grasses		0	0	370	0	0	100	15.22
Total Perennial Grasses		160	165	163	76	75	67	2.63
F	Agoseris spp.	_a -	_b 8	_a -	-	4	-	-
F	Astragalus spp.	-	-	3	-	-	1	.15
F	Calochortus nuttallii	-	4	-	-	2	-	-
F	Chenopodium spp. (a)	-	-	2	-	-	1	.00
F	Collinsia parviflora (a)	-	-	34	-	-	12	.18
F	Erodium cicutarium (a)	-	-	25	-	-	9	.12
F	Lactuca serriola	_a -	_b 10	_a -	-	5	-	-
F	Lepidium spp. (a)	-	-	218	-	-	76	1.14
F	Microsteris gracilis (a)	-	-	18	-	-	9	.07
F	Phlox longifolia	-	1	-	-	1	-	-
F	Ranunculus testiculatus (a)	-	-	26	-	-	13	.06
F	Tragopogon dubius	-	1	2	-	1	1	.00
F	Zigadenus paniculatus	-	-	-	-	-	-	.00
Total Annual Forbs		0	0	323	0	0	120	1.57
Total Perennial Forbs		0	24	5	0	13	2	0.18

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

BROWSE TRENDS --
Herd unit 21 , Study no: 9

Type	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata wyomingensis</i>	68	9.60
B	<i>Chrysothamnus nauseosus albicaulis</i>	6	.56
B	<i>Cowania mexicana stansburiana</i>	8	3.72
B	<i>Gutierrezia sarothrae</i>	60	6.02
B	<i>Juniperus osteosperma</i>	3	1.54
B	<i>Opuntia</i> spp.	1	.00
B	<i>Purshia tridentata</i>	0	.03
Total for Browse		146	21.49

CANOPY COVER --
Herd unit 21 , Study no: 9

Species	Percent Cover '98
<i>Juniperus osteosperma</i>	6

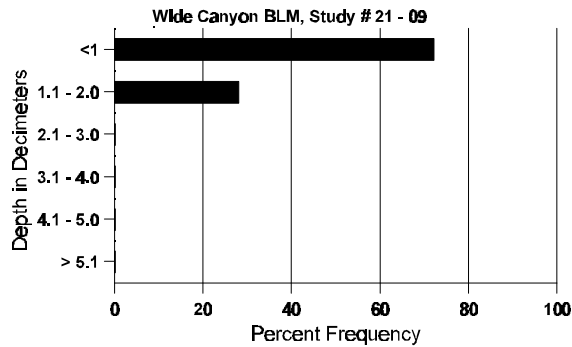
BASIC COVER --
Herd unit 21 , Study no: 9

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	380	2.50	2.00	48.18
Rock	161	4.75	5.50	10.57
Pavement	77	.50	.25	1.12
Litter	396	68.00	59.25	56.50
Cryptogams	92	.25	.75	2.17
Bare Ground	185	24.00	32.25	9.02

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 09, Study Name: Wide Canyon BLM

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
5.8	89.6 (6.6)	6.9	56.7	25.7	17.6	2.9	18.4	163.2	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 9

Type	Quadrat Frequency '98
Rabbit	22
Deer	60
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 9

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia tridentata wyomingensis</i>																		
S	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	1	1	-	1	-	-	-	-	-	3	-	-	-	60			3
Y	'85	5	1	-	-	-	-	-	-	-	6	-	-	-	400			6
	'91	2	2	-	-	-	-	-	-	-	4	-	-	-	266			4
	'98	21	4	-	6	-	-	-	-	-	31	-	-	-	620			31
M	'85	12	-	-	-	-	-	-	-	-	12	-	-	-	800	30	33	12
	'91	3	1	-	4	4	-	3	-	-	15	-	-	-	1000	29	50	15
	'98	49	10	-	2	-	-	-	-	-	62	-	-	-	1240	31	39	62
D	'85	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	'91	1	1	-	-	-	-	-	-	-	1	-	-	1	133			2
	'98	13	14	-	-	-	-	-	-	-	20	-	1	6	540			27
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	540			27
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		05%			00%			00%			- 0%							
'91		38%			00%			05%			+42%							
'98		23%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1400	Dec:	14%			
												'91	1399		10%			
												'98	2420		23%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total			
		1	2	3	4						
<i>Chrysothamnus nauseosus albicaulis</i>											
M	85	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	0	-	-	0
	98	5	1	-	-	-	-	120	29	43	6
D	85	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'85		00%		00%		00%					
'91		00%		00%		00%					
'98		14%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'85	0	Dec:	0%	
							'91	0		0%	
							'98	140		14%	
<i>Cowania mexicana stansburiana</i>											
Y	85	2	1	-	-	-	-	200			3
	91	1	-	-	-	-	-	66			1
	98	-	-	-	-	-	-	0			0
M	85	1	8	1	-	-	-	666	48	49	10
	91	-	-	-	4	6	-	666	56	58	10
	98	2	3	-	2	-	-	180	83	91	9
D	85	-	2	-	-	-	-	133			2
	91	-	1	-	1	-	-	133			2
	98	-	-	-	-	-	-	0			0
X	85	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'85		73%		07%		00%		-13%			
'91		54%		00%		00%		-79%			
'98		33%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'85	999	Dec:	13%	
							'91	865		15%	
							'98	180		0%	

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
Gutierrezia sarothrae																		
Y	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	91	9	-	-	-	-	-	-	-	-	7	2	-	-	600		9	
	98	-	-	-	5	-	-	-	-	-	5	-	-	-	100		5	
M	85	8	-	1	-	-	-	-	-	-	8	-	1	-	600	10	13	9
	91	24	-	-	1	-	-	-	-	-	23	2	-	-	1666	13	16	25
	98	280	-	-	1	-	-	-	-	-	281	-	-	-	5620	13	17	281
D	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			05%			05%			+41%							
'91		00%			00%			00%			+60%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1332	Dec:	5%			
												'91	2266		0%			
												'98	5720		0%			
Juniperus osteosperma																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	2	-	3	-	-	60	-	-	3
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	60		-			
Opuntia spp.																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200	6	8	3
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66	8	15	1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	12	1
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			-34%							
'91		00%			00%			00%			-85%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	200	Dec:	0%			
												'91	132		50%			
												'98	20		0%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	91	93	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	0		-			

Trend Study 21-10-98

Study site name: Wide Canyon DWR .

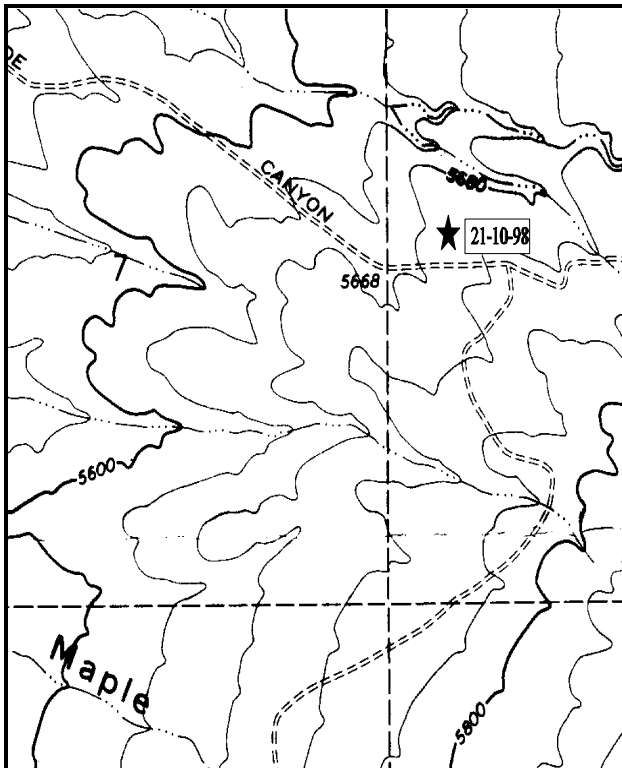
Range type: Chained, Railed Shrubland .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

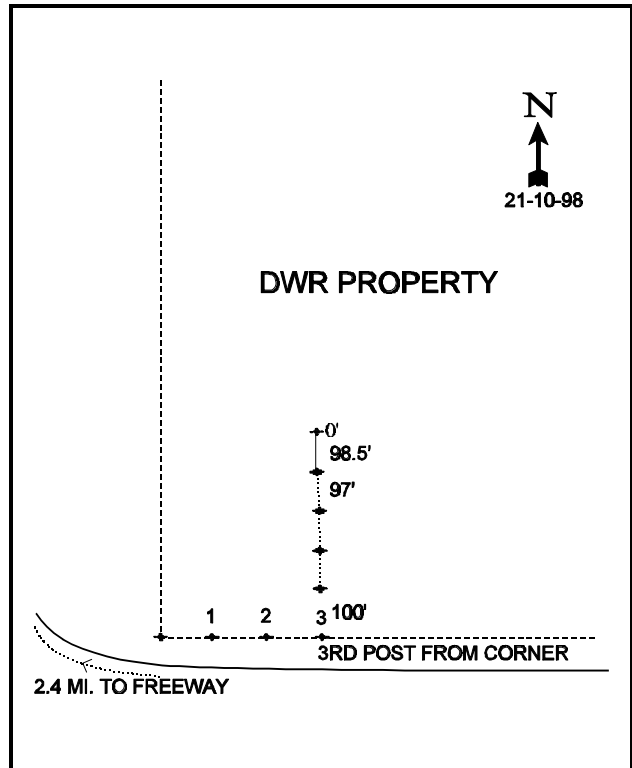
LOCATION DESCRIPTION

From the south Holden exit off I-15, go north into town. Go 0.6 miles north of the Holden City limit sign (to a log house on the east side) and turn right (200 South). Follow the road 1 block east, then north a few yards, then immediately east again up the hill to an overpass. From the overpass go 2.4 miles east to the fence corner of DWR property. Not including the corner posts, count to the third wooden post to the east. Measure 100 feet due north of the fence to the 400-foot stake. The density plots and the baseline are marked by steel rebar stakes. The 100-foot end of the baseline is 97 feet north of the first density plot. The 0-foot baseline stake (browse tag #7070) due to rocky ground was placed 1 1/2 feet south of the actual 0-foot end. The tape should be adjusted accordingly.



Map Name: Coffee Peak, Utah

Township 20S, Range 3W, Section 8



Diagrammatic Sketch

UTM 4327281.854 N, 394438.244 E

DISCUSSION

Trend Study No. 21-10 (45-5)

The Wide Canyon DWR trend study samples important deer winter range on land owned and managed by the Utah Division of Wildlife Resources. The site, like much of the area along the west side of the Pahvant Range, was cabled and/or hula dozed in the late 1950's. The range type is currently juniper, Wyoming big sagebrush and cliffrose, with a perennial grass understory. Grazing pressure is moderate. The Wide Canyon deer pellet group transect, located approximately one mile to the east, shows high use with a five year average of 56 deer days use/acre between 1981 and 1985 (Jense et al. 1985). Between 1985 and 1991, the average went down slightly to 52 deer days use/acre (Jense 1991). Pellet group data taken in 1998 along the study site baseline estimates 122 deer, 5 elk, and 9 cow use days/acre. Many of the deer groups appear to be from the winter period. Most of the cattle pats also appeared older and possible from the previous season, probably late fall.

The area is basically flat, but has a slight westerly slope (5-10%) with an elevation of 5,680 feet. The soil is sandy, shallow, and rocky with a hardpan at a depth of about 12 inches. Effective rooting depth (see methods) is estimated at just over 10 inches. Soil texture is classified as a loam with a neutral pH (7.0). Phosphorus may be limiting to plant development at only 9.7 ppm where 10 ppm is thought to be the minimum. Due to the rocky nature of the soil, average soil temperature is extremely high at 81°F at almost 12 inches in depth. This condition causes excessive dry soils during the summer, which gives winter annuals like cheatgrass a competitive advantage especially under a spring grazing system. Erosion and sedimentation are evident on the exposed areas and those with a sparse layer of litter cover. However, erosion is not a problem on this site. When compared to other study sites on the herd unit, Wide Canyon had a higher percentage of perennial grass cover and more herbaceous species are present.

Browse composition is similar to other sites, but the junipers are more prevalent here. Point quarter data from 1998 estimate 76 juniper trees/acre with an average diameter of 5 inches. Average cover of juniper is 4% which accounts for 25% of the browse cover. Overhead canopy cover is estimated at 3%. The key browse species are Wyoming big sagebrush and Stansbury cliffrose which respectively provide 58% and 9% of the browse cover. Antelope bitterbrush was also sampled, but in low numbers. Wyoming big sagebrush has remained at a steady density of about 2,400 plants/acre since 1985. Most plants show light use, but moderate use has increased from 13% in 1985 to 22% in 1991, and 40% by 1998. Heavy use occurs on a few individuals. These are usually the individuals with more characteristics of mountain big sagebrush which are more preferred. Percent decadence has also increased. In 1985, 33% of the population was considered decadent. By 1998, this number has nearly doubled to 57%. The proportion of plants displaying poor vigor has also increased and is currently at 20%. Recruitment shows a declining trend and no seedlings were encountered during any of the readings.

Cliffrose had a density of 133 plants/acre in 1985 and 1991. These shrubs were all moderately utilized and in good vigor. Half of the population was considered decadent in 1985. By 1991, all plants were classified as decadent. During the 1998 reading, density was estimated with the larger sample at 260 plants/acre. Mature plants averaged 4½ feet in height. Utilization was heavy on 15% of the shrubs with moderate use classified on 38%. Percent decadence has declined to 31%. Vigor is normal on all plants. Another encouraging sign is the presence of seedlings and young in the population.

Perennial grasses are prevalent and provide 21% total cover. The common species include: Sandberg bluegrass, bluebunch wheatgrass, crested wheatgrass, and intermediate wheatgrass. Utilization is light to moderate on the majority of the grasses, but Sandberg bluegrass was heavily utilized in 1985 and vigor was depressed on 70% of the plants. Due to the abundance of perennial grasses, annual cheatgrass is conspicuously lacking in the understory. Cheatgrass had a cover value of less than 1/4 of 1 percent in 1998. Bulbous bluegrass, a less desirable species, has increased significantly since 1991 and currently accounts for 24% of the grass cover.

Similar to the Wide Canyon BLM site, perennial forbs are deficient. All forbs combined produce less than ½ of 1 percent cover and occur in only 33 of the 100 placed quadrats.

1985 APPARENT TREND ASSESSMENT

General range trend may be downward. The soil, already shallow and low in fertility, is being slowly eroded away, especially where exposed and disturbed. Vegetative trend is down because of the increasing dominance of junipers, high density and increase of snakeweed, high percentage of decadent key species, and lack of forbs. Chaining and seeding could be beneficial to this area.

1991 TREND ASSESSMENT

Pavement cover has decreased from 13% to 4%. Basal vegetative cover has also declined from 8% to 5%. Percent bare ground cover has increased substantially (14% to 22%). Litter cover increased slightly. Overall trend would have to be considered down with the losses in vegetational basal cover and the increases in bare ground. The two key browse species, Wyoming big sagebrush and cliffrose, are showing downward trends. The sagebrush population has declined by 8% (down to 2,399 plants/acre) with an accompanying increase in percent decadency (33% to 36%). The young age class makes up only 6% of the population, down from 18%. The cliffrose population is basically stagnant with only 133 plants/acre, but percent decadency has doubled from 50% to 100% and there are no plants in the young age class. In 1985, it was thought that broom snakeweed appeared to be increasing, the population actually decreased by 77%. The trend for key browse is down, showing the effects of long-term drought. The herbaceous understory trend is up. The sum of nested frequency for grasses has increased by one and a half. There are not many forbs, but they too increased slightly since 1985.

TREND ASSESSMENT

soil - slightly down

browse - down

herbaceous understory - up, especially for grasses

1998 TREND ASSESSMENT

Trend for soil is up slightly with a two fold decline in percent bare ground (22% to 11%) since 1991. However, litter cover also declined from 66% to 57%. Erosion is not currently a problem on this site. Trend for browse continues to be down for Wyoming big sagebrush, but cliffrose displays an improving trend. Sagebrush shows more moderate use, a higher proportion of plants in poor vigor, increasing decadence, and a lack of significant recruitment. The number of dead plants is also quite high at 900 plants/acre. Another indication of downward trend is that 34% (420 plants/acre) of the decadent sagebrush were classified as dying. Cliffrose on the other hand shows reduced decadence and lighter overall use. Vigor is good and there is some limited recruitment present. Since sagebrush accounts for 58% of the browse cover or 87% of the preferred browse cover, trend for browse is considered down. This trend is likely caused primarily by competition with increasing juniper trees and a healthy perennial grass component coupled with drought. Trend for the herbaceous understory is up due to an increase in the sum of nested frequency for perennial grasses. Unfortunately, much of the increase comes from a significant increase in the less desirable bulbous bluegrass. Intermediate wheatgrass also increased significantly in nested frequency. Forbs are lacking.

TREND ASSESSMENT

soil - up slightly

browse - down for sagebrush

herbaceous understory - up for grasses

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	24	24	18	11	11	9	.29
G	Agropyron intermedium	_a 67	_a 66	_b 144	20	21	45	5.27
G	Agropyron spicatum	_a 140	_b 181	_{ab} 172	53	65	56	6.10
G	Bromus tectorum (a)	-	-	40	-	-	15	.17
G	Oryzopsis hymenoides	-	3	-	-	1	-	-
G	Poa bulbosa	_a -	_b 99	_c 158	-	38	55	5.06
G	Poa secunda	135	157	129	56	63	46	4.01
G	Sitanion hystrix	6	2	10	2	1	3	.04
Total Annual Grasses		0	0	40	0	0	15	.17
Total Perennial Grasses		372	532	631	142	200	214	20.80
F	Alyssum alyssoides (a)	-	-	47	-	-	21	.20
F	Astragalus calycosus	-	-	3	-	-	1	.03
F	Astragalus spp.	_a -	_b 6	_a -	-	4	-	-
F	Castilleja chromosa	-	2	-	-	1	-	-
F	Calochortus nuttallii	_{ab} 2	_b 7	_a -	1	5	-	-
F	Collinsia parviflora (a)	-	-	10	-	-	4	.02
F	Crepis acuminata	3	-	-	1	-	-	-
F	Cryptantha spp.	2	2	-	2	1	-	-
F	Lactuca serriola	-	1	-	-	1	-	-
F	Microsteris gracilis (a)	-	-	3	-	-	1	.00
F	Petradoria pumila	-	-	5	-	-	3	.18
F	Ranunculus testiculatus (a)	-	-	8	-	-	3	.01
F	Streptanthus cordatus	-	6	-	-	3	-	-
F	Tragopogon dubius	-	1	-	-	1	-	.00
F	Zigadenus paniculatus	2	-	-	1	-	-	-
Total Annual Forbs		0	0	68	0	0	56	0.23
Total Perennial Forbs		9	25	8	5	16	4	0.23

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

BROWSE TRENDS --
Herd unit 21 , Study no: 10

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	0	-
B	Artemisia tridentata wyomingensis	71	9.01
B	Chrysothamnus nauseosus	1	-
B	Chrysothamnus viscidiflorus stenophyllus	0	-
B	Cowania mexicana stansburiana	13	1.46
B	Gutierrezia sarothrae	31	1.19
B	Juniperus osteosperma	5	3.94
B	Leptodactylon pungens	3	.00
B	Opuntia spp.	1	-
B	Purshia tridentata	2	-
B	Ribes spp.	1	-
Total for Browse		128	15.62

CANOPY COVER --
Herd unit 21 , Study no: 10

Species	Percent Cover '98
Juniperus osteosperma	3

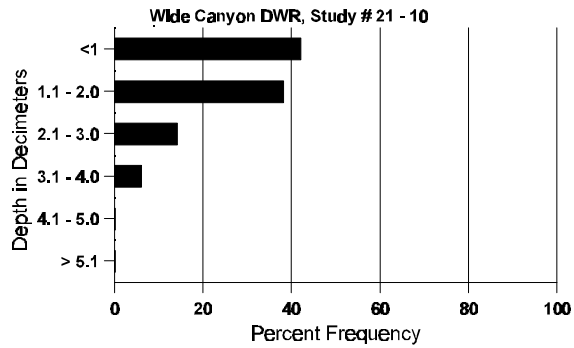
BASIC COVER --
Herd unit 21 , Study no: 10

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	376	7.75	5.00	43.12
Rock	93	3.50	3.00	2.75
Pavement	104	12.50	3.75	2.53
Litter	399	62.00	66.25	57.06
Cryptogams	102	0	.25	1.15
Bare Ground	192	14.25	21.75	10.89

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 10, Study Name: Wide Canyon DWR

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.4	81.0 (11.6)	7.0	36.7	34.7	28.6	2.6	9.7	92.8	1.0

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 10

Type	Quadrat Frequency '98
Rabbit	52
Elk	1
Deer	51
Cattle	4
Antelope	2

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 10

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Amelanchier utahensis																	
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
	'85	00%			00%			00%									
	'91	00%			00%			00%									
	'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	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 wyomingensis</i>															
Y	85	6	1	-	-	-	-	-	-	7	-	-	466		7
	91	1	-	-	1	-	-	-	-	2	-	-	133		2
	98	1	-	-	-	-	-	-	-	1	-	-	20		1
M	85	17	2	-	-	-	-	-	-	18	-	1	1266	21 23	19
	91	16	4	1	-	-	-	-	-	21	-	-	1400	24 30	21
	98	27	13	1	5	-	-	-	-	46	-	-	920	28 35	46
D	85	10	2	1	-	-	-	-	-	13	-	-	866		13
	91	6	4	2	1	-	-	-	-	7	-	1	866		13
	98	23	30	4	4	1	-	-	-	40	-	1	1240		62
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	900		45
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'85		13%		03%		03%		- 8%							
'91		22%		08%		17%		- 9%							
'98		40%		05%		20%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	2598	Dec:	33%		
										'91	2399		36%		
										'98	2180		57%		
<i>Chrysothamnus nauseosus</i>															
M	85	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	98	-	-	-	-	-	-	-	-	-	-	-	0	17 47	0
D	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	1	-	-	-	-	-	1	-	-	20		1
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'85		00%		00%		00%									
'91		00%		00%		00%									
'98		00%		100%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	0%		
										'91	0		0%		
										'98	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				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66	11	12	1
	91	1	1	-	-	-	-	-	-	-	2	-	-	-	133	12	14	2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+75%							
'91		25%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-			
												'91	266		-			
												'98	0		-			
<i>Cowania mexicana stansburiana</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66	22	18	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	3	4	1	-	-	-	-	-	-	8	-	-	-	160	56	64	8
D	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	1	1	1	-	-	-	1	-	4	-	-	-	80		4	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		100%			00%			00%			+ 1%							
'91		100%			00%			00%			+49%							
'98		38%			15%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	132	Dec:	50%			
												'91	133		100%			
												'98	260		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				
<i>Gutierrezia sarothrae</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	85	34	-	-	-	-	-	-	-	-	34	-	-	-	2266	9	8	34
	91	12	-	-	-	-	-	-	-	-	12	-	-	-	800	10	7	12
	98	90	-	-	1	-	-	-	-	-	91	-	-	-	1820	11	12	91
D	85	6	-	-	-	-	-	-	-	-	5	-	1	-	400		6	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			02%			-77%							
'91		00%			00%			00%			+59%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	3466	Dec:	12%				
											'91	800		0%				
											'98	1960		1%				
<i>Juniperus osteosperma</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	2	-	-	-	1	-	3	-	-	-	60	-	-	3
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	0%				
											'91	0		0%				
											'98	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		1	2					
Leptodactylon pungens													
Y	85	1	-	-	-	-	-	-	1	-	66		1
	91	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	0		0
M	85	1	-	-	-	-	-	-	1	-	66	9 7	1
	91	1	-	-	-	-	-	-	1	-	66	11 7	1
	98	-	-	-	-	-	-	-	-	-	0	8 9	0
D	85	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	0		0
	98	7	-	-	-	-	-	-	1	-	140		7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>		
'85		00%			00%			00%			-50%		
'91		00%			00%			00%			+53%		
'98		00%			00%			86%					
Total Plants/Acre (excluding Dead & Seedlings)										'85	132	Dec:	0%
										'91	66		0%
										'98	140		100%
Opuntia spp.													
M	85	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	0	- -	0
	98	1	-	-	-	-	-	-	1	-	20	6 9	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>		
'85		00%			00%			00%					
'91		00%			00%			00%					
'98		00%			00%			00%					
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-
										'91	0		-
										'98	20		-
Purshia tridentata													
M	85	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	0	- -	0
	98	-	-	-	-	-	-	-	-	-	0	30 41	0
D	85	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	0		0
	98	-	1	1	-	-	-	-	2	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>		
'85		00%			00%			00%					
'91		00%			00%			00%					
'98		50%			50%			00%					
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	0%
										'91	0		0%
										'98	40		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				
Ribes spp.																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
	'85	00%			00%			00%										
	'91	00%			00%			00%										
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	20		-			

Trend Study 21-11-98

Study site name: Dog Valley .

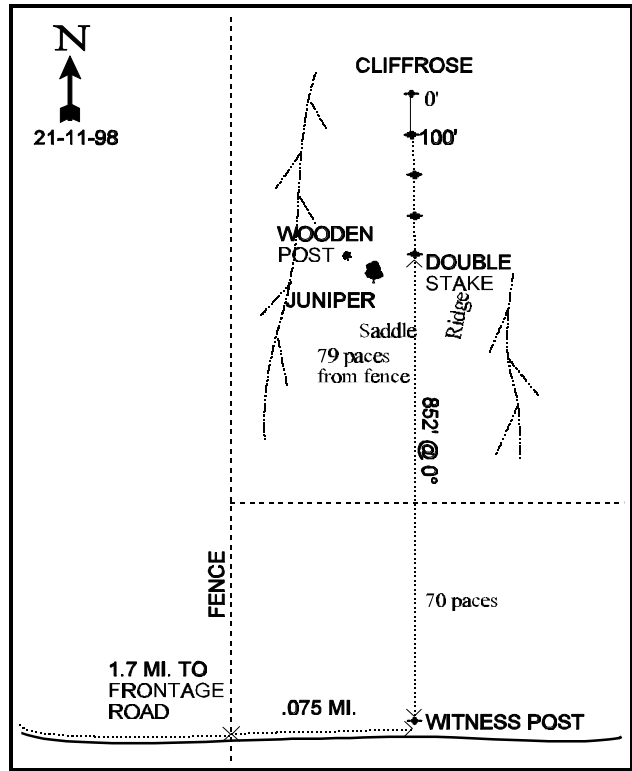
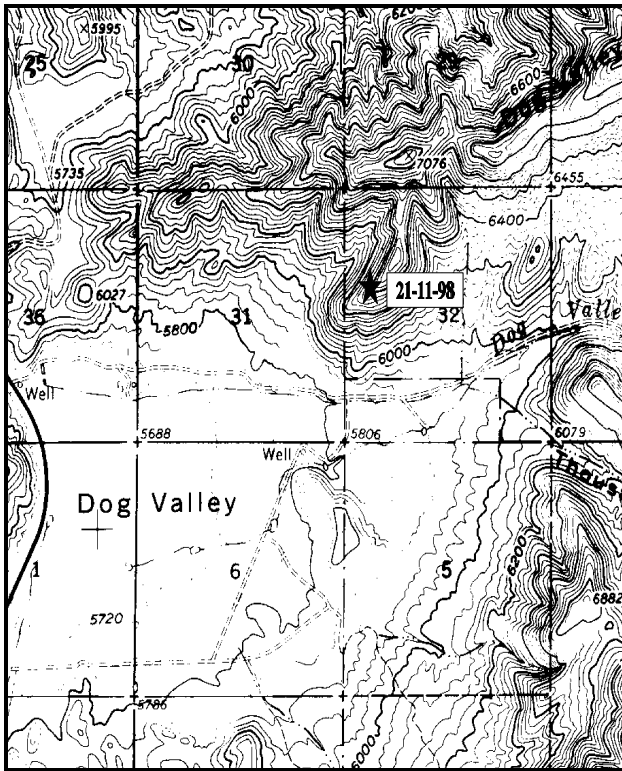
Range type: Stansbury Cliffrose .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Head south on I-15 out of Kanosh. Take the first ranch exit south of Kanosh (exit #138). Drive under the freeway to the east side. Turn and drive north on the frontage road parallel to the interstate for 1.2 miles to a cattleguard. Just past the cattleguard turn right and go east 1.7 miles to a fence. From the fence continue 0.05 miles east to a witness post on the north side of the road by a large juniper. The witness post is a steel rebar stake approximately 3 feet tall and 8 feet off the road. From the witness post, go 852 feet due north. You should use a tape to measure the 852 feet north to the 400' stake.



Map Name: Cove Fort, Utah

Diagrammatic Sketch

Township 24S , Range 6W , Section 32

UTM 4281972.099 N, 364360.477 E

DISCUSSION

Trend Study No. 21-11 (41-6/55-1)

The Dog Valley study was the first transect in the old Kanosh deer herd unit (55), and samples deer winter range above Dog Valley. The study is located in a Stansbury cliffrose community on a steep south facing slope (35%) overlooking sagebrush flats and cultivated fields. The elevation is 6,200 feet. The land is administered by the Forest Service and has been grazed by cattle on a rest-rotation basis every other year for about a 10 year period (1975-1985). The site has been dominated by cheatgrass since 1985 and a fire burned the entire area in 1996. The fire eliminated all of the cliffrose and most of the juniper. In the past, before the rest-rotation program, the site had been severely overgrazed. The Dog Valley pellet group transect measures deer use on the same slope. Estimated deer days use/acre tends to vary greatly between years, but generally there is moderately heavy use with 66 deer day use/acre between 1985 and 1990 (Jense et al. 1990). Use has declined since the fire, but deer and elk are still using the site. Pellet group data taken in 1998 along the study site baseline estimate 47 deer and 4 elk use days/acre.

Soil on the site is moderately shallow and rocky. Effective rooting depth (see methods) is estimated at just over 8 inches. Soil texture is a loam with a neutral pH (6.8). Rock and pavement had a cover value of 20% which has increased to 25% since 1985. Percent litter cover is currently high at 66%, but can mostly be attributed to a layer of dead cheatgrass. Soil movement and erosion were common in the past but not severe. Currently, the abundant litter and vegetation cover from cheatgrass appears to adequately protect the soil.

The dominant overstory before the fire was Stansbury cliffrose. The plants were large, averaging 7 feet in height with much of each plant still available to deer. They appeared heavily hedged in 1991, yet all plants displayed good vigor. No seedlings or young were encountered in 1985, but in 1991, small numbers of seedlings and young were counted. Mountain big sagebrush was also an important plant. It occurred in the open areas at an estimated density of almost 400 plants/acre in 1985. During the 1991 reading, sagebrush density was estimated at only 66 plants/acre and several dead sagebrush were encountered. Poor vigor and seed production along with heavy hedging was evident on the remaining live sagebrush. After the fire only a few seedling cliffrose were found on the site. No sagebrush were encountered. Junipers were common, especially down the slope, but since the fire there are only a few scattered trees still alive.

The dominant understory species is cheatgrass, which accounts for 97% of the grass cover and 81% of the total herbaceous cover in 1998 with a quadrat frequency of 99%. Cheatgrass was present in high numbers during past readings, however because they are annuals, previous data gathering procedures (prior to 1992) did not sample them. The more valuable perennial, bluebunch wheatgrass, occurs rarely in only 7% of the quadrats. Utilization of grasses appears light. Perennial forbs were rare prior to 1998. Currently, a few perennial forbs occur on the site but two annuals dominate the composition by providing 88% of the forb cover.

1985 APPARENT TREND ASSESSMENT

Sheet erosion is occurring, but loss is fairly slow and no active gullies are evident. The only way to improve the soil trend would be an increase in herbaceous cover. Perennial species give more watershed protection and grazing value than cheatgrass. A release from grazing pressure during the flower and seed formation stages of the desirable plants would favor bluebunch wheatgrass. Basically, the vegetative trend is stable. The key species are doing well, and neither the junipers nor broom snakeweed appear to be increasing.

1991 TREND ASSESSMENT

Basal vegetative cover is still very low at only 2%. Rock and pavement cover has increased to 25%, while litter cover has decreased to 64% with the majority of the litter cover actually dried cheatgrass. Bare ground has only risen to 9%. With what few changes that have taken place, soil trend is stable, but still in very poor condition with

the dominance of cheatgrass on the site. The key browse trend is down because mountain big sagebrush has decreased by 83%. The extended drought and competition with cheatgrass has detrimentally effected this population of sagebrush. This would be considered elevationally a lower extension of a population of mountain big sagebrush that ecotypically occurs at higher elevations with associated increases in moisture. The population was only about 400 plants/acre in 1985, which would indicate that it was a marginal site for their continued survival. Now with the drought, their population is only about 66 plants/acre. The cliffrose is fairing much better with a population increase of 11% and coincidentally, reproductive potential is 11% and the percentage of young plants is also 11%. The percent decadency is only 22% which is generally low considering the length of the drought. There are not many species occurring in the herbaceous understory. The trend is stable, but is very poor because of the dominance of cheatgrass on the site, which in turn makes it very susceptible to fire.

TREND ASSESSMENT

soil - stable, but poor condition

browse - downward with the losses to sagebrush

herbaceous understory - stable, but very poor condition with the dominance of cheatgrass

1998 TREND ASSESSMENT

Trend for soil appears stable. Percent bare ground is low and herbaceous vegetation cover and their associated litter are abundant. No significant erosion is occurring on the site. The browse trend is down due to the 1996 fire which eliminated nearly all of the useful browse on the site. The area is no longer an effective winter range. Trend for the herbaceous understory is up slightly especially for forbs, but condition is very poor due to the lack of perennial species and abundance of cheatgrass. Cheatgrass currently provides 97% of the grass cover and 81% of the total herbaceous cover. Some type of fire rehabilitation should have been done on this site to provide some competition to cheatgrass.

TREND ASSESSMENT

soil - stable

browse - downward due to fire which eliminated the key browse species

herbaceous understory - up slightly, but very poor condition with the dominance of cheatgrass and other annuals

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 11

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron spicatum	16	16	20	7	7	7	.42
G	Aristida purpurea	3	5	-	1	2	-	-
G	Bromus tectorum (a)	-	-	387	-	-	99	46.88
G	Hilaria jamesii	-	-	4	-	-	1	.85
G	Poa secunda	_a 7	_b 17	_a 6	3	10	2	.06
G	Sitanion hystrix	-	5	4	-	2	2	.03
Total Annual Grasses		0	0	387	0	0	99	46.88
Total Perennial Grasses		26	43	34	11	21	12	1.37
F	Alyssum alyssoides (a)	-	-	253	-	-	81	2.61
F	Antennaria rosea	-	-	4	-	-	1	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	<i>Astragalus calycosus</i>	-	-	9	-	-	3	.06
F	<i>Cirsium</i> spp.	-	-	2	-	-	2	.24
F	<i>Draba</i> spp. (a)	-	-	11	-	-	3	.01
F	<i>Epilobium paniculatum</i> (a)	-	-	3	-	-	2	.01
F	<i>Erodium cicutarium</i> (a)	-	-	176	-	-	68	5.56
F	<i>Lactuca serriola</i>	_a -	_a -	_b 74	-	-	30	.49
F	Unknown forb-perennial	_a 3	_a -	_b 18	1	-	8	.28
Total Annual Forbs		0	0	440	0	0	152	8.18
Total Perennial Forbs		3	0	110	1	0	46	1.14

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

BROWSE TRENDS --

Herd unit 21 , Study no: 11

Type	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata vaseyana</i>	0	-
B	<i>Cowania mexicana stansburiana</i>	0	.01
B	<i>Gutierrezia sarothrae</i>	1	-
B	<i>Sambucus cerulea</i>	0	-
B	<i>Tetradymia canescens</i>	4	.15
Total for Browse		5	0.16

CANOPY COVER --

Herd unit 21 , Study no: 11

Species	Percent Cover '98
<i>Juniperus osteosperma</i>	3

BASIC COVER --

Herd unit 21 , Study no: 11

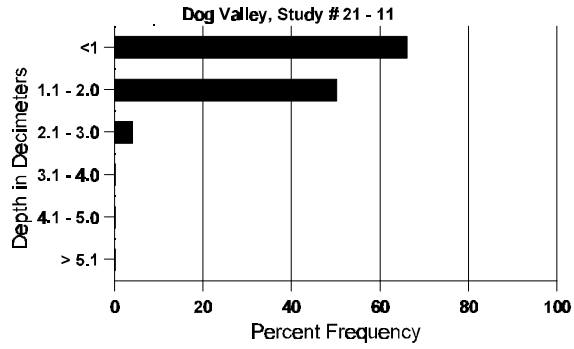
Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	394	1.25	2.00	54.39
Rock	280	11.50	16.25	18.90
Pavement	220	8.25	9.25	6.03
Litter	398	72.25	63.75	66.49
Cryptogams	8	0	0	.04
Bare Ground	107	6.75	8.75	2.25

SOIL ANALYSIS DATA --

Herd Unit 21, Study # 11, Study Name: Dog Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.2	50.8 (9.5)	6.8	40.7	29.7	29.6	2.6	20.7	121.4	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 11

Type	Quadrat Frequency '98
Rabbit	13
Elk	1
Deer	35

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 11

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																	
Y	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	85	2	1	-	-	-	-	-	-	-	3	-	-	-	200	20 26	3
	91	-	-	1	-	-	-	-	-	-	1	-	-	-	66	12 21	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
D	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		33%			00%			00%			-83%						
'91		00%			100%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'85	399	Dec:	17%			
											'91	66		0%			
											'98	0		0%			
<i>Cowania mexicana stansburiana</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	85	3	5	-	-	-	-	-	-	-	8	-	-	-	533	69 75	8
	91	-	1	1	-	2	2	-	-	-	6	-	-	-	400	82 70	6
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	1	1	-	-	-	-	-	-	2	-	-	-	133		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	600		30
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		63%			00%			00%			+11%						
'91		44%			56%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'85	533	Dec:	0%			
											'91	599		22%			
											'98	0		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4		1	2				
<i>Gutierrezia sarothrae</i>												
Y	85	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	20		1	
M	85	-	-	-	-	-	-	-	0	-	-	0
	91	1	-	-	-	-	-	-	66	6	4	1
	98	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		00%		00%		00%						
'91		00%		00%		00%		-70%				
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-			
						'91	66		-			
						'98	20		-			
<i>Sambucus cerulea</i>												
M	85	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	0	26	13	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		00%		00%		00%						
'91		00%		00%		00%						
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-			
						'91	0		-			
						'98	0		-			
<i>Tetradymia canescens</i>												
Y	85	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	20		1	
M	85	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	0	-	-	0
	98	5	-	-	-	-	-	-	100	10	20	5
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		00%		00%		00%						
'91		00%		00%		00%						
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-			
						'91	0		-			
						'98	120		-			

Trend Study 21-12-98

Study site name: Dameron Canyon .

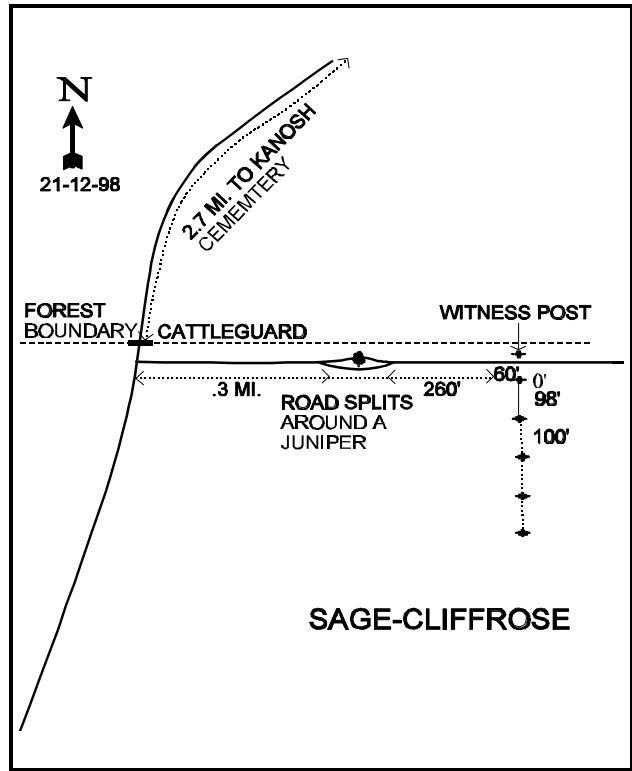
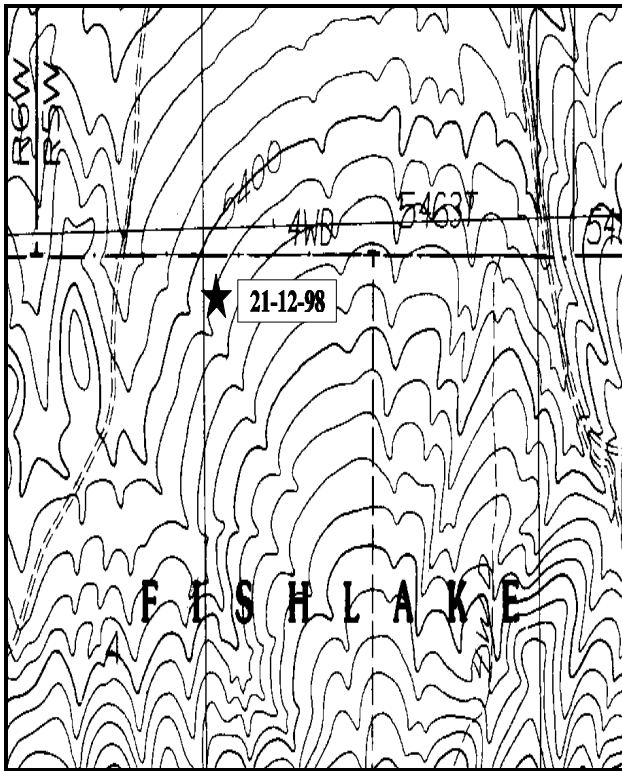
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Go south on the main road from Kanosh. Continue south on a dirt road towards the cemetery when the main road turns west towards the interstate. From the northeast corner of the Kanosh cemetery (1/2 mile south of town) follow the main road south for 2.7 miles to a cattleguard. Just past the cattleguard turn left and go 0.3 miles along the fence to a split in the road around a juniper. From where the road rejoins, go 260 feet to a witness post on the left side of the road by the fence. The witness post is a steel rebar stake 2 1/2 feet tall. From the witness post go 60 feet due south to the start of the frequency baseline. The 0-foot baseline stake is tagged #7109. The 100-foot end of the baseline is marked by a stake that is actually only 98 feet south, so the tape must be adjusted at that end.



Map Name: Fillmore, Utah

Diagrammatic Sketch

Township 24S, Range 5W, Section 4

UTM 4290938.343 N, 373251.921 E

DISCUSSION

Trend Study No. 21-12 (41-7/55-2)

The Dameron Canyon trend study samples a fairly flat (1-2% slope) area of sagebrush, cliffrose, and juniper south of Kanosh. The slope is very gradual and drains to the north with an elevation of 5,400 feet. The transect is laid out just inside the Forest Service boundary and may be effected by differential grazing pressure because of its proximity to the fence. The range is used for early spring grazing by cattle but no signs of recent grazing were found during any reading. The Forest Service has allowed free use firewood cutting here to help reduce juniper competition with the more desirable browse species. Surrounding areas dominated by juniper do not produce as much palatable browse, and therefore, receive little deer use. Deer use on the study site has been heavy, as evidenced by the past intense hedging on the cliffrose and bitterbrush. However, the Dameron pellet group transect located about one mile to the west, averaged only 26 deer days use/acre between 1985 and 1990 (Jense et al. 1990). However, pellet group data from the site in 1998 estimate 143 deer days use/acre. Most of the deer pellet groups were from the previous winter. Part of the baseline, including the first frequency belt, was chained since the 1985 reading. It appears not to have changed the composition with the exception of increased frequency of broom snakeweed.

Soil on this site is moderately shallow and rocky with an effective rooting depth (see methods) of almost 10 inches. Soil texture is a loam with a neutral pH (6.8). Percent bare ground was common during the 1985 and 1991 readings with 21% and 27% respectively. In these areas only a thin layer of dead cheatgrass protects the soil from erosion. Even so, erosion was not a problem on the site due to the levelness of the terrain. Photo point comparisons between readings indicate that cheatgrass is much more abundant in 1998 leaving just 10% bare ground.

Key browse species found on the site include: Wyoming big sagebrush, bitterbrush, and a few cliffrose. Wyoming big sagebrush currently provides 44% of the browse cover with a population of 2,860 plants/acre in 1998. Density was estimated at 5,199 plants/acre in 1985 and 4,799 in 1991. The large change in estimated density for sagebrush is mostly because of the much larger sample size now giving more accurate population estimates for shrubs that have clumped and/or discontinuous distributions. The number of dead in the population can only explain about 20% of this loss. Density of mature plants has remained fairly stable since 1991, but young and decadent shrubs declined considerably. Utilization has been mostly light to moderate since 1985 and vigor is generally good. Percent decadence is also low ranging from 14% in 1985, 24% in 1991 and 18% in 1998.

Antelope bitterbrush currently makes up only 18% of the browse cover, but it is obviously preferred and has been heavily hedged. All plants sampled in 1985 were classified as heavily hedged, however, currently only 25% are heavily utilized ('98). Moderate use was reported on an additional 50% of the population in 1998. Although classified as vigorous, they are not producing much leader growth. Reproduction from seed is poor with no young plants sampled during any of the readings, with only a few seedlings encountered in 1998. There may be some reproduction by the layering of stems. Vigor is currently good and percent decadence low at only 5%.

Stansbury cliffrose provides some additional forage on the site but these shrubs occur in small numbers. No cliffrose was encountered in the density plots in 1991, although some were encountered along the frequency belts. Cliffrose and bitterbrush are hybridizing on the site which has made identification difficult. The average mature bitterbrush is 3 to 4 feet tall and bushy, while the cliffrose is taller and most of the new growth is partly unavailable to browsing. All individuals sampled in 1985 were heavily hedged, while during the 1998 reading all plants appeared moderately utilized.

Broom snakeweed is currently the most abundant shrub on the site. It has increased in density by nearly 5 fold since 1985 to a population of 7,198 plants/acre by 1991. Current density is estimated at 10,540

plants/acre ('98). Age class distribution indicates that this expansion is possibly ending with 90% of the plants sampled in 1998 classified as mature. The proportion of seedling and young plants has declined substantially.

The herbaceous understory is totally dominated by annual grasses and forbs. Perennial herbaceous vegetation is lacking. Currently ('98), cheatgrass provides 79% of the grass cover. The only common perennial grass is Sandberg bluegrass which accounts for only 18% of the grass cover. Perennial forbs are also rare, with 91% of the meager forb cover being provided by annuals like pale alyssum and umbrella holosteum.

1985 APPARENT TREND ASSESSMENT

Soil trend appears stable and the vegetative trend appears downward. With the heavy utilization and lack of reproduction of the cliffrose and bitterbrush, these populations appear to be slowly declining. Any practices that encourage growth and reproduction of the cliffrose and bitterbrush would be advocated. Chaining openings within the dense pinyon-juniper stands nearby could relieve some of the pressure on this area.

1991 TREND ASSESSMENT

Soil trend is slightly downward. Basal vegetative cover has gone up slightly to 3.5%, but this is still too low. Percent rock and pavement cover has increased to 17%. Litter cover has decreased to 53% with bare ground increasing to 27%. Browse trend is also slightly downward at this time. The most abundant browse species is Wyoming big sagebrush with a density of 4,799 which is reflective of a decrease of 8% since 1985. Percent decadence has increased to 24%. At the next survey, it will be of interest to determine what percentage of the seedlings have survived for the reproductive potential was very high at 76% (3,666 seedlings/acre). The few cliffrose that were on the site before are no longer present. Bitterbrush has decreased by 40% (332 plants/acre to 200 plants/acre). The broom snakeweed has increased by almost five fold to 7,198 plants/acre. As with the other sites in herd unit 21, the herbaceous understory is poor. The most common perennial species is a very small Sandberg bluegrass. Trend is slightly downward and in poor condition with composition mostly made up of weedy increasers and annuals.

TREND ASSESSMENT

soil - slightly downward

browse - slightly downward

herbaceous understory - slightly downward and in poor condition

1998 TREND ASSESSMENT

Trend for soil is up with a substantial decline in percent bare ground from 27% in 1991 to 10% in 1998. Rock/pavement cover have declined, while percent litter cover has increased. Unfortunately, most of these positive changes are due to a vigorous stand of annual cheatgrass. Photo point comparisons show cheatgrass on the site since 1985, but it has become more dense and vigorous since then and currently poses a fire hazard. Trend for browse is stable for bitterbrush and cliffrose, but slightly down for Wyoming big sagebrush. Sagebrush provides 71% of the preferred browse cover. The sagebrush shows a 40% decline in density since 1991, however some of this change may be due to the larger sample used in 1998. In addition, density of mature plants has remained fairly stable since the last reading but the number of plants in the other age classes has declined substantially. Utilization of the sagebrush is mostly light and vigor has improved slightly while percent decadence has declined from 24% to 18%. The bitterbrush population is mostly mature with little apparent reproduction. However, vigor is good, utilization mostly moderate and percent decadence very low at only 5%. Overall browse trend is considered stable. Trend for the herbaceous understory is stable, but still in poor condition due to the dominance of annual grasses and forbs.

TREND ASSESSMENT

soil - up

browse - stable overall, slightly down for Wyoming big sagebrush

herbaceous understory - stable, but poor and dominated by cheatgrass

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	-	-	3	-	-	1	.03
G	Agropyron spicatum	a-	a3	b11	-	1	4	.21
G	Bromus japonicus (a)	-	-	11	-	-	3	.21
G	Bromus tectorum (a)	-	-	349	-	-	95	19.84
G	Poa secunda	193	189	168	73	75	66	4.42
G	Secale montanum	-	-	2	-	-	1	.00
G	Sitanion hystrix	b26	a2	a14	14	2	9	.29
Total Annual Grasses		0	0	360	0	0	98	20.05
Total Perennial Grasses		219	194	198	87	78	81	4.97
F	Alyssum alyssoides (a)	-	-	48	-	-	17	.48
F	Allium spp.	-	-	1	-	-	1	.00
F	Arabis spp.	-	-	7	-	-	2	.01
F	Astragalus calycosus	-	-	3	-	-	1	.00
F	Calochortus nuttallii	a-	a-	b8	-	-	4	.02
F	Draba spp. (a)	-	-	55	-	-	18	.19
F	Epilobium paniculatum (a)	-	-	6	-	-	2	.01
F	Holosteum umbellatum (a)	-	-	223	-	-	73	2.42
F	Lactuca serriola	a-	b55	a1	-	26	1	.00
F	Lomatium spp.	-	-	3	-	-	1	.03
F	Machaeranthera canescens	-	-	8	-	-	3	.01
F	Microsteris gracilis (a)	-	-	16	-	-	6	.03
F	Phlox longifolia	4	-	5	3	-	3	.01
F	Polygonum douglasii (a)	-	-	3	-	-	2	.01
F	Ranunculus testiculatus (a)	-	-	39	-	-	15	.12
F	Tragopogon dubius	a-	a-	b15	-	-	8	.19
F	Unknown forb-perennial	4	-	-	1	-	-	-
F	Zigadenus paniculatus	-	1	-	-	1	-	-
Total Annual Forbs		0	0	390	0	0	133	3.26
Total Perennial Forbs		8	56	51	4	27	24	0.30

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

BROWSE TRENDS --
Herd unit 21 , Study no: 12

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	75	13.55
B	Chrysothamnus nauseosus	1	1.00
B	Cowania mexicana stansburiana	2	.33
B	Gutierrezia sarothrae	77	8.80
B	Juniperus osteosperma	1	1.63
B	Purshia tridentata	17	5.50
B	Rhus trilobata trilobata	0	-
B	Ribes spp.	1	.15
B	Sambucus cerulea	1	-
Total for Browse		175	30.98

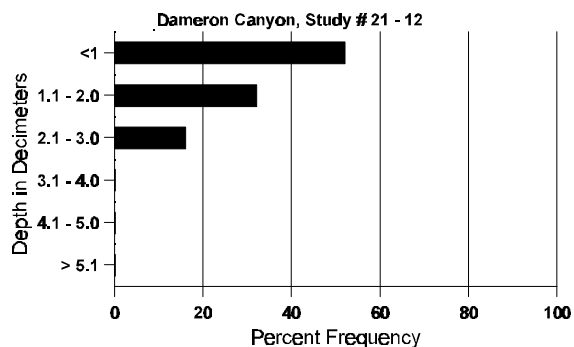
BASIC COVER --
Herd unit 21 , Study no: 12

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	383	3.00	3.50	49.84
Rock	147	4.50	5.25	5.39
Pavement	217	7.50	12.00	6.49
Litter	399	64.25	52.50	61.09
Cryptogams	56	0	.25	1.30
Bare Ground	181	20.75	26.50	9.62

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 12, Study Name: Dameron Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.6	51.5 (11.6)	6.8	44.7	30.7	24.6	3.7	11.9	163.2	.9

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 12

Type	Quadrat Frequency '98
Rabbit	8
Elk	2
Deer	50
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 12

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia tridentata wyomingensis</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	55	-	-	-	-	-	-	-	-	55	-	-	-	3666			55
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	85	20	-	-	-	-	-	-	-	-	20	-	-	-	1333			20
	91	13	2	-	-	-	-	-	1	-	16	-	-	-	1066			16
	98	14	-	-	3	-	-	-	-	-	17	-	-	-	340			17
M	85	41	6	-	-	-	-	-	-	-	47	-	-	-	3133	28	29	47
	91	14	9	-	6	9	1	-	-	-	37	-	-	2	2600	24	26	39
	98	76	19	-	5	-	-	-	-	-	100	-	-	-	2000	26	31	100
D	85	8	3	-	-	-	-	-	-	-	8	-	2	1	733			11
	91	2	8	1	1	3	2	-	-	-	10	-	-	7	1133			17
	98	18	5	1	1	-	-	-	-	-	22	-	-	3	500			25
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	400			20
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		12%			00%			04%			- 8%							
'91		43%			06%			13%			-40%							
'98		17%			.69%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	5199	Dec:	14%			
												'91	4799		24%			
												'98	2860		18%			
<i>Chrysothamnus nauseosus</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	34	48	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	80		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Cowania mexicana stansburiana</i>																	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	-	3	-	-	-	-	-	-	-	3	-	-	-	60	78 107	3
D	85	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			100%			00%									
'91		00%			00%			00%									
'98		100%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'85	66	Dec:	100%			
											'91	0		0%			
											'98	80		0%			
<i>Gutierrezia sarothrae</i>																	
S	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4
	91	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9
	98	16	-	-	-	-	-	-	-	-	16	-	-	-	320		16
Y	85	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8
	91	31	-	-	-	-	-	-	-	-	31	-	-	-	2066		31
	98	47	-	-	-	-	-	-	-	-	47	-	-	-	940		47
M	85	14	-	-	-	-	-	-	-	-	14	-	-	-	933	9 13	14
	91	74	-	-	2	-	-	-	-	-	76	-	-	-	5066	10 9	76
	98	475	-	-	1	-	-	-	-	-	476	-	-	-	9520	9 9	476
D	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	98	4	-	-	-	-	-	-	-	-	3	-	-	1	80		4
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%			+79%						
'91		00%			00%			00%			+32%						
'98		00%			00%			.18%									
Total Plants/Acre (excluding Dead & Seedlings)											'85	1532	Dec:	4%			
											'91	7198		1%			
											'98	10540		1%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4		1	2		
Juniperus osteosperma										
Y	85	-	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	-	0	0
	98	1	-	-	-	-	-	-	20	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
	'85	00%		00%		00%				
	'91	00%		00%		00%				
	'98	00%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-	
						'91	0		-	
						'98	20		-	
Purshia tridentata										
S	85	-	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	-	0	0
	98	2	-	-	-	-	-	-	40	2
M	85	-	-	4	-	-	-	-	266	46 43 4
	91	-	-	-	1	1	1	-	200	43 66 3
	98	3	9	2	-	-	3	-	380	51 67 19
D	85	-	-	1	-	-	-	-	66	1
	91	-	-	-	-	-	-	-	0	0
	98	-	1	-	-	-	-	-	20	1
X	85	-	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	-	0	0
	98	-	-	-	-	-	-	-	20	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
	'85	00%		100%		20%		-40%		
	'91	33%		33%		00%		+50%		
	'98	50%		25%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'85	332	Dec:	20%	
						'91	200		0%	
						'98	400		5%	
Rhus trilobata trilobata										
M	85	-	-	-	-	-	-	-	0	- - 0
	91	-	-	-	-	-	-	-	0	- - 0
	98	-	-	-	-	-	-	-	0	72 96 0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
	'85	00%		00%		00%				
	'91	00%		00%		00%				
	'98	00%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-	
						'91	0		-	
						'98	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			
Ribes spp.								
D	85	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	0
	98	1	-	-	-	-	-	20
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
	'85	00%		00%		00%		
	'91	00%		00%		00%		
	'98	00%		00%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec: 0%
						'91	0	0%
						'98	20	100%
Sambucus cerulea								
M	85	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	0
	98	-	2	-	-	-	-	40
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>
	'85	00%		00%		00%		
	'91	00%		00%		00%		
	'98	100%		00%		00%		
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec: -
						'91	0	-
						'98	40	-

Trend Study 21-13-98

Study site name: Walker Creek .

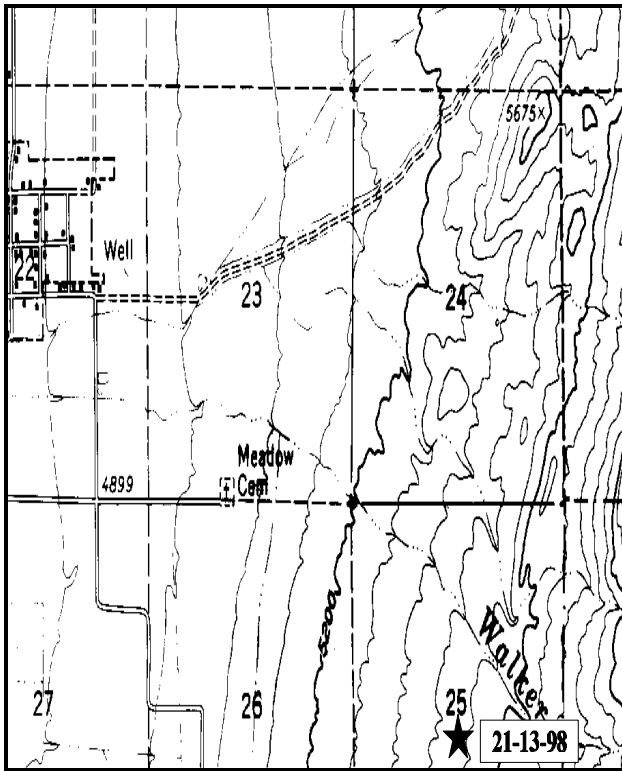
Range type: Bulldozed Pinyon-Juniper .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

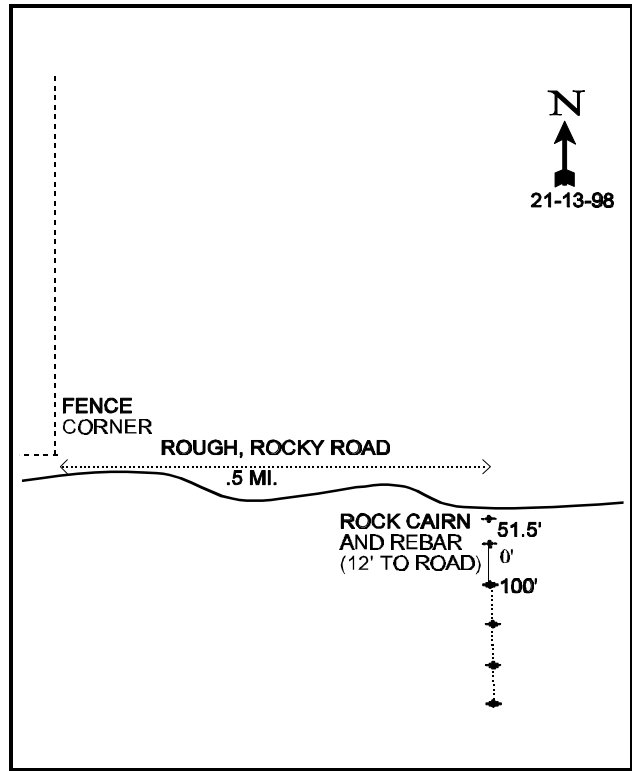
LOCATION DESCRIPTION

Go south from Meadow (southwest of Fillmore) on SR133 to mile marker 6. Go approximately 0.05 miles further south on 133 and turn east on a gravel road. Go east 0.8 miles to a junction. Turn right and follow this road for 1 mile around several bends to a cattleguard. Past the cattleguard the main road turns back south. Instead of turning south, continue straight east for 0.1 miles to a fork. Keep right and go 0.15 miles to a concrete aqueduct. Continue on the road 0.25 miles to a fence corner on the left, travel another 0.5 miles to a cairn on the right side of the road. The 0-foot baseline stake is 51.5 feet south of the rebar and rock cairn. The 0-foot stake is a 2 1/2 foot tall rebar tagged #7074. A 4X4 vehicle is advisable for the rough roads.



Map Name: Fillmore, Utah

Township 22S, Range 24W, Section 17



Diagrammatic Sketch

UTM 4302863.447 N, 381153.005 E

DISCUSSION

Trend Study No. 21-13 (41-8/55-3)

The Walker Creek trend study is located on the gentle slopes below the Pahvant Range southeast of Meadow. The area is rather flat (0-3% slope to the west) with an elevation of 5,500 feet, with small intermittent draws that drain to the west. In 1966, 270 acres in the Walker Creek area (BLM) were treated by dozing out individual junipers and leaving all other desirable browse species. The project was done primarily to benefit wildlife. Grazing was permitted in the past, but the area received very little cattle use. Currently ('98), there is no sign of livestock use on the site. Pellet groups were abundant and well distributed through the area in 1985. Pellet group data from 1991 indicated a moderately high level of use at 100 deer days use/acre. In addition, 2 deer carcasses were found on the site. Pellet group data from 1998 estimate 94 deer days use/acre. Resting and escape cover is widely available. Water is available in Meadow Creek ½ mile to the north.

Soil at the site is moderately deep with an effective rooting depth of almost 12 inches. Soil depth measurements were restricted by numerous rocks within the profile. Parent material is primarily from sandstone but some granite was found on the site. Soil texture is a sandy clay loam with a slightly acid pH (6.4). Phosphorus may be limiting to plant development at only 9 ppm where 10 ppm is considered minimal for normal plant growth. Erosion is minimal even in the small gullies around the area due to the abundant vegetation and litter cover. Unfortunately, most of this protective cover comes from cheatgrass.

The key browse species are basin big sagebrush and Stansbury cliffrose. The sagebrush is four times more abundant and accounts for 55% of the total browse cover on the site. Both sagebrush and cliffrose are vigorous, growing well and show mostly moderate utilization. The sagebrush population has become increasingly more mature since study site establishment in 1985. Just over half (54%) of the sagebrush were classified as mature in 1988, increasing slightly to 58% by 1991. During the 1998 reading, 75% of the sagebrush was classified as mature. A few young plants were encountered, but no seedlings have been sampled since 1985. This is likely a function of the abundant cheatgrass understory which provides intense competition for sagebrush seedlings during their establishment. Utilization of the sagebrush has become lighter since 1985, with most plants displaying good vigor. Percent decadence has declined slightly from a high of 32% in 1985 to 23% in 1998.

Stansbury cliffrose provides 25% of the browse cover on the site. Most plants are all available, but some individuals are becoming partly unavailable due to height. The average mature plant has increased in height from 3 feet in 1985 to 5 feet in 1998. Although showing high preference, it has not been damaged by the intense hedging as observed on other sites in the herd unit. The cliffrose is quite bushy, which could indicate some crossing with bitterbrush. Of the plants sampled, 72% were mature and 14% were young in 1991. The proportions have changed with 90% of the cliffrose currently mature and only 7% young. All display good vigor and percent decadence is low at only 3% in 1998.

Point quarter data from 1998 estimate 145 juniper trees/acre with an average trunk diameter of almost 3 inches. Data from the old density plots estimated a much higher density of juniper at 800 plants/acre in 1985 and 999 in 1991. These estimates were made with three small .01 acre circular plots which most often over or underestimate shrub and tree densities.

The herbaceous understory, like many of the sites on unit 21, is dominated by cheatgrass and annual forbs. Perennial grasses are limited primarily to small numbers of Sandberg bluegrass, crested wheatgrass, and bottlebrush squirreltail. Cheatgrass contributes 89% of the grass cover. Since it is an annual, it was not sampled in 1985 or 1991, therefore no quantitative comparisons can be made. Annual and perennial forbs are uncommon. Eight annual and 3 perennial forbs were encountered on the site in 1998. These produced just over ½ of 1% cover and annual forbs provided 74% of the forb cover. The few perennial forbs present are either small, in poor vigor or unavailable most of the year.

1985 APPARENT TREND ASSESSMENT

Soil trend is currently stable with low levels of erosion. The key browse species, big sagebrush and cliffrose, appear to be stable. However, the lack of desirable grasses and forbs and the encroachment of junipers and broom snakeweed would indicate a slow downward trend. Another juniper treatment followed by seeding with a mix of perennial grasses and forbs may be warranted in the future.

1991 TREND ASSESSMENT

Soil trend appears stable but in poor condition because of the very low cover values for basal vegetative cover. Percent bare ground is still not very high at 18% . Key browse for the site are basin big sagebrush and Stansbury cliffrose. The sagebrush population has dropped 7% to 1,732 plants/acre. They also showed a slight drop in percent decadence. The cliffrose population is stable with a slight increase in percent decadency. Broom snakeweed has increased in numbers by 30%. Trend for browse is stable. The herbaceous understory is very similar to the other sites in unit 21, having very few perennial species. Sandberg bluegrass is the only common species and it is a small plant which provides little useful forage. Trend is stable, but poor because of the overabundance of increaser species.

TREND ASSESSMENT

soil - stable, but poor condition

browse - stable

herbaceous understory - stable, but poor condition

1998 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground from 18% to only 4%. Litter cover has also increased. This change is primarily due to the vigorous stand of cheatgrass in the understory which provides half of the vegetative cover on the site and poses a significant fire hazard. Trend for the key browse species, basin big sagebrush and cliffrose is stable. Population densities are up slightly, but some of the difference may be due to the larger sample used in 1998. Both populations are becoming increasingly mature, but vigor is currently good and percent decadence has declined. Heavy use has also declined since 1991. However, this stable trend is precarious due to the decline in the proportion of young plants in the population for both sagebrush and cliffrose. Some seedlings were found for cliffrose in 1998, however no sagebrush seedlings have been sampled since 1985. This is mostly due to the vigorous stand of cheatgrass which provides intense competition to the establishment of sagebrush seedlings. Without more recruitment in the future, these shrub populations will decline. Another factor is the fire hazard posed by the abundant cheatgrass understory. It is not a question of if a fire will occur on this site but when. A fire would devastate the sagebrush and cliffrose on the site and eliminate this area as important deer winter range for many years. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency of perennial grasses and forbs. They are both still deficient however.

TREND ASSESSMENT

soil - up

browse - stable currently, but poor reproduction

herbaceous understory - up slightly, but in very poor condition due to the dominance of cheatgrass

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 13

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	a1	a2	b17	1	2	8	.80
G	Agropyron spicatum	-	-	1	-	-	1	.00
G	Aristida purpurea	4	1	1	3	1	1	.15
G	Bromus tectorum (a)	-	-	374	-	-	99	32.18
G	Poa secunda	a74	b101	b111	33	46	50	2.03
G	Sitanion hystrix	a3	a7	b42	1	3	18	.72
G	Vulpia octoflora (a)	-	-	29	-	-	9	.46
Total Annual Grasses		0	0	403	0	0	108	32.64
Total Perennial Grasses		82	111	172	38	52	78	3.72
F	Alyssum alyssoides (a)	-	-	2	-	-	1	.00
F	Asclepias asperula	2	-	-	1	-	-	-
F	Collinsia parviflora (a)	-	-	24	-	-	11	.08
F	Draba spp. (a)	-	-	14	-	-	6	.03
F	Erodium cicutarium (a)	-	-	1	-	-	1	.03
F	Eriogonum racemosum	2	-	-	2	-	-	-
F	Helianthus annuus (a)	2	-	-	1	-	-	-
F	Holosteum umbellatum (a)	-	-	19	-	-	8	.06
F	Lactuca serriola	-	-	2	-	-	1	.00
F	Microsteris gracilis (a)	-	-	38	-	-	14	.14
F	Phlox longifolia	a-	a-	b8	-	-	4	.07
F	Ranunculus testiculatus (a)	-	-	18	-	-	7	.08
F	Zigadenus paniculatus	6	1	7	3	1	5	.07
Total Annual Forbs		2	0	116	1	0	48	0.42
Total Perennial Forbs		10	1	17	6	1	10	0.16

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

BROWSE TRENDS --
Herd unit 21 , Study no: 13

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata tridentata	78	15.96
B	Cowania mexicana stansburiana	27	7.35
B	Gutierrezia sarothrae	35	1.35
B	Juniperus osteosperma	4	4.09
B	Opuntia spp.	2	.30
B	Quercus gambelii	0	-
Total for Browse		146	29.06

CANOPY COVER --
Herd unit 21 , Study no: 13

Species	Percent Cover '98
Juniperus osteosperma	4

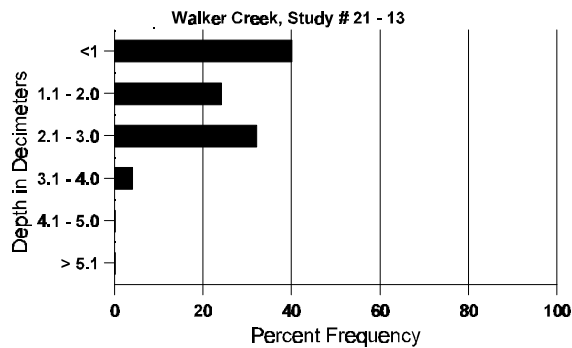
BASIC COVER --
Herd unit 21 , Study no: 13

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	383	1.75	1.00	58.23
Rock	200	7.50	12.25	13.37
Pavement	110	3.75	4.25	3.85
Litter	395	65.50	64.50	70.77
Cryptogams	51	0	0	.69
Bare Ground	85	21.50	18.00	3.53

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 13, Study Name: Walker Creek

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.5	56.0 (12.4)	6.4	60.0	17.4	22.6	2.5	9.0	108.8	.9

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 21 , Study no: 13

Type	Quadrat Frequency '98
Rabbit	20
Deer	44

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 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				
<i>Artemisia tridentata tridentata</i>												
S	85	2	-	-	-	-	-	-	2	133		2
	91	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	0		0
Y	85	4	-	-	-	-	-	-	4	266		4
	91	4	-	-	-	-	-	-	4	266		4
	98	1	-	-	-	-	1	-	2	40		2
M	85	5	8	2	-	-	-	-	15	1000	23 29	15
	91	11	2	-	1	-	-	1	14	1000	25 32	15
	98	92	1	-	4	-	-	1	98	1960	29 38	98
D	85	4	3	2	-	-	-	-	8	600		9
	91	4	1	1	1	-	-	-	3	466		7
	98	25	1	-	1	-	-	1	19	560		28
X	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	580		29
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		39%		14%		04%		- 7%				
'91		12%		04%		12%		+33%				
'98		02%		00%		07%						
Total Plants/Acre (excluding Dead & Seedlings)									'85	1866	Dec:	32%
									'91	1732		27%
									'98	2600		23%
<i>Cowania mexicana stansburiana</i>												
S	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	1	1	-	-	-	-	-	2	40		2
Y	85	1	1	-	-	-	-	-	2	133		2
	91	-	-	1	-	-	-	-	1	66		1
	98	1	1	-	-	-	-	-	2	40		2
M	85	2	3	-	-	-	-	-	5	333	43 42	5
	91	-	4	-	-	-	1	-	5	333	49 45	5
	98	5	18	-	2	1	-	-	26	520	62 66	26
D	85	-	-	-	-	-	-	-	-	0		0
	91	1	-	-	-	-	-	-	1	66		1
	98	1	-	-	-	-	-	-	1	20		1
X	85	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		57%		00%		00%		- 0%				
'91		57%		29%		00%		+20%				
'98		69%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'85	466	Dec:	0%
									'91	465		14%
									'98	580		3%

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																		
S	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	91	4	-	-	-	-	-	-	-	-	-	-	-	4	266		4	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	85	4	-	-	-	-	-	-	-	4	-	-	-	266		4		
	91	6	-	-	-	-	-	-	-	3	-	-	3	400		6		
	98	17	-	-	-	-	-	-	-	17	-	-	-	340		17		
M	85	26	-	-	-	-	-	-	-	26	-	-	-	1733	9 10	26		
	91	32	-	-	1	-	-	1	-	31	-	-	3	2266	11 12	34		
	98	84	-	-	1	-	-	-	-	85	-	-	-	1700	8 11	85		
D	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	3	-	-	-	-	-	-	-	1	-	-	2	200		3		
	98	2	-	-	-	-	-	-	-	-	-	-	2	40		2		
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	-	-	-	-	-	-	-	-	-	-	-	-	120		6		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+30%							
'91		00%			00%			19%			-27%							
'98		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1999	Dec:	0%			
												'91	2866		7%			
												'98	2080		2%			
<i>Juniperus osteosperma</i>																		
S	85	2	-	-	-	-	-	-	-	2	-	-	-	133		2		
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	85	5	-	-	1	-	-	-	-	5	-	-	1	400		6		
	91	2	4	-	2	-	-	2	-	10	-	-	-	666		10		
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2		
M	85	4	-	-	2	-	-	-	-	6	-	-	-	400	69 56	6		
	91	2	-	-	-	1	-	2	-	5	-	-	-	333	75 49	5		
	98	1	-	-	-	-	-	-	1	2	-	-	-	40	- -	2		
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	-	-	-	-	-	-	-	-	-	-	-	-	100		5		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			08%			+20%							
'91		33%			00%			00%			-92%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	800	Dec:	-			
												'91	999		-			
												'98	80		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	17	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	40		-			
Quercus gambelii																		
S	'85	-	-	1	-	-	-	-	-	-	-	1	-	-	66			1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	0		-			

Trend Study 21-14-98

Study site name: Meadow Creek .

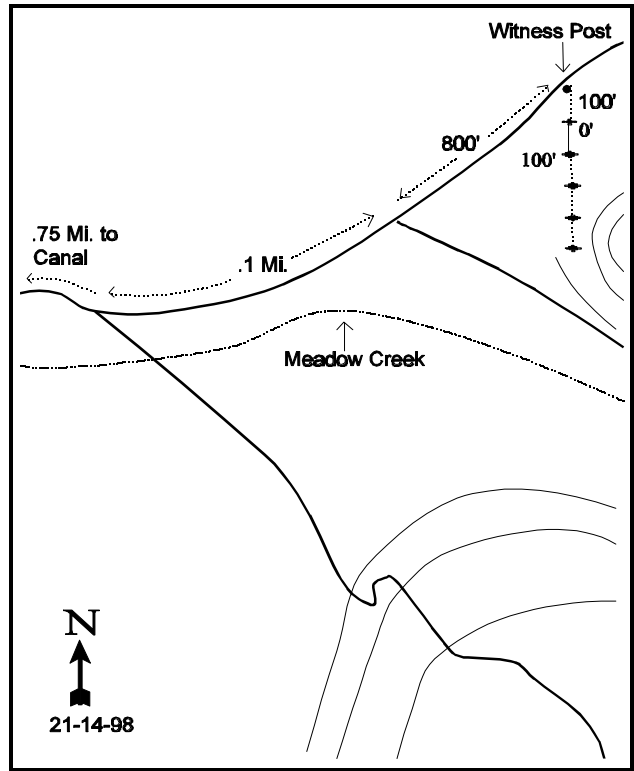
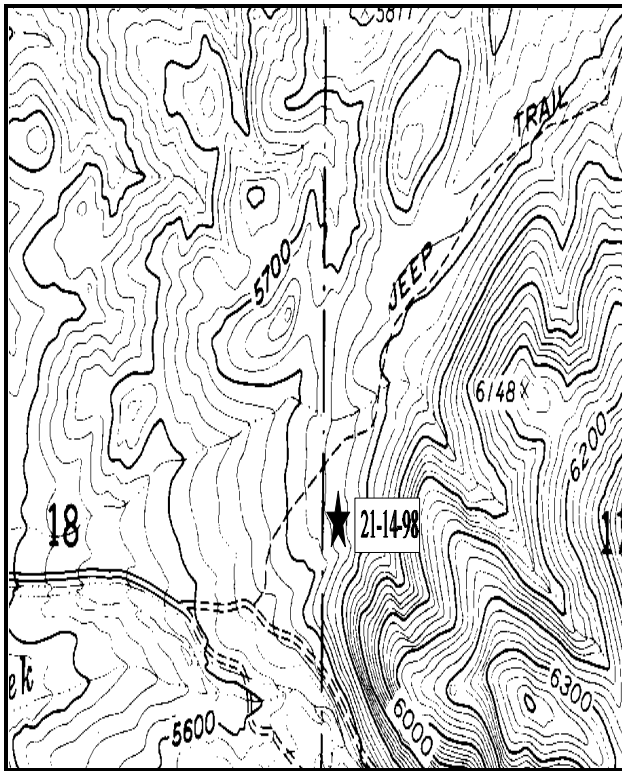
Range type: Chained, Cabled-Reseeded P-J.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the corner of 100 North and 200 East in Meadow, 0.5 miles north to the Meadow Creek Road. Turn right and go 2.75 miles east. Drive across the canal and continue 0.75 miles to a fork in the road. Turn left and go 0.1 miles to another fork. Turn left and drive up about 0.15 miles (800 feet) to a rebar witness post on the right side of the road. The baseline starts 100 feet south of the witness post. The 0-foot baseline stake is a rebar, tagged #7110.



Map Name: Fillmore, Utah

Diagrammatic Sketch

Township 22S, Range 4W, Section 17

UTM 4306158.492 N, 384045.940 E

DISCUSSION

Trend Study No. 21-14 (41-9/55-4)

The Meadow Creek study samples critical deer winter range on the foothills at the mouth of Meadow Canyon. The transect and surrounding BLM land is an important winter concentration area for big game. The site has a slope that varies from 4-8% to the west and south. The elevation is about 5,850 feet. The current vegetative composition is the result of the 1966 two-way chaining and seeding treatment. A variety of browse are found on the site, mainly mountain big sagebrush, juniper, cliffrose, and bitterbrush. Deer use is heavy, documented by consistently high pellet group counts at the Meadow Creek pellet group transect with an annual average of 61 deer days use/acre between 1980 and 1985 (Jense et al. 1985). This trend continues with the average deer days use/acre increasing to 67 between 1985 and 1991 (Jense et al. 1990). Two deer carcasses were found on the site during the 1985 reading. Pellet group data taken along the study site baseline in 1998 estimate 56 deer and 8 cow use days/acre.

The soil is derived from a sandstone parent material which is found in the profile and scattered over the surface. Effective rooting depth (see methods) is estimated at just over 13 inches. Soil texture is a sandy clay loam with a slightly acid pH (6.3). Phosphorus may be limiting to plant development at 7.6 ppm where 10 ppm is thought to be the minimum necessary for normal plant development. Cover from vegetation and litter is sufficient to slow erosion.

A good variety of browse is growing on the site, but the chaining may be reaching its peak in productivity of desirable browse. Juniper are becoming more dominant on this site. Point quarter data from 1998 estimate a density of 367 juniper trees/acre with an average trunk diameter of 3.6 inches. Fifteen percent of the trees sampled were chained over trees which were still living. Currently ('98) juniper provides 45% of the browse cover and overhead canopy cover averages 17%. This much canopy cover usually depresses understory production by about 40 to 50%, especially during long periods of drought. Mature trees average 12 to 15 feet in height. The juniper provide good cover, but an increase in numbers and canopy cover will come at the expense of the more palatable understory species.

Mountain big sagebrush, cliffrose, and bitterbrush are the preferred key species. Sagebrush is the most abundant with a density of 13,600 mostly young plants in 1985. During the 1991 reading, density was estimated at 7,399 plants/acre. The proportion of young plants in the population declined from 96% in 1985 to 22% in 1991 while the number of mature plants increased from 600 plants/acre to 5,333. The much larger sample used in 1998 estimates 1,640 sagebrush plants/acre, 77% of which are mature. The number of dead plants in the population can only explain 8% of the decrease. Therefore, this is a result of the sampling design which gives much more accurate estimate for populations that have distributions that are discontinuous and/or clumped. Utilization has remained mostly light and percent decadence is currently low at 18%. Vigor is generally good but plants displaying poor vigor have been increasing from 0 in 1985 to 11% in 1998.

Cliffrose and bitterbrush occur in small numbers. They both display good vigor with no decadent plants sampled. Use has been heavy in the past but current use is light to moderate. Broom snakeweed has declined significantly from nearly 7,000 plants/acre in 1985, to 2,132 in 1991 and only 260 by 1998.

This site supports a fair amount of perennial grasses including: crested wheatgrass, bluebunch wheatgrass, and Sandberg bluegrass. These species provide excellent early spring forage for livestock and deer. Cheatgrass is present but not in great numbers and currently ('98) provides only 19% of the grass cover. Few forbs are present, and no seeded forbs were found.

1985 APPARENT TREND ASSESSMENT

Due to the low rate of erosion and healthy vegetative and litter cover, the soil is stable. The increase of junipers could indicate a slow downward vegetative trend, although the area should continue to provide a good

quality and quantity of browse for at least ten or more years. The key species are vigorous and the current amount of hedging appears sustainable.

1991 TREND ASSESSMENT

The basic cover values indicate a stable condition, with basal vegetative cover fairly high at 12% and percent bare ground at 15%. The mountain big sagebrush population has decreased by 46%, but much of this decline was because of the excessively large young age class (96%) in 1985. It is now at a more healthy density of 7,399 plants/acre. Cliffrose and bitterbrush are stable. Broom snakeweed has declined by 70%. Trend for key browse is considered stable. The herbaceous understory is stable. Two grasses, crested wheatgrass and bluebunch wheatgrass, are doing well. There are not many forbs on the site, but this appears normal for this herd unit.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable, but poor for forbs

1998 TREND ASSESSMENT

Trend for soil appears stable with similar ground cover characteristics compared to 1991. Trend for the key browse species is down slightly. Changes in density of sagebrush and cliffrose are mostly due to the much larger sample used in 1998. However, biotic potential and the proportion of young plants in the populations of these species is low and declining. Percent decadence and the proportion of plants displaying poor vigor have both increased in the sagebrush population. The larger sample used in 1998 picked up a few bitterbrush that were not previously sampled. They appear to be stable, moderately browsed, and in good vigor. Juniper trees are abundant with an estimated density of 367 trees/acre (point quarter data). Overhead canopy cover varies on the site, but the average is 17%. It appears that the increasing juniper cover may be negatively affecting the sagebrush along with an extended drought. Trend for the herbaceous understory is up slightly due to a significant increase in the nested frequency of crested wheatgrass. Perennial forbs are still lacking.

TREND ASSESSMENT

soil - stable

browse - slightly downward with the losses to sagebrush

herbaceous understory - up slightly, but few forbs

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 14

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	_a 101	_a 111	_b 147	38	43	54	7.93
G	Agropyron smithii	-	2	-	-	1	-	-
G	Agropyron spicatum	102	89	66	37	32	27	2.36
G	Bouteloua gracilis	3	-	-	2	-	-	-
G	Bromus japonicus (a)	-	-	6	-	-	2	.03
G	Bromus tectorum (a)	-	-	191	-	-	63	2.62
G	Poa fendleriana	-	3	1	-	1	1	.03
G	Poa secunda	15	31	31	6	14	14	.39

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	<i>Sitanion hystrix</i>	13	3	5	4	1	3	.21
G	<i>Vulpia octoflora</i> (a)	-	-	12	-	-	5	.05
Total Annual Grasses		0	0	209	0	0	70	2.70
Total Perennial Grasses		234	239	250	87	92	99	10.94
F	<i>Alyssum alyssoides</i> (a)	-	-	222	-	-	68	2.38
F	<i>Arabis</i> spp.	-	2	2	-	2	1	.03
F	<i>Astragalus</i> spp.	-	-	-	-	-	-	.00
F	<i>Calochortus nuttallii</i>	-	5	-	-	3	-	-
F	<i>Cryptantha</i> spp.	-	-	3	-	-	2	.15
F	<i>Descurainia pinnata</i> (a)	-	-	5	-	-	2	.04
F	<i>Draba</i> spp. (a)	-	-	13	-	-	4	.04
F	<i>Holosteum umbellatum</i> (a)	-	-	11	-	-	5	.02
F	<i>Microsteris gracilis</i> (a)	-	-	21	-	-	8	.04
F	<i>Phlox longifolia</i>	-	3	-	-	2	-	-
F	<i>Plantago patagonica</i> (a)	-	-	3	-	-	1	.00
F	<i>Ranunculus testiculatus</i> (a)	-	-	2	-	-	2	.01
F	<i>Tragopogon dubius</i>	6	-	-	3	-	-	-
F	Unknown forb-perennial	2	-	-	1	-	-	-
F	<i>Zigadenus paniculatus</i>	-	3	-	-	1	-	-
Total Annual Forbs		0	0	277	0	0	90	2.53
Total Perennial Forbs		8	13	5	4	8	3	0.21

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

BROWSE TRENDS --
Herd unit 21 , Study no: 14

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata vaseyana	45	8.82
B	Cercocarpus montanus	0	-
B	Chrysothamnus nauseosus albicaulis	7	1.67
B	Chrysothamnus viscidiflorus stenophyllus	0	-
B	Cowania mexicana stansburiana	2	1.62
B	Gutierrezia sarothrae	10	.01
B	Juniperus osteosperma	16	12.07
B	Opuntia spp.	1	-
B	Purshia tridentata	2	.15
B	Quercus gambelii	6	2.38
Total for Browse			26.76

CANOPY COVER --
Herd unit 21 , Study no: 14

Species	Percent Cover '98
Juniperus osteosperma	17

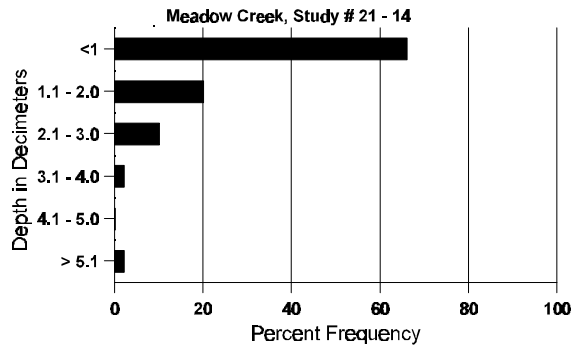
BASIC COVER --
Herd unit 21 , Study no: 14

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	345	11.00	11.75	42.72
Rock	130	3.75	4.50	5.43
Pavement	173	4.25	6.50	6.07
Litter	385	63.50	61.25	55.46
Cryptogams	88	2.25	1.00	3.31
Bare Ground	196	15.25	15.00	18.19

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 14, Study Name: Meadow Creek

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.2	59.6 (16.9)	6.3	58.0	17.4	24.6	2.4	7.6	118.4	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 14

Type	Quadrat Frequency '98
Rabbit	46
Deer	22
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 14

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia tridentata vaseyana</i>																		
S	85	25	-	-	-	-	-	-	-	-	24	-	1	-	1666			25
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
Y	85	193	2	-	-	-	-	-	-	-	195	-	-	-	13000			195
	91	21	2	-	1	-	-	-	-	-	23	1	-	-	1600			24
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600	15	18	9
	91	60	9	8	3	-	-	-	-	-	79	-	1	-	5333	6	6	80
	98	51	10	2	-	-	-	-	-	-	60	3	-	-	1260	25	37	63
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	4	-	-	3	-	-	-	-	-	4	-	-	3	466			7
	98	13	2	-	-	-	-	-	-	-	5	1	2	7	300			15
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	440			22
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		.98%			00%			00%			-46%							
'91		10%			07%			04%			-78%							
'98		15%			02%			11%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	13600	Dec:	0%				
											'91	7399		6%				
											'98	1640		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												
Cercocarpus montanus																	
Y	85	-	-	-	-	-	-	-	-	-	0		0				
	91	-	-	1	-	-	-	-	-	-	1	-	1				
	98	-	-	-	-	-	-	-	-	-	-	-	0				
M	85	-	-	1	-	-	-	-	-	-	1	25	30	1			
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		100%		00%		+ 0%									
'91		00%		100%		00%											
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	66	Dec:	-				
										'91	66		-				
										'98	0		-				
Chrysothamnus nauseosus albicaulis																	
Y	85	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	1	3	-	-	-	-	-	-	3	-	1	-	266	13	16	4
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	1	-	-	-	20	27	35	1
D	85	4	4	-	-	-	-	-	-	7	-	1	-	533			8
	91	3	2	-	-	-	-	-	-	2	-	-	3	333			5
	98	5	-	-	1	-	-	-	-	3	-	-	3	120			6
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		54%		00%		15%		-62%									
'91		40%		00%		60%		-52%									
'98		00%		00%		38%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	865	Dec:	62%				
										'91	333		100%				
										'98	160		75%				

A G R E	Y R	Form Class (No. of 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	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200	8	13	3
	91	5	-	-	-	-	-	-	-	-	5	-	-	-	333	14	12	5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	85	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	91	1	-	-	-	-	-	-	-	-	1	-	-	66		1		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			20%			+29%							
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	332	Dec:	20%			
												'91	465		14%			
												'98	0		0%			
Cowania mexicana stansburiana																		
Y	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	-	1	1	-	-	-	-	-	-	2	-	-	-	133	20	28	2
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	66	35	39	1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	55	63	1
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		67%			33%			00%			+ 0%							
'91		67%			00%			00%			-80%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	199	Dec:	-			
												'91	199		-			
												'98	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>Gutierrezia sarothrae</i>														
S	85	6	-	-	-	-	-	-	6	-	-	400		6
	91	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	1	-	-	20		1
Y	85	37	-	-	-	-	-	-	37	-	-	2466		37
	91	3	-	-	-	-	-	-	3	-	-	200		3
	98	1	-	-	-	-	-	-	1	-	-	20		1
M	85	62	-	-	-	-	-	-	62	-	-	4133	8 9	62
	91	25	-	-	-	-	-	-	25	-	-	1666	8 7	25
	98	12	-	-	-	-	-	-	12	-	-	240	6 7	12
D	85	6	-	-	-	-	-	-	5	-	1	400		6
	91	4	-	-	-	-	-	-	3	-	-	266		4
	98	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
'85		00%		00%		.95%		-70%						
'91		00%		00%		03%		-88%						
'98		00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'85	6999	Dec:	6%	
										'91	2132		12%	
										'98	260		0%	
<i>Juniperus osteosperma</i>														
Y	85	3	-	-	-	-	-	-	3	-	-	200		3
	91	2	-	-	-	-	-	-	2	-	-	133		2
	98	4	-	-	-	-	-	-	4	-	-	80		4
M	85	3	-	-	1	-	-	-	4	-	-	266	64 69	4
	91	5	1	-	-	-	-	-	5	-	1	400	121 91	6
	98	15	-	-	-	-	-	-	15	-	-	300	-	15
X	85	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
'85		00%		00%		00%		+13%						
'91		13%		00%		13%		-29%						
'98		00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'85	466	Dec:	-	
										'91	533		-	
										'98	380		-	

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total										
		1	2	3	4													
Opuntia spp.																		
S	85	-	-	-	-	-	-	-	-	-	-	-	0		0			
	91	-	-	-	1	-	-	-	-	-	-	-	1	-	66	1		
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0		
Y	85	3	-	-	-	-	-	-	-	-	-	3	-	200	3			
	91	2	-	-	1	-	-	-	-	-	-	3	-	200	3			
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	0			
M	85	1	-	-	-	-	-	-	-	-	-	1	-	66	5 9	1		
	91	4	-	-	-	-	-	-	-	-	-	4	-	266	3 4	4		
	98	1	-	-	-	-	-	-	-	-	-	1	-	20	8 13	1		
D	85	4	-	-	-	-	-	-	-	-	-	1	-	266		4		
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>										
'85		00%		00%		38%		-12%										
'91		00%		00%		00%		-96%										
'98		00%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)										'85	532	Dec:	50%					
										'91	466		0%					
										'98	20		0%					
Purshia tridentata																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	-	3	-	-	-	-	-	-	-	-	3	-	60	35 58	3		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>										
'85		00%		00%		00%		None										
'91		00%		00%		00%		Appeared										
'98		100%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-					
										'91	0		-					
										'98	60		-					
Quercus gambelii																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	4	-	-	14	-	-	-	-	-	-	18	-	360		18		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	18	-	-	3	-	-	-	-	-	-	21	-	420	43 29	21		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>										
'85		00%		00%		00%												
'91		00%		00%		00%												
'98		00%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-					
										'91	0		-					
										'98	780		-					

Trend Study 21-15-98

Study site name: Fillmore Cemetery East .

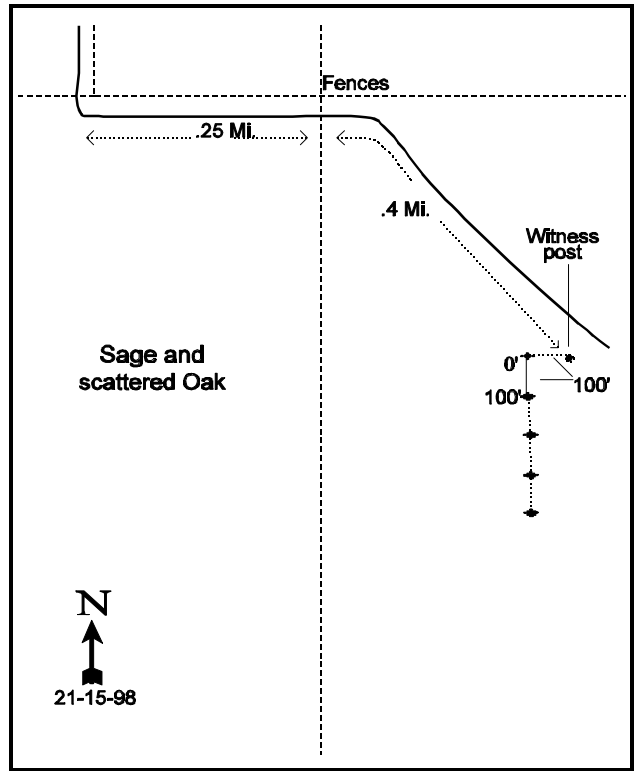
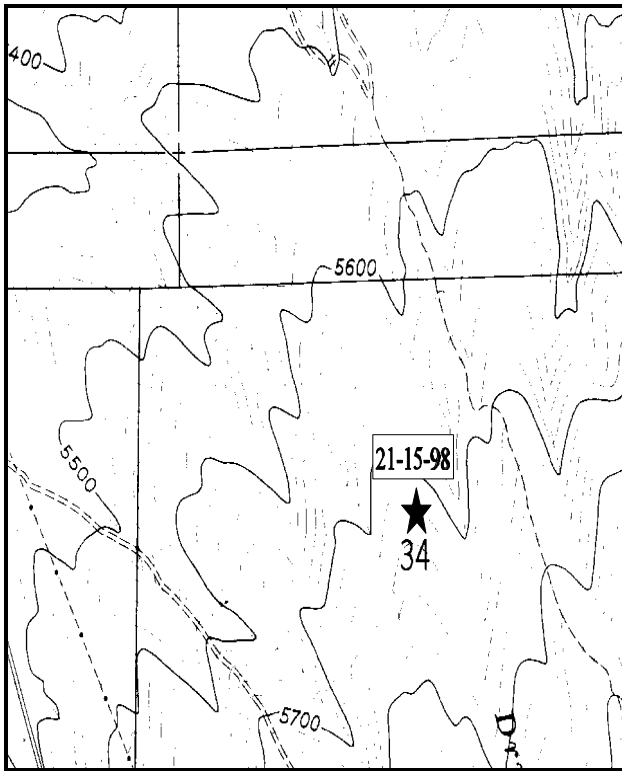
Range type: Mixed Oak-Sage .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From 500 South and Main in Fillmore (the bend in the road), go east for 0.95 miles past the LDS Church and the cemetery to an intersection. Turn right (south) and go 0.3 miles to a corral. Turn left just beyond the corral, then immediately turn right on a road that goes up a hill. Follow this road 0.5 miles to a fence line. Turn right and go down hill 0.05 miles through a fence. Turn left and travel parallel to the fence (east) for 0.25 miles to a gate. Go through the gate and bear right (not along the fence) for 0.4 miles to a rock cairn with a rebar in the center, 4 feet off the road to the right. The frequency baseline starts 100 feet west of the cairn. The O foot stake is a rebar tagged #7073.



Map Name: Fillmore, Utah

Diagrammatic Sketch

Township 21S, Range 4W, Section 34

UTM 4311087.966 N, 388279.770 E

DISCUSSION

Trend Study No. 21-15 (41-10/55-5)

The Fillmore Cemetery East trend study is located in the center of a Division owned section southeast of Fillmore. The study has a 8-10% slope with a west-northwest aspect and an elevation of 5,700 feet. The current community type is a mixture of oak and sagebrush with an occasional juniper. This type is a result of a chaining and seeding treatment done in 1973. Cattle grazed the allotment in the late 1970's, but it has been rested since 1981. Use of the area by deer determined by the South Chalk pellet group transect indicates an increase in use since the 1970's. Between 1981 and 1985, an average of 49 deer days use/acre was recorded (Jense et al. 1985). In 1991, the pellet group transect determined that deer days use/acre was down to 42. Pellet group data taken along the study site baseline in 1998 estimate 80 deer use days/acre. Most pellet groups appeared to be from the fall or early winter of 1997 and were mostly centered around bitterbrush and sagebrush plants.

Soil at the site is moderately shallow and very rocky on the surface and throughout the profile. Effective rooting depth (see methods) is estimated at almost 11 inches. Parent material is conglomerate, quartzite, and sandstone. Soil texture is a sandy clay loam with a slightly acid pH (6.5). Under the shrubs, litter is deep and the organic content of the surface layer is relatively high. In the shrub interspaces there is a considerable amount of bare ground where rock/pavement cover is concentrated on the surface. However, erosion is not a serious problem on this site and any soil movement appears localized.

Overall, browse composition is dominated by mountain big sagebrush and Gambel oak. Oak occurs in scattered clones and in some places it is more abundant than sagebrush. Mountain big sagebrush currently ('98) provides 60% of the browse cover. Population density has remained relatively stable since 1985 with about 2,500 plants/acre. The sagebrush has displayed light to moderate use since 1985. The proportion of plants displaying poor vigor and decadence peaked in 1991 at 32% and 68% respectively. Since then, vigor has improved and percent decadence has declined to 34%. Seedlings have been encountered during all readings but only in 1998 were young plants found. It appears that sagebrush seedlings are not surviving due to the high proportion of annual grasses in the understory. Currently, they make up 60% of the grass cover.

Antelope bitterbrush was encountered in the more open sagebrush areas and sampled only on the frequency baselines in 1985 and 1991. The larger sample used in 1998 picked up more bitterbrush and estimated its density at 360 plants/acre. This low-growing bitterbrush is moderately to heavily hedged. There were no seedlings sampled in 1998, but it is slowly spreading by layering.

The oak occurs in dense clumps with many young sprouts. It appears to be increasing, and although it shows little sign of use, the trees are producing good quantities of browse that deer can utilize. The larger sample used in 1998 sampled less oak and density has declined 83% as a result. Oak is rarely utilized on this site and is not as important to monitor as sagebrush and bitterbrush. It displays good vigor, has no decadent plants, and will likely slowly expand on the site. Broom snakeweed is fairly common and has nearly quadrupled in density since 1985. Other browse plants that occur relatively infrequently are white-stemmed rubber rabbitbrush and basin big sagebrush.

Perennial forbs and grasses are uncommon, especially where the oak is dense. The most common perennial species are bottlebrush squirreltail, crested wheatgrass, and Sandberg bluegrass. Cheatgrass and Japanese brome provide 60% of the grass cover. Forbs are diverse, but dominated by annuals and thistle. The herbaceous plants provide important diversity, yet not much forage when in such low frequencies.

1985 APPARENT TREND ASSESSMENT

Soil trend is stable to improving as erosion is slight and litter and soil conditions appear to be improving. Oak will continue to increase but the sagebrush is well established and it will take a long time to displace it. Therefore, mixture of sagebrush and oak should supply forage and cover requirements for many years. A continued rest from grazing will benefit the scarce herbaceous vegetation.

1991 TREND ASSESSMENT

Soil trend is stable with most of the basic cover values remaining similar to 1985 conditions. Percent bare ground did increase slightly. Bare ground (relatively high) and vegetative basal cover (fairly low) should be watched closely for any significant changes. Key browse species sampled on the density plots were mountain big sagebrush and Gambel oak. Mountain big sagebrush demonstrated slight increases in density, but decadency increased to 68%, with 32% of the plants now being classified having poor vigor. This high decadency rate is mitigated by the fairly high biotic potential of 10%. The high decadency rate is showing the effects of the relatively long drought we have been experiencing. Gambel oak exhibited a slight decrease in its density, while broom snakeweed did show a substantial increase in its density (51%). The overall trend for key browse is considered slightly down. Here again, we have the typically depleted understory of grasses and forbs for herd unit 21. There has been a slight increase (sum of nested frequency) for both grasses and forbs, but because the values are so low, trend is considered stable for now.

TREND ASSESSMENT

soil - stable

browse - slightly down

herbaceous understory - stable, but still very poor condition

1998 TREND ASSESSMENT

Trend for soil is stable with a decline in bare ground but also a decline in litter cover. Erosion is not currently a problem on this site. Trend for browse is stable for the key species, mountain big sagebrush and bitterbrush. Density of Gambel oak declined in density due to the larger sample used in 1998. It is mostly unutilized and less important as forage. Sagebrush displays light to moderate use, improving vigor, and a decline in percent decadence from 68% to 34%. Young plants sampled in 1998 appear to be in sufficient numbers to maintain the current population. Bitterbrush was picked up in the larger sample used in 1998. Population density is currently estimated at 360 plants/acre. Utilization is moderate to heavy, but vigor is good and there were no decadent plants sampled. The herbaceous understory is depleted especially for forbs. Three species of perennial grasses are present in moderate numbers, but annual grasses consisting of Japanese brome and cheatgrass currently account for 60% of the grass cover. One of the perennial grasses is bulbous bluegrass, a less desirable species. It appeared in 1991 and has increased significantly in nested frequency. Forbs are diverse but dominated by annuals and thistle. Trend is considered stable.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable, but poor condition

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	22	11	28	9	5	10	1.03
G	Agropyron spicatum	-	3	4	-	1	1	.03
G	Bromus japonicus (a)	-	-	155	-	-	52	2.98
G	Bromus tectorum (a)	-	-	266	-	-	91	3.80
G	Poa bulbosa	_a -	_a 8	_b 26	-	2	8	1.16
G	Poa fendleriana	-	-	3	-	-	1	.03
G	Poa secunda	_a 16	_a 26	_b 55	7	10	21	.87
G	Sitanion hystrix	_a 22	_{ab} 45	_b 50	11	22	24	1.35
G	Vulpia octoflora (a)	-	-	7	-	-	3	.01
Total Annual Grasses		0	0	428	0	0	146	6.79
Total Perennial Grasses		60	93	166	27	40	65	4.50
F	Alyssum alyssoides (a)	-	-	157	-	-	54	1.03
F	Arabis spp.	-	-	3	-	-	1	.03
F	Astragalus argophyllus	2	3	3	1	1	1	.03
F	Astragalus cibarius	1	1	3	1	1	3	.04
F	Asclepias spp.	-	-	7	-	-	2	.18
F	Calochortus nuttallii	_a -	_b 8	_a -	-	5	-	-
F	Chaenactis douglasii	-	4	-	-	2	-	-
F	Cirsium calcareum	17	9	15	7	5	9	.70
F	Cirsium parryi	-	25	-	-	13	-	-
F	Collinsia parviflora (a)	-	-	8	-	-	4	.02
F	Crepis acuminata	-	-	1	-	-	1	.00
F	Cryptantha spp.	-	3	-	-	1	-	-
F	Descurainia pinnata (a)	-	-	13	-	-	5	.02
F	Draba spp. (a)	-	-	43	-	-	16	.42
F	Epilobium paniculatum (a)	-	-	3	-	-	1	.00
F	Eriogonum racemosum	-	5	-	-	3	-	-
F	Galium boreale	-	-	4	-	-	2	.01
F	Holosteum umbellatum (a)	-	-	27	-	-	13	.06
F	Lactuca serriola	-	9	-	-	5	-	-
F	Linum lewisii	_b 14	_a 2	_{ab} 6	6	1	3	.04
F	Lithospermum rudérale	6	7	-	4	3	-	-
F	Lithophragma	-	-	-	-	-	-	.00
F	Machaeranthera canescens	1	3	3	1	2	1	.00
F	Microsteris gracilis (a)	-	-	6	-	-	4	.04
F	Phlox longifolia	3	5	2	3	3	2	.01
F	Ranunculus testiculatus (a)	-	-	49	-	-	17	.13
F	Sphaeralcea coccinea	-	-	2	-	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	<i>Streptanthus cordatus</i>	-	-	1	-	-	1	.00
F	<i>Zigadenus paniculatus</i>	_a 6	_b 17	_a 6	2	9	3	.07
Total Annual Forbs		0	0	306	0	0	114	1.72
Total Perennial Forbs		50	101	56	25	54	30	1.17

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

BROWSE TRENDS --

Herd unit 21 , Study no: 15

Type	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata tridentata</i>	2	.15
B	<i>Artemisia tridentata vaseyana</i>	79	16.63
B	<i>Gutierrezia sarothrae</i>	41	2.22
B	<i>Opuntia</i> spp.	2	.15
B	<i>Purshia tridentata</i>	12	6.00
B	<i>Quercus gambelii</i>	16	2.68
Total for Browse		152	27.84

BASIC COVER --

Herd unit 21 , Study no: 15

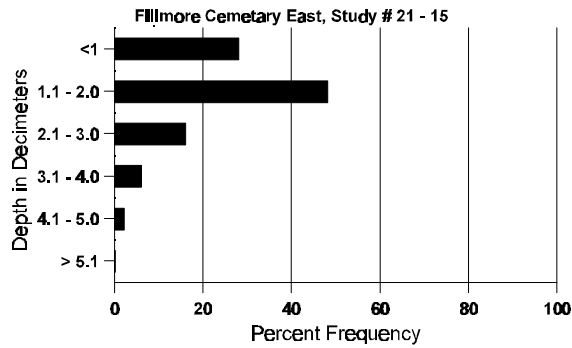
Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	354	1.75	2.75	39.64
Rock	144	4.75	6.75	6.26
Pavement	244	17.25	12.50	16.35
Litter	391	57.25	57.00	54.25
Cryptogams	75	0	0	1.10
Bare Ground	210	19.00	21.00	15.75

SOIL ANALYSIS DATA --

Herd Unit 21, Study # 15, Study Name: Fillmore Cemetary East

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.7	56.2 (11.9)	6.5	46.0	27.4	26.6	2.8	23.4	169.6	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 15

Type	Quadrat Frequency '98
Rabbit	15
Horse	1
Deer	51

BROWSE CHARACTERISTICS --

Herd unit 21 , 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	5	6	7	8	9		1	2		
Artemisia tridentata tridentata															
M	'85	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	2	-	-	-	-	-	-	-	-	2	40	40	47	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>				
'85		00%			00%			00%							
'91		00%			00%			00%							
'98		00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-	
											'91	0		-	
											'98	40		-	

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																	
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	91	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9
M	85	13	9	-	-	-	-	-	-	-	22	-	-	-	1466	26 29	22
	91	7	-	-	5	-	-	-	-	-	12	-	-	-	800	31 35	12
	98	65	14	-	-	-	-	-	-	-	79	-	-	-	1580	25 36	79
D	85	10	5	-	-	-	-	-	-	-	13	-	1	1	1000		15
	91	18	3	-	3	2	-	-	-	-	14	-	-	12	1733		26
	98	38	6	-	-	-	-	-	-	-	35	-	2	7	880		44
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	520		26
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		38%			00%			05%			+ 3%						
'91		13%			00%			32%			+ 5%						
'98		15%			00%			07%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	2466	Dec:	41%		
												'91	2533		68%		
												'98	2660		34%		
<i>Gutierrezia sarothrae</i>																	
S	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4
	91	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	85	13	1	-	-	-	-	-	-	-	12	-	2	-	933		14
	91	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6
	98	32	-	-	-	-	-	-	-	-	32	-	-	-	640		32
M	85	7	-	-	-	-	-	-	-	-	6	-	1	-	466	7 6	7
	91	35	-	-	-	-	-	-	-	-	35	-	-	-	2333	9 11	35
	98	223	-	-	-	-	-	-	-	-	223	-	-	-	4460	7 9	223
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		05%			00%			14%			+51%						
'91		00%			00%			00%			+44%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	1399	Dec:	0%		
												'91	2866		5%		
												'98	5100		0%		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Opuntia</i> spp.																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	1	-	-	-	-	-	2	-	-	-	40	7	16
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	40		-		
<i>Purshia tridentata</i>																	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	1	-	-	2	-	-	3	-	-	-	60		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	11	3	-	1	-	-	-	-	15	-	-	-	300	21	46
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		67%			17%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	360		-		
<i>Quercus gambelii</i>																	
S	85	121	-	-	-	-	-	-	-	119	1	-	1	8066			121
	91	20	-	-	12	-	-	2	-	33	1	-	-	2266			34
	98	9	-	-	-	-	-	-	-	9	-	-	-	180			9
Y	85	110	-	-	-	-	-	-	-	103	-	7	-	7333			110
	91	38	-	-	24	-	-	23	-	85	-	-	-	5666			85
	98	31	-	-	4	-	-	-	-	35	-	-	-	700			35
M	85	22	3	-	-	-	-	-	-	22	1	2	-	1666	66	45	25
	91	7	2	-	10	2	-	-	12	33	-	-	-	2200	72	38	33
	98	40	-	-	-	-	-	-	-	40	-	-	-	800	50	35	40
D	85	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	4	1	-	2	4	-	-	5	6	-	-	10	1066			16
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	300			15
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		02%			00%			07%			- 1%						
'91		07%			00%			07%			-83%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	9065	Dec:	1%		
												'91	8932		12%		
												'98	1500		0%		

Trend Study 21-16-98

Study site name: Baker Canyon .

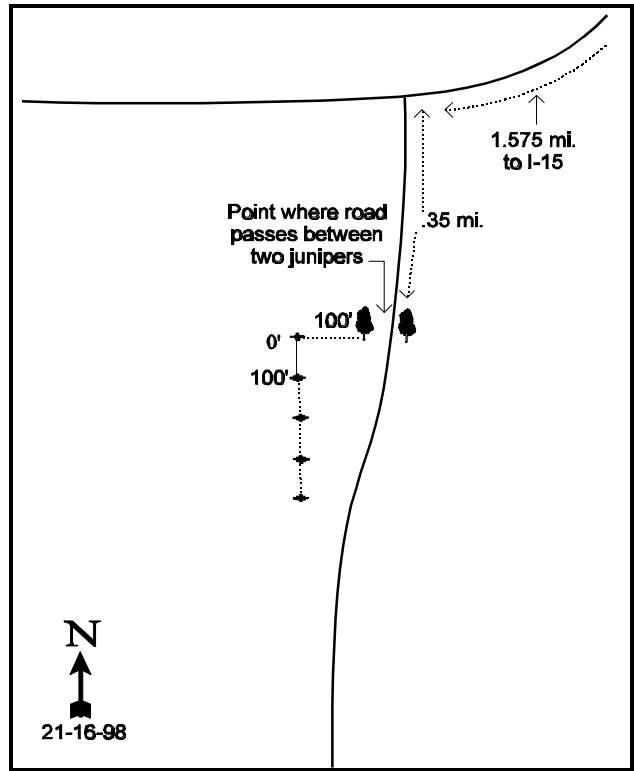
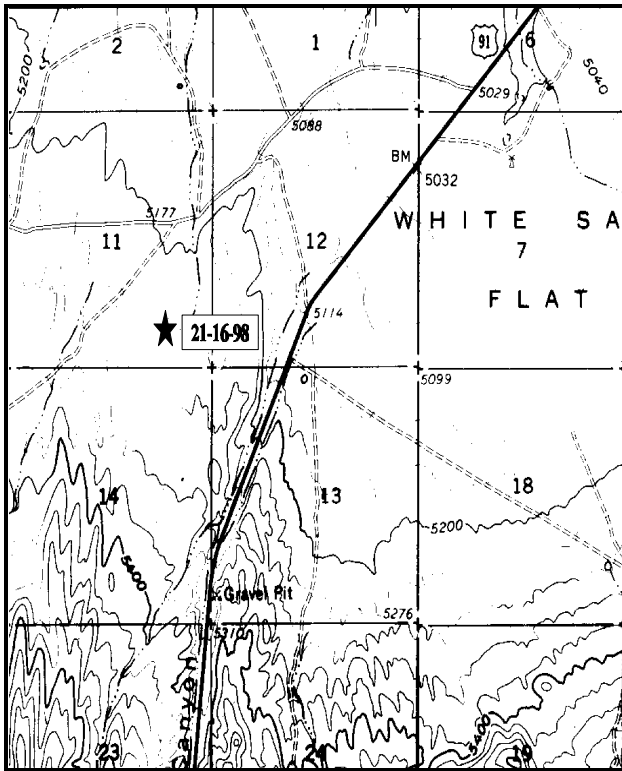
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed south from Kanosh on the main road. Turn left just before the I-15 interchange. Travel on the frontage road for 1.8 miles (paralleling the freeway on the east side) to an overpass. Go over the interstate and continue 0.5 miles west to a fork. Take the left fork and go about 1.05 miles. Just beyond the point of a small hill turn left on a 2-tire track road. Go 0.35 miles to the first point where the road squeezes between two junipers. From the south side of the large juniper to the right, go 100 feet due west to the start of the frequency baseline. The 0-foot baseline stake is a rebar, tagged #7071.



Map Name: Cove Fort, Utah

Diagrammatic Sketch

Township 24S , Range 7W , Section 11

UTM 4288115.455 N , 360986.614 E

DISCUSSION

Trend Study No. 21-16 (41-11/55-6)

The Baker Canyon trend study samples deer winter range west of I-15 and the White Sage Flat area. It is an arid, nearly level site with a slight west aspect at an elevation of 5,300 feet. The range type is Wyoming big sagebrush-grass with scattered junipers. Some of the surrounding area was plowed and drilled with Russian wildrye in 1967, but the study site itself was not treated. It has been used for spring grazing on a three pasture rest-rotation system. The BLM did a control burn of the area prior to the 1991 reading to reduce Wyoming big sagebrush. The original frequency baseline remained unburned but the density plots were burned which effectively reduced the sagebrush density by 95%. Traditionally, deer concentrate in the White Sage Flat area in the winter and spring, but past use was reported as being light. Sheep appeared to have used the area in the past putting heavy pressure on the sagebrush. Pellet group data from 1998 estimate 19 deer and 7 cow use days/acre. Deer use is concentrated in the remaining fingers of unburned sagebrush.

The soil is a moderately shallow sandy clay loam of the Pharo Series which is very cobbly on the surface and through the soil profile. Effective rooting depth (see methods) is estimated at just over 11 inches. It is moderately eroded and a concentration of pavement and rock is left on the surface averaging 28% cover in 1998. Parent material is limestone. There is a buildup of litter and soil around the plants, but generally litter cover is low and bare soil abundant. Soil movement is not a serious problem because of the levelness of the terrain.

The most abundant and palatable browse species is Wyoming big sagebrush which had a density of nearly 4,000 plants/acre in 1985. The rather short sagebrush plants had a "clubbed" appearance, which may be the result of past heavy hedging (by sheep and/or deer) and poor annual growth (drought). Before the burn (1985), the majority of the population was made up of old mature plants, many classified as decadent (42%). However, seedlings and young were well represented. Since the burn, the density of sagebrush was estimated at only 199 plants/acre in 1991, with no seedlings and young plants accounting for 67% of the population. The new, much larger sample size used in 1998 estimated 780 sagebrush plants/acre, 79% of which are mature. Shrub density is now estimated along five, 100 foot belts located on a 400 foot baseline which includes the original unburned frequency baseline. Nearly all of the sagebrush on the site occurs within this unburned section while burned areas are dominated by herbaceous vegetation. Utilization of the sagebrush is similar to previous years with mostly moderate use and normal vigor on all plants.

Some juniper trees were killed by the burn, but many remain scattered through the area. Other browse species are present in low numbers and include: ephedra, rubber rabbitbrush, and narrowleaf low rabbitbrush.

The herbaceous vegetation is a significant component of this site especially since the burn. Common grasses include: bluebunch wheatgrass, Sandberg bluegrass, and bottlebrush squirrel. Cheatgrass is present but not dominant, producing 39% of the grass cover. Forbs provide little forage but some species are fairly common.

1985 APPARENT TREND ASSESSMENT

Soil trend is stable, owing mainly to the levelness of the site. Vegetative trend also appears stable, except junipers appear to be very slowly encroaching onto the sagebrush flat. The sagebrush appears to have been very heavily used but the age class composition indicates a self-sustaining population. This is an area where deer look for an early green-up feed source each spring. Any management to increase the herbaceous component without eliminating the sagebrush would be beneficial to both deer and livestock.

1991 TREND ASSESSMENT

The soil trend continues to be stable with a slight increase in vegetative basal cover and small decrease in percent bare ground. The most significant change is the burn treatment that took place since 1985. It affected

the density plots, but not the frequency baseline. The burn effectively left a mosaic pattern of shrub and grass openings. The key browse species, Wyoming big sagebrush, decreased by 95% while all of the juniper around the density plots were kill by the fire. For key browse, the overall trend is down. The herbaceous understory has shown significant improvement for the grasses, but much of the increased sum of nested frequency for forbs is for increasers like Russian thistle. Bluebunch wheatgrass, Indian ricegrass, Sandberg bluegrass, and bottlebrush squirreltail have all demonstrated substantial increases in their frequencies. The change is more significant than the data shows due to the fact that nearly all of the frequency data comes from the unburned part of the frequency baseline. Overall trend for herbaceous understory is up.

TREND ASSESSMENT

soil - stable

browse - down with the burning treatment

herbaceous understory - up

1998 TREND ASSESSMENT

Trend for soil appears down due to an increase in percent bare ground from 24% to 41% and a decline in litter cover (43% to 29%). Some of the differences are due to the larger sample used in 1998 which sampled more of the burned areas. Previous frequency and cover data came almost entirely from an unburned finger of Wyoming big sagebrush which actually has higher vegetative and litter cover. The burned areas contain mostly bunch grasses with bare ground in between. Photo point comparisons do not show any significant changes in ground cover characteristics. With this in mind, trend for soil is considered stable. No erosion is noticeable due in part to the level terrain. Trend for browse appears stable. Again, the last reading sampled sagebrush only in burned areas while the new, much larger sample includes part of the original frequency baseline which was left mostly unburned. Most of the mature and decadent shrubs sampled occurred within this unburned section. Utilization of the sagebrush is similar to 1991 levels, vigor is normal on all plants and percent decadence is low at 15%. Recruitment is poor however with no seedlings and few young being sampled. Trend for the herbaceous understory is stable for grasses but down for forbs. Nested frequency of the dominant grass, bluebunch wheatgrass, has increased significantly since 1991. However, more of the burned areas were sampled in 1998 where bluebunch wheatgrass is more abundant. All other perennial grasses encountered in 1991 declined significantly in nested frequency. Sum of nested frequency of perennial forbs has declined since 1991, but much of the difference is due to a lower frequency of Russian thistle. Trend is considered stable for the herbaceous understory.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 16

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	<i>Agropyron spicatum</i>	_a 77	_a 69	_b 132	32	34	51	7.48
G	<i>Bromus tectorum</i> (a)	-	-	238	-	-	84	6.51
G	<i>Elymus junceus</i>	-	-	1	-	-	1	.00
G	<i>Oryzopsis hymenoides</i>	_a 4	_b 23	_a 8	2	10	3	.39
G	<i>Poa fendleriana</i>	_b 8	_a -	_{ab} 1	4	-	1	.15
G	<i>Poa secunda</i>	_a 53	_b 96	_a 62	24	39	29	1.73
G	<i>Sitanion hystrix</i>	_a 28	_b 68	_a 24	14	29	13	.52
Total Annual Grasses		0	0	238	0	0	84	6.51
Total Perennial Grasses		170	256	228	76	112	98	10.28
F	<i>Alyssum alyssoides</i> (a)	-	-	304	-	-	92	3.30
F	<i>Antennaria rosea</i>	-	3	-	-	1	-	-
F	<i>Astragalus calycosus</i>	_a -	_b 48	_b 62	-	19	28	.93
F	<i>Astragalus marianus</i>	17	26	3	8	11	3	.04
F	<i>Calochortus nuttallii</i>	-	3	-	-	2	-	-
F	<i>Chaenactis douglasii</i>	3	12	-	1	5	-	-
F	<i>Comandra pallida</i>	-	-	5	-	-	2	.03
F	<i>Crepis acuminata</i>	-	2	-	-	1	-	-
F	<i>Draba</i> spp. (a)	-	-	4	-	-	2	.01
F	<i>Erodium cicutarium</i> (a)	-	-	59	-	-	21	1.17
F	<i>Lactuca serriola</i>	-	4	1	-	3	1	.00
F	<i>Machaeranthera canescens</i>	_b 33	_a 8	_{ab} 15	15	6	11	.23
F	<i>Phlox hoodii</i>	_a 25	_b 56	_b 64	13	24	25	2.58
F	<i>Phlox longifolia</i>	-	18	-	-	9	-	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	138	-	-	46	1.04
F	<i>Salsola iberica</i> (a)	-	58	-	-	30	-	-
F	<i>Sphaeralcea coccinea</i>	14	25	33	7	12	12	1.40
F	<i>Thlaspi alpestre</i>	_b 11	_a -	_a -	5	-	-	-
Total Annual Forbs		0	58	505	0	30	161	5.52
Total Perennial Forbs		103	205	183	49	93	82	5.25

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

BROWSE TRENDS --
Herd unit 21 , Study no: 16

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	23	3.15
B	Chrysothamnus nauseosus albicaulis	1	1.00
B	Chrysothamnus viscidiflorus stenophyllus	10	.99
B	Ephedra nevadensis	4	1.23
B	Gutierrezia sarothrae	0	-
B	Juniperus osteosperma	2	2.90
Total for Browse		40	9.29

CANOPY COVER --
Herd unit 21 , Study no: 16

Species	Percent Cover '98
Juniperus osteosperma	2

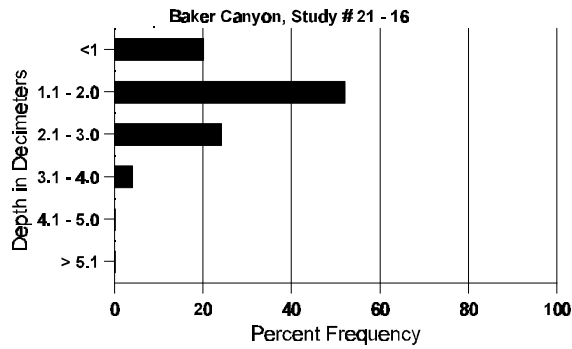
BASIC COVER --
Herd unit 21 , Study no: 16

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	364	2.50	4.50	33.32
Rock	205	2.00	2.75	4.11
Pavement	326	26.00	22.75	23.60
Litter	390	40.25	42.75	28.61
Cryptogams	43	4.50	3.75	1.54
Bare Ground	320	24.75	23.50	40.77

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 16, Study Name: Baker Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.1	50.6 (11.8)	7.1	48.0	27.4	24.6	1.0	16.8	140.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 16

Type	Quadrat Frequency '98
Rabbit	7
Deer	13
Cattle	4

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 16

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia tridentata wyomingensis</i>																		
S	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	4	5	-	-	-	-	-	-	-	9	-	-	-	600			9
	91	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	98	2	-	-	-	-	-	-	-	-	1	1	-	-	40			2
M	85	12	13	1	-	-	-	-	-	-	26	-	-	-	1733	26	22	26
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	66	8	8	1
	98	15	15	-	1	-	-	-	-	-	30	-	-	-	620	21	27	31
D	85	1	21	3	-	-	-	-	-	-	17	-	-	8	1666			25
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	5	1	-	-	-	-	-	-	6	-	-	-	120			6
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	480			24
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		65%			07%			13%			-95%							
'91		67%			00%			00%			+74%							
'98		51%			03%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	3999	Dec:	42%			
												'91	199		0%			
												'98	780		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		1	2									
<i>Chrysothamnus nauseosus albicaulis</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	1	-	-	-	20	43	80	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-				
										'91	0		-				
										'98	20		-				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	1	-	-	-	-	-	-	1	-	-	-	66	10	4	1
	98	13	-	-	-	-	-	-	-	13	-	-	-	260	10	13	13
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		100%			00%			00%			+75%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-				
										'91	66		-				
										'98	260		-				
<i>Ephedra nevadensis</i>																	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	2	-	-	-	40			2
M	85	-	1	-	-	-	-	-	-	1	-	-	-	66	19	21	1
	91	1	-	-	-	-	-	-	-	1	-	-	-	66	30	43	1
	98	1	1	1	-	-	-	-	-	3	-	-	-	60	26	49	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		100%			00%			00%			+ 0%						
'91		00%			00%			00%			+34%						
'98		20%			20%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	66	Dec:	-				
										'91	66		-				
										'98	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				
Gutierrezia sarothrae																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	19	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	0		-			
Juniperus osteosperma																		
S	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	1	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	266	Dec:	-			
												'91	0		-			
												'98	40		-			

SUMMARY

WILDLIFE MANAGEMENT UNIT - 21 (39, 41) - FILLMORE

Soil, browse, and herbaceous trends are, on average, up for unit 21 compared to 1991 data. In 1991, 5 sites displayed a downward or slightly downward soil trend, 10 sites had a downward or slightly down browse trend and one site showed a slightly downward herbaceous understory trend. Currently no sites have a downward soil trend and only 5 sites display a downward or slightly down browse trend. Only two sites have a downward herbaceous understory trend. Most of the improvements in the soil and downward trends in browse are caused by an alarming abundance of cheatgrass and other annual grasses and forbs in the understories of these sites. Thick cheatgrass provides additional vegetation and litter cover, but it also is more susceptible to fire which has occurred on several sites since study establishment in 1985. Fires on these critical winter ranges have been devastating because they eliminate important browse forage. One such fire burned the site at Dog Valley in 1996. The site originally supported a good stand of cliffrose, however a thick stand of cheatgrass was present in the understory. After the fire, no cliffrose survived and the site is now totally dominated by cheatgrass. A few other sites on this unit support good quality browse, but the understories are similarly dominated by cheatgrass. It is not a question of what if there is a fire, but when it will occur.

Cheatgrass, a winter annual, also provides intense competition to shrub seedling establishment and most sites show reduced shrub reproduction as a result. In addition, many sites in the unit have high soil temperatures (+70°F) which give winter annuals like cheatgrass, a significant competitive advantage over perennial grasses and forbs. Extra care must be taken on these sites with regard to their grazing management, because overgrazing can quickly push these sites to dominated by annual grasses.

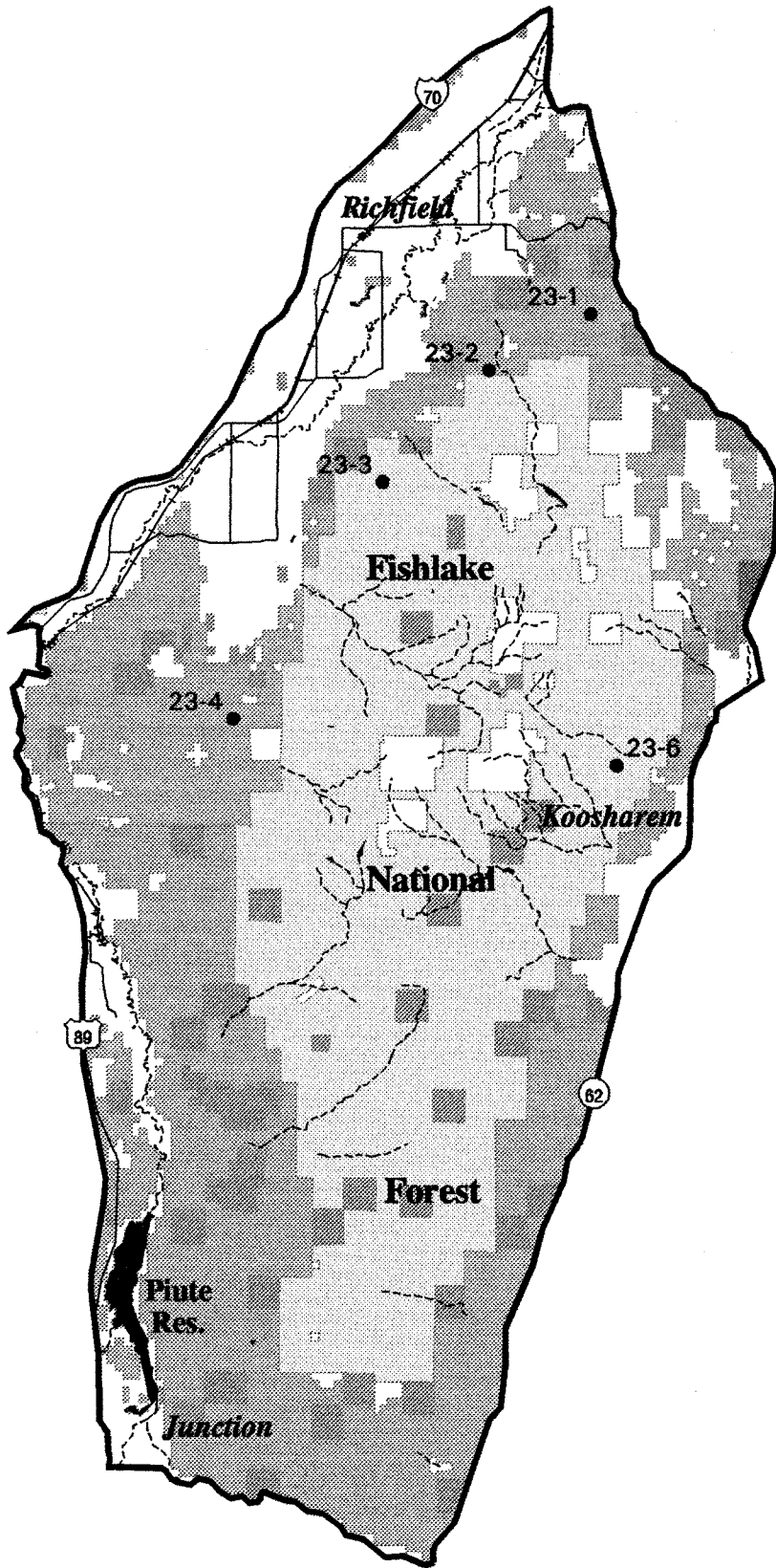
The only thing which appears to keep cheatgrass in check is a healthy perennial grass component. Six sites on the unit have perennial grass cover values which range from almost 10% to 25% with an average of 15%. Cheatgrass on these perennial dominated sites averages only about 4% cover and usually provides no more than 20% of the total grass cover. The other 10 sites have an average of only about 5% perennial grass cover. Cheatgrass on these sites averages 21% cover and provides almost 80% of the grass cover.

Another unit wide trend, caused partly by the dominance of cheatgrass, is the poor condition of nearly all the forb components of the herbaceous understories. Perennial forbs are severely lacking and average less than 2% cover for all 16 sites in the unit. Total forb cover averages only just under 5% on this unit.











Site	1991			1998		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & Forbs
21-1 Long Canyon	-	0	+	0	0	0
21-2 Lovell Hollow	0	-	+	0	+	0
21-3 Cascade Spring	+	0	0	0	0	+
21-4 Horse Hollow	-	-	+	0	-	-
21-5 Wood Canyon	-	-	0	+	-	+
21-6 "M" Hill	0	0	+	+	0	0
21-7 Bennet Field	0	-	+	0	-	-
21-8 Smith's Ridge	+	-	+	0	+	+
21-9 Wide Canyon BLM	-	0	0	+	0	0
21-10 Wide Canyon DWR	-	-	+	+	-	+
21-11 Dog Valley	0	-	0	0	-	+
21-12 Dameron Canyon	-	-	-	+	-	0
21-13 Walker Canyon	0	0	0	+	0	+
21-14 Meadow Creek	0	0	0	0	-	+
21-15 Fillmore Cemetery	0	-	0	0	0	0
21-16 Baker Canyon	0	-	+	0	0	0

(+) = upward trend, (-) = downward trend, (0) = stable trend

Management Unit 23

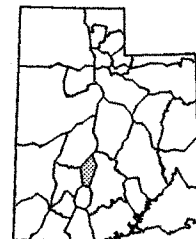


Legend

-  Forest Service
-  BLM
-  State of Utah
-  Native American Reservation
-  Private Land
-  Water Body
-  Transect Location
-  Road
-  Railroad
-  Perennial Stream



Unit Location



Map Scale 1:364,320 (1" = 5.75 miles)

UDAF GIS March, 1999

WILDLIFE MANAGEMENT UNIT- 23 (45) - MONROE

Boundary Description

Piute and Sevier counties - The boundary begins at Interstate 70 and highway U.S. 89 at Sevier; then south on US-89 to highway SR-62; then east and north on SR-62 to highway SR-24; then on SR-24 to I-70; south on I-70 to US-89 and beginning point.

Management Unit Description

Unit 23, located in central Utah, completely encompasses Monroe Mountain for which it is named. This mountain is oriented north and south with drainages to the east, south and west. All of the water from the mountain eventually enters the Sevier River, either directly from the west side of the mountain or via tributaries (Otter Creek and the east fork of the Sevier River) on the east and south sides. The top of the mountain is relatively flat and has a good mixture of spruce-fir forests, aspen stands, sagebrush flats, and meadows. Numerous springs, small lakes, and reservoirs provide reliable water sources for both livestock and wildlife. Signal Peak at 11,223 feet and Monroe Peak at 11,227 feet are the elevational high points. The municipalities located within the unit boundaries are Richfield, Sigurd, Elsinore, Joseph, Sevier, Marysvale, Junction, Kingston, Angle, Greenwich, and Koosharem.

Winter range is still considered the limiting factor for the unit's elk and deer herds. The upper limits of the normal range extend to 8,000 feet on the southern end of the mountain and 7,800 feet on the northern end. During severe winters, the upper limit drops to about 7,800 feet on the southern end, and 6,800 feet on the northern end. Deer wintering on the north end are particularly susceptible to winter loss during harsh winters when the winter range is severely restricted by deep snows. Winter concentration areas for deer are between Glenwood and Poverty Flat on the west side and between Burrville and Greenwich on the east side. The units elk herd splits each winter with part wintering near Greenwich and part wintering near Marysvale. Crop depredation problems occur each year in the fields near Greenwich and Monroe. Revegetation of adjacent pinyon-juniper areas is an ongoing task to provide an alternate forage source for these problem animals. In addition, a 2-mile stretch of experimental high-tension electric fence was built across the top of a field south of Monroe. This fence has helped eliminate depredation problems on that particular field when it is maintained properly.

Huff and Blotter (1964) did the initial winter range survey. They reported acreages and percent cover of preferred deer browse for four general winter range vegetative types. Pinyon-juniper made up 62% of the winter range with 13% of the browse preferred by deer. The sagebrush, mixed, and mountain brush types cover 27%, 7%, and 4% of the winter range respectively. With regard to these last three vegetative types, percent preferred browse made up 14%, 18%, and 39% of these vegetative types respectively. The pinyon-juniper type, which provides good protective cover, but is a less productive source of preferred browse, appears to be slowly encroaching into other vegetative types. Estimate of total acreage for normal winter range is 146,000 acres. Mann (1985) determine how much additional acreage would be needed. He determined that approximately 2,026 acres needed to be acquired from private landowners to help maintain the herd at its present numbers.

The summer range is in fairly good condition despite a history of overgrazing by livestock. More restrictive grazing plans have resulted in an upward trend in vegetative composition and vigor in recent years. The gentle topography, abundance of water with an interspersed of forage and cover provide quality fawning, calving, and summering areas for both deer and elk. Fawn production and survival is normally good. The ratio of fawns per 100 does was 82 between 1975-84 (Jense et al. 1985). It had fallen to 76 fawns/100 does with the prolonged drought since 1985 (Jense et al. 1991). The summer range has an extensive network of roads with new roads having been proposed for timber sales. These roads and the associated activities can cause stress on the wildlife and affect their land use patterns. Some road closures would be beneficial to the

units big game populations in the future. Many summer homes have been built and more will likely be built in the future on the parcels of private land scattered throughout the summer range. The mountain is used for camping and fishing during the summer, and hunting in the fall.

The Monroe Mountain unit has been a productive deer unit providing excellent hunting opportunities in the past. Between 1951 and 1971, an average of 1,456 bucks were taken for a yearly hunter success rate averaging over 75% (Jense et al. 1985). A combination of overharvesting does during the either sex hunts of 1971 and 1972, a drought during 1974-75 and the devastating winters of 1972-73 and 1978-79, resulted in low population levels in the late 1970's and early 1980's, but the herd has rebounded well and is once again nearing carrying capacity. The lower deer numbers reduced pressure on the forage, and combined with good water years from 1982 through 1985, resulted in improved range conditions. Because of the great variations in deer harvest through time, a regression of deer harvest from 1950 to 1990 gives a more realistic indication of overall trend through the last forty years. The regression of the trend actually shows a 5% decline.

The Monroe Mountain elk herd unit boundaries are the same as the deer herd unit boundaries. This is a new elk unit. The first elk hunt was held in 1982. Ten bull permits have been issued each year since, with 21 mature bulls and 3 spikes harvested during the 1982, 1983 and 1984 hunts (Jense et al. 1985). Since 1985, the number of bull permits have remained about the same until 1990 with a more than 30% increase in permits and over 50 antlerless permits. The elk population appears to be increasing at this time.

Bear Ridge, Sols Meadow, Thompson Basin, Poverty Flat, Smith Canyon and Koosharem Canyon were chosen as study sites by an interagency committee of Forest Service, BLM, and DWR personnel. These permanent range trend transects were established and read in 1985, and reread in both 1991 and 1998.

Trend Study 23-1-98

Study site name: Bear Ridge .

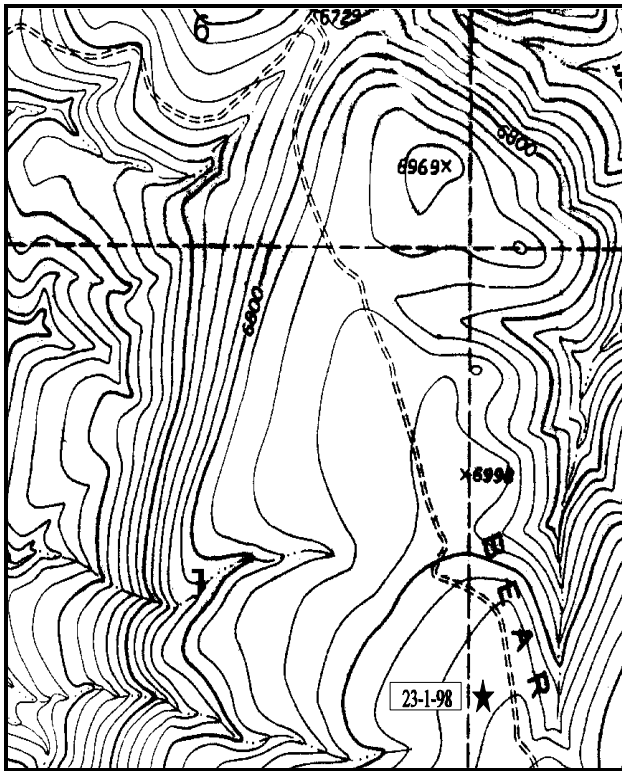
Range type: Pinyon-Juniper.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

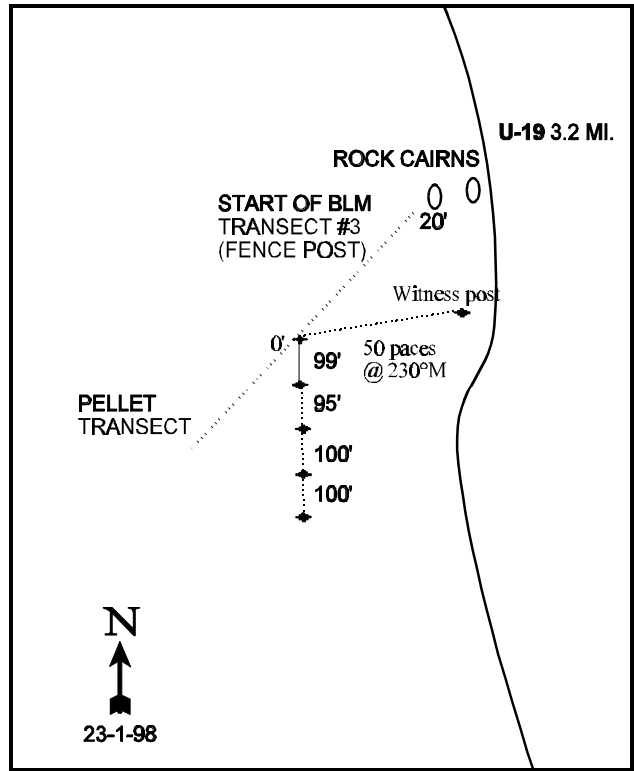
LOCATION DESCRIPTION

From Richfield, go east on Highway 119 to the junction of U-24. One hundred yards before the intersection there is a dirt road to the right (west) off of Highway 119. Follow this road for 1.5 miles to a hairpin turn, keep right. Go 0.55 miles to a fork, bear left and go 1.15 miles more to a witness post on the west side of the road. Walk 50 paces at 230 degrees magnetic to the 0-foot baseline stake. The trend study stakes are rebar 2-1/2 feet tall, the first one has a browse tag #7038 attached.



Map Name: Water Creek Canyon, Utah

Township 24S, Range 1W, Section 8



Diagrammatic Sketch

UTM 4287487.128 N, 418334.021 E

DISCUSSION

Trend Study No. 23-1 (45-1)

The Bear Ridge study site is located near the top of Bear Ridge. It has a gentle slope (5-10%) and a southwest aspect. The ridge is covered by a mature pinyon-juniper stand with a fairly abundant understory of shrubs and herbaceous vegetation. The 7,000 foot elevation is still within the limits of normal winter range. The range trend study samples the same area as the Bell Rock pellet group transect. Counts from the pellet transect show that deer use has remained relatively stable through 1985 with an average of 22 deer days use/hectare (Jense et al. 1985). The average at that time was low when compared to data from the other pellet group transects in the herd unit. Deer use from 1985 to 1991 averaged almost 36 deer days use/hectare (Jense et al. 1991). There was no sign of elk use at that time. In 1998, a pellet group transect indicated that deer use was up to 52 deer days use/acre, while some elk use was noted (8 elk days use/acre). Livestock grazing pressure still appears to be light on this BLM land.

The soil is covered by a layer of erosion pavement and rocks. Currently, this covers almost 38% of the soil surface. More than one-third of the ground cover is made up of rock and pavement. Percent bare soil has varied from a low of 10%, to where it is now at its highest value (21%) with only fair herbaceous cover and relatively high amounts of litter. It would appear that some sheet erosion has occurred with the prominence of pavement and rock cover on the soil surface. However, it is only serious on the steeper slopes. Initially, the percent bare ground was thought to be low for a pinyon-juniper community, but now it is moderately high at 21%. Soil textural analysis indicates it to be a loam to clay loam with a neutral to mildly alkaline pH (7.3). Effective rooting depth is just over 11 inches with a soil temperature of 64°F at almost 13 inches in depth. The amount of phosphorus in the soil could be a limiting factor in the soil at only 9 ppm, which is below the minimum thought necessary for normal plant development.

The pinyon-juniper woodland is beginning to affect the understory of shrubs and herbaceous species. Point-centered quarter data in 1998 estimates the density of juniper to be 213 trees/acre with an average diameter of nearly 9 inches. Pinyon has a density of 115 trees/acre and an average diameter of almost 5 inches. Canopy cover for pinyon-juniper trees is 10%. This kind of density and cover will normally decrease understory production by as much as 40%.

Mountain big sagebrush, black sagebrush, and antelope bitterbrush are all important browse species, currently making up 40% of the browse cover. Most of both the mountain and black sagebrush plants were classified as decadent in 1991, with many dead plants evident. This has not changed much in 1998. Black sagebrush has no seedlings and a very low percent young age class. Percent decadence has gone down from a high of 77% in 1991, to a low of 34% in 1998, which is lower than that observed in 1985 (53%). Those classified with poor vigor have decreased. Currently, about 40% of the population has died off, and those plants classified with heavy use has decreased to zero. For the future, it appears that more of the population will be lost as the percentage of the decadent plants classified as dying has steadily increased through all years. The mountain big sagebrush are having a more difficult time persisting on this site because biotic potential is zero, and the percent of plants in the young age class is at its low (9%). Also, those classified with poor vigor have steadily increased to a current level of 40%, percent decadence has increased to it's highest value since 1985 at 67%, and the percentage of dead plants is up to 68% at this time. All this points to only one thing, a strongly downward trend for mountain big sagebrush. The bitterbrush, although heavily hedged, looks healthier with percent decadence down to 8%. Numbers are up and it now makes up 16% of the browse cover. Presently, there is acceptable amounts of forage production and excellent cover for wildlife.

Herbaceous vegetation is dominated by perennial grasses where they contribute 93% of the herbaceous cover. Large, vigorous bluebunch wheatgrass plants are most common. Normally a decreaser under heavy cattle grazing, it has a high yield and good forage value on spring and early summer ranges. Sandberg bluegrass, bottlebrush squirreltail, and Indian ricegrass are also fairly common. Forbs are almost nonexistent on this

site. Trend for herbaceous understory is stable as sum of nested frequency values have remained relatively stable.

1985 APPARENT TREND ASSESSMENT

The soil trend is basically stable. Vegetative trend is apparently down. The pinyon-juniper overstory is closing in, and due to heavy use coupled with competition with the trees, there is little reproduction of the key browse species. Chaining and reseeded would help restore the area, but treatment is not yet critical as forage production and erosion control are still within acceptable limits.

1991 TREND ASSESSMENT

With the increase in bare ground from 10% to 15%, and percent cover for rock and pavement decreasing to 30%, the trend would be considered slightly down for vegetative basal cover is barely 6%. The key browse species, black sagebrush, mountain big sagebrush, and bitterbrush all show different stages of a downward trend. Black sagebrush didn't change much in density, but percent decadency went from 53% to 77%. Mountain big sagebrush lost 24% of it's population with the proportion of decadent plants also increasing. The bitterbrush's density went down by 13% and rate of decadency went up to 29%. The herbaceous species show a slight upward trend for grasses and forbs. There are still very few forbs present on the site, although quadrat frequency and nested frequency values have increased for the most part.

TREND ASSESSMENT

soil - slightly downward

browse - downward

herbaceous understory - slightly upward

1998 TREND ASSESSMENT

The trend for soil is slightly downward again. Percent bare soil has been increasing each time about 5 to 6%, where it is currently up to 21%. The ratio of protective cover to bare soil is also marginal. This site is basically becoming more dominated by juniper and pinyon and its effect on the understory species has been intensified by an extended period of drought. The trend for browse, especially key browse, is downward again. Black sagebrush which contributes 11% of the browse cover, continues with most measured parameters indicating a downward trend. Mountain big sagebrush (makes up 13% of the browse cover) also has most of its measured parameters showing a downward trend, even more so than black sagebrush. Currently, 68% of the population is dead with percent decadence continually increasing where it is now at its highest value (67%). Bitterbrush, which provides 16% of the browse cover, is the only key browse that shows any kind of improvement. However, it cannot compensate for the losses to the two sagebrush species. The herbaceous understory trend is stable to slightly upward. However, the herbaceous species still barely provide 12% total cover. This trend is primarily because of the grasses, for the forbs contribute less than one percent cover and provide little cover or forage.

TREND ASSESSMENT

soil - slightly downward

browse - downward

herbaceous understory - stable to slightly upward

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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron spicatum	_b 227	_b 227	_a 183	79	84	68	7.78
G	Bromus tectorum (a)	-	-	42	-	-	14	.43
G	Oryzopsis hymenoides	4	12	12	2	4	4	.17
G	Poa fendleriana	_a 6	_b 36	_b 49	3	16	21	.98
G	Poa secunda	_a 3	_b 18	_c 94	1	10	40	2.00
G	Sitanion hystrix	_b 25	_{ab} 20	_a 6	13	9	3	.01
Total Annual Grasses		0	0	42	0	0	14	0.43
Total Perennial Grasses		265	313	344	98	123	136	10.96
F	Agoseris glauca	-	10	1	-	5	1	.00
F	Arabis spp.	_a -	_b 18	_a 1	-	9	1	.00
F	Astragalus convallarius	_a 2	_a 4	_b 6	1	1	6	.15
F	Calochortus nuttallii	_{ab} 4	_b 8	_a -	2	4	-	-
F	Chaenactis douglasii	-	-	1	-	-	1	.03
F	Comandra pallida	-	-	3	-	-	1	.03
F	Collinsia parviflora (a)	-	-	3	-	-	1	.00
F	Crepis acuminata	-	6	7	-	2	2	.06
F	Eriogonum racemosum	-	-	4	-	-	1	.03
F	Eriogonum umbellatum	-	1	9	-	1	5	.16
F	Lomatium spp.	-	-	1	-	-	1	.00
F	Phlox austromontana	-	6	4	-	3	2	.16
F	Physaria chambersii	1	4	-	1	2	-	-
F	Phlox longifolia	_a 8	_b 27	_a 16	4	14	6	.20
F	Unknown forb-perennial	3	1	-	1	1	-	-
Total Annual Forbs		0	0	3	0	0	1	0
Total Perennial Forbs		18	85	53	9	42	27	0.84

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

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

Type	Species	Strip Frequency '98	Average Cover % '98
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		??	19.79

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

Species	Percent Cover '98
Juniperus osteosperma	7
Pinus edulis	3

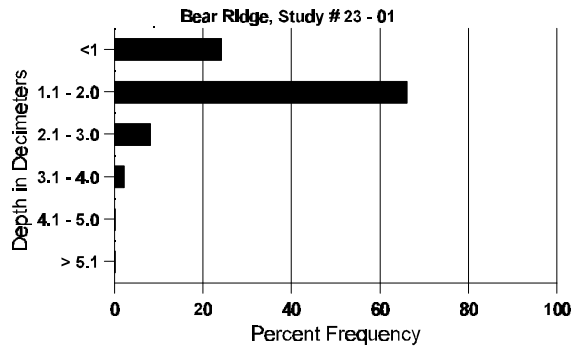
BASIC COVER --
Herd unit 23 , Study no: 1

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

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

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 23 , Study no: 1

Type	Quadrat Frequency '98
Rabbit	25
Elk	4
Deer	36

BROWSE CHARACTERISTICS --

Herd unit 23 , Study no: 1

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
Artemisia nova																		
S	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	-	2	1	-	-	-	-	-	-	2	-	-	1	200			3
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	85	1	8	4	-	-	-	-	-	-	11	-	2	-	866	13	21	13
	91	2	4	1	-	-	-	-	-	-	6	-	-	1	466	9	16	7
	98	16	21	-	2	-	-	-	-	-	39	-	-	-	780	16	23	39
D	85	-	7	11	-	-	-	-	-	-	13	-	2	3	1200			18
	91	8	7	6	3	-	1	1	-	-	20	-	-	6	1733			26
	98	10	11	-	1	-	-	-	-	-	16	-	-	6	440			22
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	860			43
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		50%			47%			24%			- 0%							
'91		32%			24%			21%			-43%							
'98		49%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	2266	Dec:	53%			
												'91	2265		77%			
												'98	1300		34%			

A G R E	Y R	Form Class (No. of 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	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	-	-	-	-	-	-	-	-	-	4	-	-	-	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%			
<i>Chrysothamnus depressus</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	20		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200	12	11	3
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	10	12	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	400	Dec:	-			
												'91	0		-			
												'98	20		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	-	-	-	-	40	9	9	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%			-39%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	66		-		
												'98	40		-		
<i>Juniperus osteosperma</i>																	
S	85	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	91	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	98	-	-	-	2	-	-	-	-	-	-	-	-	40			2
Y	85	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	91	2	-	-	-	-	-	-	-	-	-	1	-	133			2
	98	2	-	-	-	-	-	-	-	-	-	-	-	40			2
M	85	-	-	-	3	-	-	-	-	-	-	-	-	200	69	64	3
	91	-	-	-	-	1	1	-	-	1	-	-	-	200	152	98	3
	98	-	-	-	-	-	-	-	2	-	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%			+20%						
'91		20%			40%			20%			-76%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	266	Dec:	-		
												'91	333		-		
												'98	80		-		
<i>Opuntia spp.</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	-	-	20			1
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	-	-	-	-	40			2
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	-	-	-	20	8	12	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	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		1	2									
<i>Pinus edulis</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	1	-	-	-	20		1	
M	85	-	-	-	2	-	-	-	-	2	-	-	-	133	69	64	2
	91	1	-	-	1	-	-	-	-	2	-	-	-	133	133	104	2
	98	3	-	-	-	-	-	1	-	4	-	-	-	80	-	-	4
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		00%		00%		+ 0%									
'91		00%		00%		00%		-40%									
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	133	Dec:	-				
										'91	133		-				
										'98	80		-				
<i>Purshia tridentata</i>																	
S	85	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	85	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	1	-	1	-	-	-	-	-	2	-	-	-	133		2	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	-	5	-	-	-	-	-	-	5	-	-	-	333	24	42	5
	91	-	-	1	-	2	-	-	-	3	-	-	-	200	19	35	3
	98	18	13	-	2	-	-	-	-	33	-	-	-	660	22	41	33
D	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	1	-	-	-	1	-	-	1	1	-	-	133		2	
	98	1	1	-	1	-	-	-	-	1	-	-	2	60		3	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		63%		00%		00%		-13%									
'91		43%		43%		00%		+39%									
'98		37%		00%		05%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	533	Dec:	0%				
										'91	466		29%				
										'98	760		8%				
<i>Tetradymia canescens</i>																	
M	85	-	1	-	-	-	-	-	-	1	-	-	-	66	7	4	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		100%		00%		00%											
'91		00%		00%		00%											
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	66	Dec:	-				
										'91	0		-				
										'98	0		-				

Trend Study 23-2-98

Study site name: Sols Meadow .

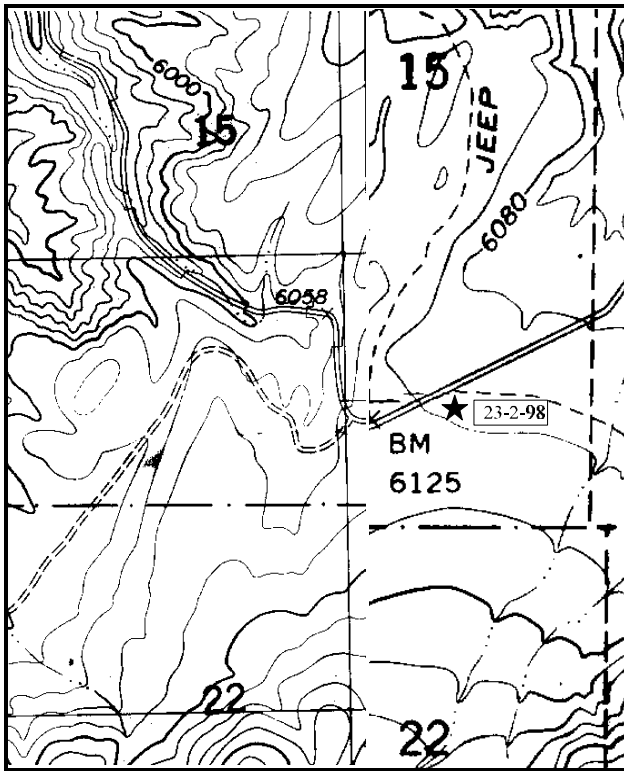
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 167 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 71ft), line 2 (34 & 95ft), line 3 (59ft).

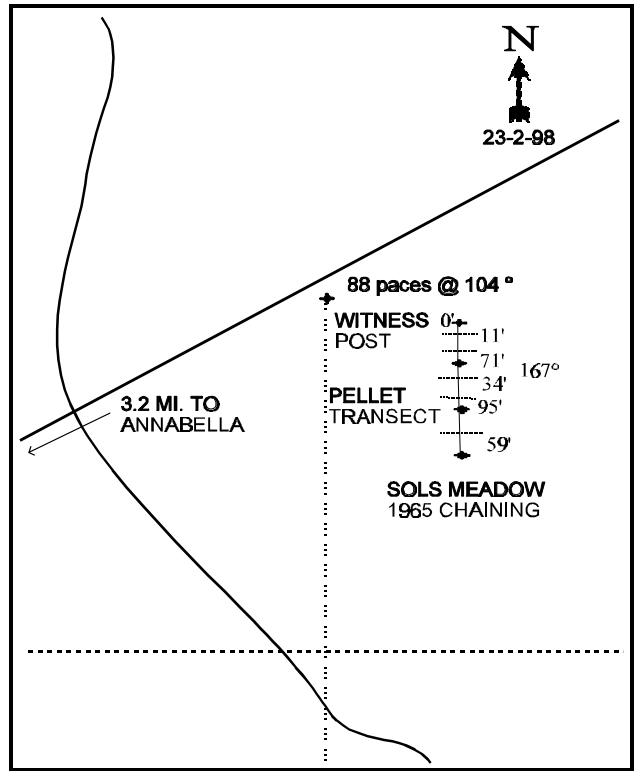
LOCATION DESCRIPTION

Starting from the Annabella cemetery go northeast 0.1 miles to a cattleguard. Bear left. Go 0.4 miles and cross under a powerline. Continue 1.5 miles to the BLM boundary sign, then 1.2 miles more to a fork in the road. Continue straight 0.1 miles on the main road to a green and yellow fencepost on the right. The rebar marking the 0-foot end of the frequency baseline is 27 paces at 104 degrees from the green and yellow fencepost (which marks the start of a pellet transect).



Map Name: Water Creek Canyon, Utah

Township 24S, Range 2W, Section 15



Diagrammatic Sketch

UTM 4284665.953 N, 413213.472 E

DISCUSSION

Trend Study No. 23-2 (45-2)

The Sols Meadow study site is on BLM land that was chained and aerially seeded with crested wheatgrass in 1965. The junipers are re-establishing their dominance on the site, but Wyoming big sagebrush is presently the most abundant species. The juniper density is now estimated by point-centered quarter data at 19 trees/acre with an average diameter (at 6 inches) at just over 5 inches. Juniper canopy cover is only 1%. Currently, the seeding has permits for 22 AUM's for cattle in May, June and October. Sheep do not use this portion of the allotment. Deer use has generally been moderate in the area as determined by the Maple Creek pellet group transect. The pellet group transect that was read parallel to the vegetative transect indicated deer use at 97 deer days use/acre, 19 elk days use/acre, and cattle at 3 cow days use/acre.

The site is a dry, gentle, north facing slope (3-5%), located on the northwest side of the Monroe Mountains. The soil developed on an old alluvial fan from sandstone, shale, quartzite, and limestone parent materials. The light-brown soil is a sandy loam with a neutral to slightly acidic pH (6.6). Effective rooting depth is almost 17 inches with a soil temperature of 55°F at 18 inches. The organic matter content is low with a low site potential. Phosphorus is low at 8.6 ppm, which could be a limiting factor to plant development. Litter and vegetative cover are good around and under the sagebrush plants and junipers. The interspaces are mostly bare soil or have a cover of annuals and pavement. Erosion has not been a serious problem because of the negligible slope, but should be monitored closely.

The key species is Wyoming big sagebrush. It currently provides 87% of the browse cover and is the only browse species present except for Utah juniper. Young and mature junipers, averaging 8-10 feet tall, are scattered throughout the old chaining. These trees showed no evidence of deer browsing. Initially, the sagebrush population appeared healthy and expanding. The number of seedlings almost equaled the number of decadent plants, and the rest of the population were vigorous young and mature plants. Most of the larger plants were moderately hedged, but some individuals had been quite heavily browsed. The more heavily browsed plants are the hybrids between Wyoming big sagebrush and mountain big sagebrush. Sagebrush density was good in 1985, with 5,398 plants/acre. Since that time biotic potential has steadily decreased, along with the percentage of young plants in the population. Percent decadence has been as high as 52%, where it is currently still high at 44%. Thirty-four percent of the population is now classified as dead. With the percentage of decadent plants classified as dying still high at 32%, the percentage of dead plants in the population could go up to 40%. Trend for sagebrush is continuing to go down. This downward trend corresponds to the same time period that extended drought was also occurring throughout the area. Pricklypear cactus, an increaser, is prevalent in large patches, but now occurs in low numbers.

The number and diversity of herbaceous species is very low. The most common perennial species is crested wheatgrass. It grows tall and vigorous, but only under the protection of the sagebrush. Cheatgrass grows mostly in the shrub interspaces, currently making up 61% of the grass or herbaceous cover as the forb cover is almost nonexistent. Forbs that are there are mostly small, low-value annuals.

1985 APPARENT TREND ASSESSMENT

The trend for soil appears stable. Soil movement is kept to a minimum by the gentleness of the terrain. In terms of the key species, their form, vigor, and age class distribution appear stable. However, the community is slowly changing as many junipers not controlled with the chaining have been released from adult competition and are quickly growing to maturity.

1991 TREND ASSESSMENT

Most measured parameters for soil did not change except for percent pavement and bare ground. Bare ground increased from 21% to 31% while percent pavement decreased from 25% to 16%. This increase in bare ground indicates a slight downward trend for soil which should be watched closely. This could be just an effect of the extended drought, where drought would effect litter and vegetative cover. The Wyoming big sagebrush has shown an increase of 16% in it's population, but it's rate of decadency has gone up from 12 to 52%. Another critical parameter is that the percentage of the population that is expressing poor vigor has gone from 6% up to 23% in 1991. These downward changes could directly be attributed to the extended drought, but percent decadency and vigor should improve with more normal precipitation patterns. There are not very many species of grasses or forbs on the site. Quadrat frequency for grasses are good, with 50% for crested wheatgrass and 13% for bottlebrush squirreltail. Trend for herbaceous understory is up since the last inventory.

TREND ASSESSMENT

soil - slightly downward

browse - stable to slightly downward, depends on the recovery of the sagebrush from poor vigor (23%) and high rates of decadency (52%)

herbaceous understory - slightly upward, but still in poor condition because of low species diversity and frequencies

1998 TREND ASSESSMENT

Trend for soil is slightly up at this time with percent bare soil decreasing from 31% to 22%. The only key browse species is Wyoming big sagebrush, which is continuing to show downward trends for most of the measured parameters. Trend for browse is down. Trend for herbaceous understory is stable, with sum of nested frequency remaining relatively stable.

TREND ASSESSMENT

soil - slightly up

browse - down

herbaceous understory - stable, but cheatgrass dominates by making up 61% of the herbaceous understory cover

HERBACEOUS TRENDS --

Herd unit 23 , Study no: 2

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron cristatum	97	114	132	46	50	53	7.03
G	Bromus tectorum (a)	-	-	252	-	-	83	11.73
G	Sitanion hystrix	_a 4	_b 26	_{ab} 10	1	13	7	.45
Total Annual Grasses		0	0	252	0	0	83	11.73
Total Perennial Grasses		101	140	142	47	63	60	7.49
F	Alyssum alyssoides (a)	-	-	2	-	-	1	.00
F	Eriogonum cernuum (a)	6	5	-	3	3	-	-
F	Euphorbia spp.	-	-	2	-	-	1	.00
F	Gayophytum ramosissimum (a)	-	-	3	-	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	Sisymbrium altissimum (a)	-	19	-	-	8	-	-
F	Stephanomeria pauciflora	3	-	-	1	-	-	-
Total Annual Forbs		6	24	5	3	11	2	0
Total Perennial Forbs		3	0	2	1	0	1	0.01

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

BROWSE TRENDS --

Herd unit 23 , Study no: 2

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	78	12.83
B	Gutierrezia sarothrae	2	-
B	Juniperus osteosperma	3	2.00
B	Opuntia spp.	4	-
Total for Browse		87	14.83

CANOPY COVER --

Herd unit 23 , Study no: 2

Species	Percent Cover '98
Juniperus osteosperma	1

BASIC COVER --

Herd unit 23 , Study no: 2

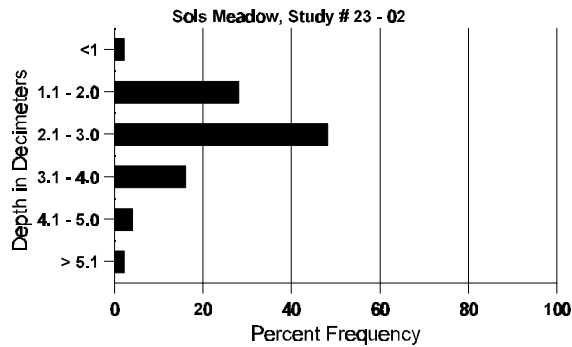
Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	321	5.00	3.75	31.53
Rock	119	5.00	2.00	4.00
Pavement	227	25.00	16.00	7.97
Litter	393	44.25	46.00	45.56
Cryptogams	72	0	1.50	1.85
Bare Ground	269	20.75	30.75	21.92

SOIL ANALYSIS DATA --

Herd Unit 23, Study # 02, Study Name: Sols Meadow

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.9	54.5 (17.7)	6.6	62.0	19.4	18.6	1.2	8.6	115.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 23 , Study no: 2

Type	Quadrat Frequency '98
Rabbit	57
Elk	11
Deer	52
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 23 , Study no: 2

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Artemisia tridentata wyomingensis</i>																	
S	85	9	-	-	-	-	-	-	-	-	8	-	1	-	600		9
	91	2	-	-	-	-	-	1	-	-	3	-	-	-	200		3
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
Y	85	23	7	4	-	-	-	-	-	-	33	-	1	-	2266		34
	91	11	3	-	3	-	-	-	-	-	16	1	-	-	1133		17
	98	4	8	-	-	-	-	-	-	-	12	-	-	-	240		12
M	85	8	20	9	-	-	-	-	-	-	34	-	3	-	2466	18 23	37
	91	20	7	-	2	-	-	-	-	-	28	1	-	-	1933	26 30	29
	98	39	22	6	-	-	-	-	-	-	67	-	-	-	1340	24 31	67
D	85	3	2	5	-	-	-	-	-	-	10	-	-	-	666		10
	91	33	14	1	2	-	-	-	-	-	26	1	2	21	3333		50
	98	28	34	-	1	-	-	-	-	-	42	1	-	20	1260		63
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1520		76
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		36%			22%			05%			+16%						
'91		25%			01%			24%			-56%						
'98		45%			04%			14%									
Total Plants/Acre (excluding Dead & Seedlings)											'85	5398	Dec:	12%			
											'91	6399		52%			
											'98	2840		44%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	6	8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	40		-		
<i>Juniperus osteosperma</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	1	-	-	2	-	-	3	-	-	-	60	-	-
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'98	60		-		
<i>Opuntia spp.</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	85	5	-	-	-	-	-	-	-	5	-	-	-	333			5
	91	6	-	-	-	-	-	-	-	6	-	-	-	400			6
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	15	-	-	-	-	-	-	-	15	-	-	-	1000	4	9	15
	91	9	3	-	1	-	-	-	-	13	-	-	-	866	5	6	13
	98	3	-	-	-	-	-	-	-	3	-	-	-	60	4	6	3
D	85	4	-	-	-	-	-	-	-	2	-	2	-	266			4
	91	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	98	1	-	-	-	-	-	-	-	-	-	-	1	20			1
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			08%			-17%						
'91		15%			00%			00%			-94%						
'98		00%			00%			25%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	1599	Dec:	17%		
												'91	1332		5%		
												'98	80		25%		

Trend Study 23-3-98

Study site name: Thompson Basin .

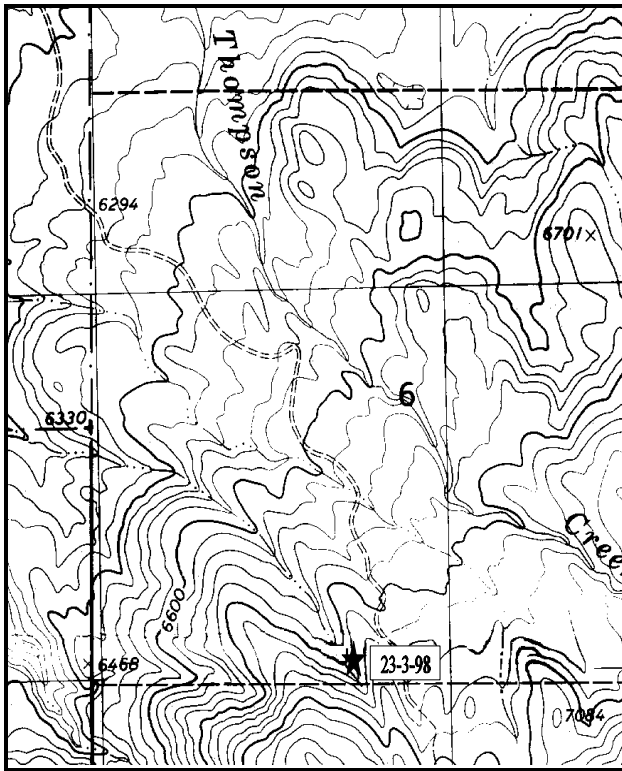
Range type: Pinyon-Juniper .

Compass bearing: frequency baseline 180 degrees. (Lines 2 & 3 155°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft).

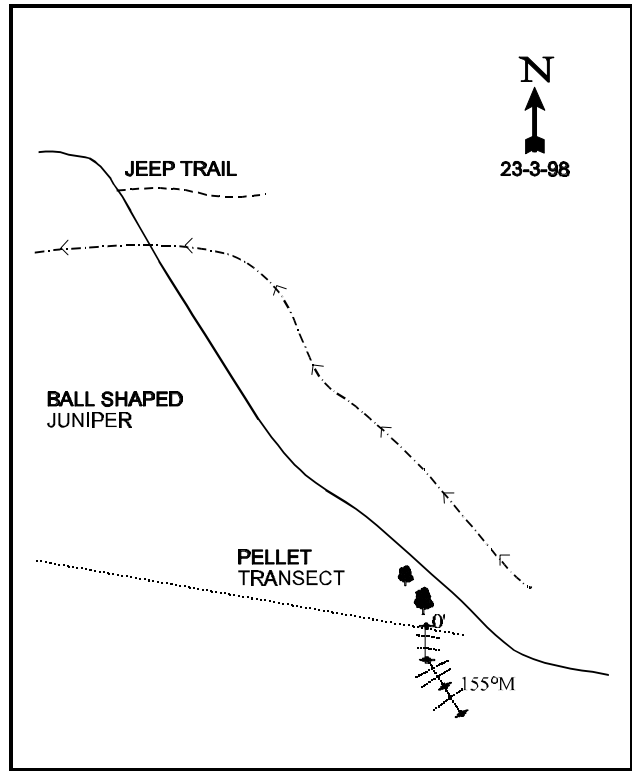
LOCATION DESCRIPTION

From the Monroe City cemetery, go 3.05 miles north and east to a gravel road on the right. Turn here and go 1.0 miles to the Thompson Basin Road. Turn right and proceed 1.9 miles to a cattleguard. Continue 1.0 mile up the road and stop. There is a witness post on the right side of the road. Fifty feet up the hill, there should be a juniper with the center trunk cut out. The 0-foot baseline stake is on the other side of this tree, approximately 60 feet from the road. The 0-foot stake is a 3/4" rebar tagged #7041.



Map Name: Monroe, Utah

Township 25S , Range 2W , Section 6



Diagrammatic Sketch

UTM 4279061.626 N, 407908.913 E

DISCUSSION

Trend Study No. 23-3(45-3)

The Thompson Basin study is located on a steep (53%), juniper covered slope above Thompson Basin. The study has an elevation of 6,800 feet and a east-northeast aspect. An area below the transect was chained about 15 years ago by the Forest Service. Also, a fire had gone through the area approximately 20 years ago. Thompson Basin has been noted historically as a concentration area for deer during the winter. Deer pellet groups are frequently encountered. The pellet transect, which intersects the trend study, indicates a five year average of 80 deer days use/hectare (Jense et al. 1985). The six year average since then was 21 deer days use/hectare (Jense et al. 1991). The pellet group transect read with the vegetative transect (1998) shows 21 deer days use/acre and 12 elk days use/acre. Deer use usually varies considerably from year to year. In the past, the slopes were heavily grazed by both deer and sheep. However, the Forest Service has closed the area to livestock grazing to protect the watershed values.

Ground cover is dominated by large rocks and pavement. Soil textural analysis indicates it to be a sandy clay loam with a neutral to slightly acidic pH (6.6). Effective rooting depth is almost 13 inches, however the site has a relatively high soil temperature of 75°F at 14 inches in depth. The steep slope has a moderate to severe erosion potential. The cover provided by the bunch grasses and the low amount of bare soil helps keep erosion to a minimum. However, there are a few large active gullies on the hillside and in the valley.

The dominant overstory is a mixed mature juniper and pinyon woodland. The older junipers show evidence of highlining, but the younger trees have not been utilized. All are vigorous. There was a high proportion of seedlings and young in the population when it was first read, now they are very few. Currently, there were 99 juniper/acre (average diameter of almost 10 inches) and 72 pinyon/acre (average diameter of about 4 inches) as determined by the point-quarter method. The canopy cover for juniper and pinyon totals 23%. This generally means that this amount of canopy cover will decrease production of the understory by as much as 50%.

Mountain big sagebrush is the principal key browse species, but had only a fair density in 1991 of 1,466 plants/acre. In 1985, the sagebrush appeared vigorous and seemed to be recovering from heavy browsing pressure in the past, especially the hard winter's of 1982-84. The mature plants show light to moderate use of current year's growth. The majority of the plants were classified as mature and decadent. No seedlings were encountered in 1985 or 1991. The percent decadence was at its high of 55% in 1991, currently it is down to 30%. This is still too high for a healthy sagebrush population. Forty-two percent of the population is now dead. It appears that this trend is slowing down, but the trend for the sagebrush population is still down with competition with the juniper and pinyon trees in conjunction with an extended drought through much of 1985 to 1995. Two increasers, pricklypear cactus and stickyleaf low rabbitbrush, are present but do not appear to be increasing very rapidly. Only pricklypear increased since 1985. Some young mountain mahogany are also found near the study site.

Grasses are fairly abundant in the interspaces. Mutton bluegrass is the most abundant, followed by bluebunch wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. The grasses provide important ground cover, some winter forage and are very valuable in spring as early green forage. Forbs are very sparse, with the more common ones being desert phlox and longleaf phlox.

1985 APPARENT TREND ASSESSMENT

There is some soil movement and erosion from the hillside, but the grass and sagebrush cover aides in infiltration and stabilizes the slope. The slow increase in the density of pinyons and junipers threatens the understory plants and increases erosion potential. The character of the soil and steepness of the slope make chaining unfeasible. However, firewood cutting could be encouraged to maintain open canopy in this area.

1991 TREND ASSESSMENT

The soil appears to be slightly down, with percent bare ground going from 11% up to almost 20%. Most sites have shown this same pattern with the extended drought. The numerous large rocks setting on the soil surface indicate that there has been considerable soil loss in the past. This should be monitored closely because of the steepness of the slope (53%). Mountain big sagebrush has a decreased population of 8% in conjunction with percent decadency going from 33% up to 55%. The percentage of plants that are heavily hedged and classified with poor vigor have also increased. Low rabbitbrush has not increased in numbers since the last inventory. The trend for browse is down. The herbaceous understory has been improving, with almost all nested and quadrat frequency values for both grasses and forbs increasing. In fact, all grasses had increases that were significant from those in 1985.

TREND ASSESSMENT

soil - slightly downward

browse - down

herbaceous understory - up

1998 TREND ASSESSMENT

The trend for soil is stable to slightly up with percent bare soil decreasing down to about 8%. Rock and pavement cover has remained high at almost 57%. Mountain big sagebrush has shown further decreases in its population along with a dead to live ratio of 1:1.4, or about 42% are dead. Percent decadence has decreased, but it is still relatively high at 30%. Trend for the key browse is down because the biotic potential and percent young in the population are still fairly low, not enough to replace the lost plants within the population. Trend for the herbaceous understory is slightly down with nested frequency values for both the grasses and forbs going down.

TREND ASSESSMENT

soil - stable to slightly up

browse - down

herbaceous understory - slightly down for both forbs and grasses

HERBACEOUS TRENDS --

Herd unit 23 , Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron spicatum	_a 41	_c 203	_b 124	18	79	43	4.71
G	Bromus tectorum (a)	-	-	36	-	-	18	.19
G	Poa fendleriana	_a 41	_b 128	_c 162	15	59	67	6.05
G	Poa secunda	_a 17	_c 138	_b 85	7	57	33	1.00
G	Sitanion hystrix	_a 4	_b 43	_a 1	2	22	1	.00
Total Annual Grasses		0	0	36	0	0	18	0.19
Total Perennial Grasses		103	512	372	42	217	144	11.77
F	Antennaria rosea	1	3	-	1	1	-	-
F	Arabis spp.	-	17	8	-	9	4	.02
F	Castilleja chromosa	-	8	-	-	3	-	-
F	Crepis acuminata	-	5	-	-	3	-	-
F	Erigeron eatonii	-	3	3	-	1	1	.00
F	Erigeron pumilus	3	6	-	1	3	-	-

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	<i>Eriogonum racemosum</i>	3	1	3	3	1	1	.03
F	<i>Machaeranthera canescens</i>	5	-	-	3	-	-	-
F	<i>Phlox austromontana</i>	_a 12	_b 52	_b 56	6	24	24	1.24
F	<i>Phlox longifolia</i>	_a -	_b 59	_a 3	-	24	1	.01
F	<i>Streptanthus cordatus</i>	-	-	1	-	-	1	.00
Total Annual Forbs		0	0	0	0	0	0	0
Total Perennial Forbs		24	154	74	14	69	32	1.31

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

BROWSE TRENDS --

Herd unit 23 , Study no: 3

Type	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata vaseyana</i>	40	4.21
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	0	-
B	<i>Ephedra viridis</i>	0	-
B	<i>Juniperus osteosperma</i>	10	8.44
B	<i>Opuntia</i> spp.	12	.06
B	<i>Pinus edulis</i>	4	4.00
Total for Browse		66	16.72

CANOPY COVER --

Herd unit 23 , Study no: 3

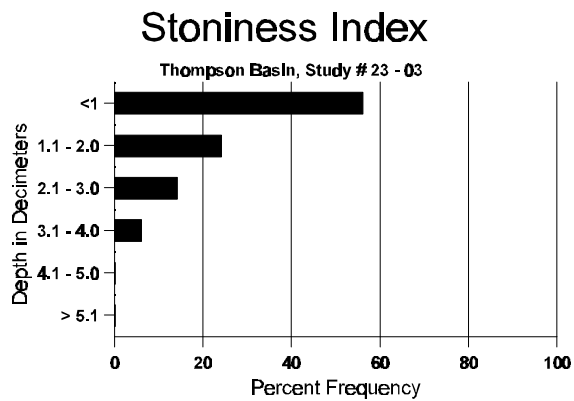
Species	Percent Cover '98
<i>Juniperus osteosperma</i>	17
<i>Pinus edulis</i>	6

BASIC COVER --
Herd unit 23 , Study no: 3

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	296	2.75	6.00	33.60
Rock	276	29.00	24.25	21.23
Pavement	275	18.00	14.25	17.47
Litter	385	38.00	35.50	42.68
Cryptogams	16	1.50	.75	.14
Bare Ground	197	10.75	19.25	8.38

SOIL ANALYSIS DATA --
Herd Unit 23, Study # 03, Study Name: Thompson Basin

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.7	75.0 (13.7)	6.6	54.0	19.4	26.6	2.0	10.5	166.4	.8



PELLET GROUP FREQUENCY --
Herd unit 23 , Study no: 3

Type	Quadrat Frequency '98
Sheep	2
Rabbit	23
Elk	4
Deer	12

BROWSE CHARACTERISTICS --

Herd unit 23 , Study no: 3

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total										
		1	2	3	4														
<i>Artemisia tridentata vaseyana</i>																			
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	98	3	-	-	-	-	-	-	-	3	-	-	-	60		3			
Y	85	2	-	-	-	-	-	-	-	2	-	-	-	133		2			
	91	1	-	-	1	-	-	-	-	2	-	-	-	133		2			
	98	-	2	-	1	-	-	-	-	3	-	-	-	60		3			
M	85	6	6	2	-	-	-	-	-	13	1	-	-	933	11	21	14		
	91	4	3	1	-	-	-	-	-	2	5	1	-	533	14	22	8		
	98	29	3	-	-	-	-	-	-	30	-	2	-	640	20	29	32		
D	85	3	5	-	-	-	-	-	-	8	-	-	-	533		8			
	91	1	8	3	-	-	-	-	-	6	-	1	5	800		12			
	98	12	2	-	1	-	-	-	-	12	-	1	2	300		15			
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	98	-	-	-	-	-	-	-	-	-	-	-	-	720		36			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'85		46%		08%		00%		- 8%											
'91		50%		18%		32%		-32%											
'98		14%		00%		10%													
Total Plants/Acre (excluding Dead & Seedlings)										'85	1599	Dec:	33%						
										'91	1466		55%						
										'98	1000		30%						
<i>Chrysothamnus viscidiflorus stenophyllus</i>																			
M	85	1	1	-	-	-	-	-	-	2	-	-	-	133	11	14	2		
	91	2	-	-	1	-	-	-	-	3	-	-	-	200	11	14	3		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
D	85	2	-	-	-	-	-	-	-	2	-	-	-	133			2		
	91	-	1	-	-	-	-	-	-	-	-	-	1	66			1		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'85		25%		00%		00%		+ 0%											
'91		25%		00%		25%													
'98		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'85	266	Dec:	50%						
										'91	266		25%						
										'98	0		0%						

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
Ephedra viridis																	
M	85	-	-	-	-	-	-	-	0	-	-	0					
	91	-	-	-	-	-	-	-	0	-	-	0					
	98	-	-	-	-	-	-	-	0	12	22	0					
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>		<u>%Change</u>							
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-				
										'91	0		-				
										'98	0		-				
Juniperus osteosperma																	
S	85	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	1	-	-	-	-	2	-	-	-	133		2	
	98	5	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	85	1	-	-	-	-	-	-	-	1	-	-	-	66	69	93	1
	91	-	-	-	1	-	-	-	-	1	-	-	-	66	118	79	1
	98	2	-	-	3	-	-	-	-	5	-	-	-	100	-	-	5
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>		<u>%Change</u>							
'85		00%			00%			00%		+67%							
'91		00%			00%			00%		+ 1%							
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	66	Dec:	-				
										'91	199		-				
										'98	200		-				

A G R E	Y R	Form Class (No. of 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	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
M	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133	3	2	2
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	200	4	5	3
	98	12	-	-	-	-	-	-	-	-	12	-	-	-	240	5	10	12
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+34%							
'91		00%			00%			00%			+38%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	133	Dec:	0%			
												'91	200		0%			
												'98	320		6%			
Pinus edulis																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	1	-	3	-	-	-	60	-	-	3
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+ 0%							
'91		00%			00%			00%			+18%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-			
												'91	66		-			
												'98	80		-			

Trend Study 23-4-98

Study site name: Poverty Flat .

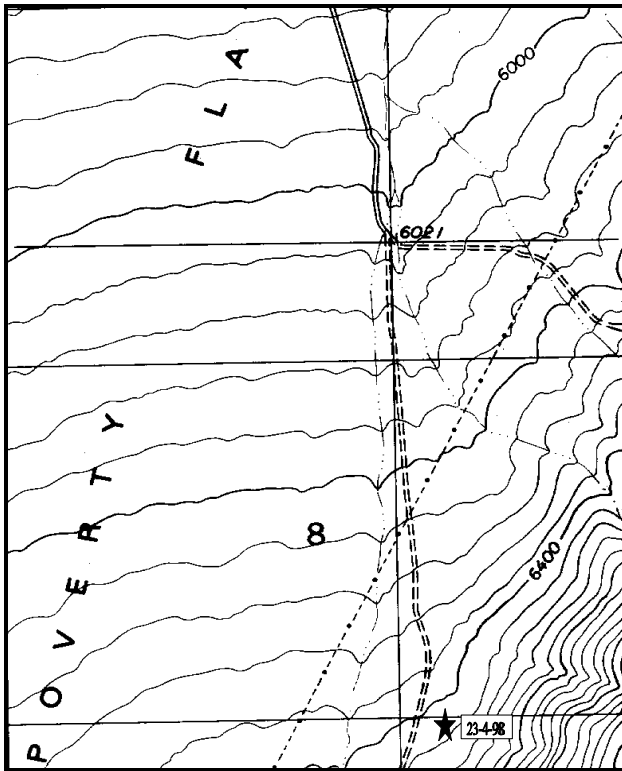
Range type: Big Sagebrush .

Compass bearing: frequency baseline 162 M degrees. (Line 3 & 4 175°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

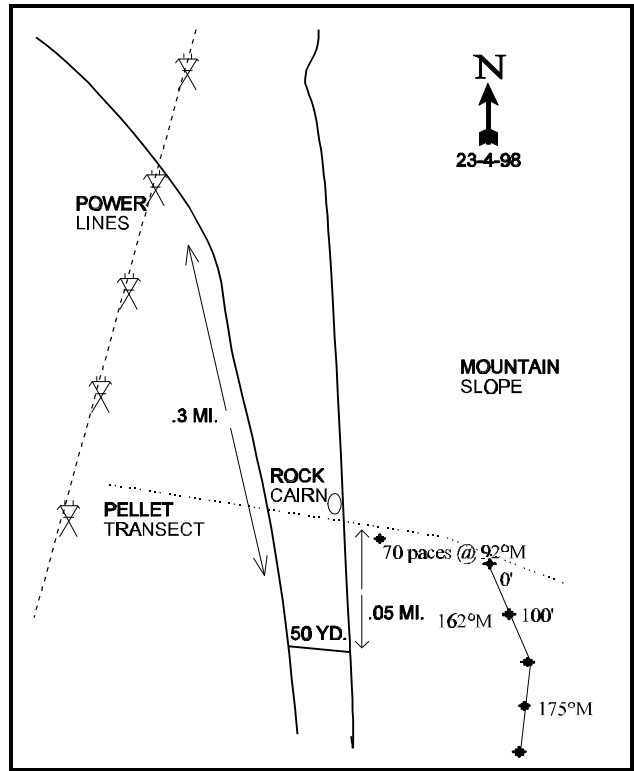
LOCATION DESCRIPTION

From 600 South and Main in Monroe, turn southwest on Jones Road, a gravel road coming in at a 45 degree angle (Jones Road). Proceed 3.4 miles to a junction, stay left. Go up this road 1.7 miles to a fork. Stay right, go 0.5 miles and pass under a powerline. Continue 0.3 miles further to a fork, turn left. Go about 50 yards then turn left again. Go another 0.05 miles (about 150 yards) to a witness post on the east side of the road. Walk upslope to the 5th yellow stake. The frequency baseline begins 12 feet south of the 5th yellow stake east of the road (about 365 feet from road).



Map Name: Monroe, Utah

Township 26S , Range 3W , Section 8



Diagrammatic Sketch

UTM 4267140.834 N, 400229.809 E

DISCUSSION

Trend Study No. 23-4 (45-4)

The Poverty Flat study is located on the west side of the Monroe Mountains on the foothills above Poverty Flat, south of Monroe. The hillside study has a slope of about 20%-25%, an elevation of 6,420 feet, and a west aspect. The slope is covered by juniper and Wyoming big sagebrush. When the site was visited in 1998, it was determined that a wildfire had burned through the area in 1997 in which all the key browse was lost. The land is administered by the BLM and is part of a sheep allotment managed as a three pasture rest-rotation system with use allowed from June 1-20 and September 6 through March 31. Apparently, sheep use is more centered on the flat for they graze the hillside where the transect is located only when trailing to and from summer pasture on the forest. Deer use on the study site is moderate to heavy, as evidenced by the numerous pellet groups, hedging and antler drops. Several carcasses were found near the site in both 1985 and 1991, indicating winter losses. A pellet group transect read in conjunction with the vegetative transect indicated deer use at 19 deer days use/acre and elk use at 2 elk days use/acre.

The apparent effective rooting depth (see methods) before hitting solid rock appears moderately shallow at about 11 inches. Rocks are scattered throughout the profile and soil surface. Ground cover is predominately large rocks and pavement, which currently cover over 65% of the ground surface leaving very little actual bare soil. Soil temperature is one of the highest ever measured at 81°F at just over 12 inches in depth. This high of a temperature will be very limiting to the establishment of perennial species after the wildfire. This would allow continued dominance of the site by annuals. There was good litter cover in the past, especially under the sagebrush, but this has been lost to fire. The texture of the soil is a loam with a neutral pH (6.7). The color is brown with low organic matter and low fertility. It is typical of the soils along the foothills in Sevier Valley.

Utah juniper is the dominate overstory, but Wyoming big sagebrush was the most abundant and important browse species until the recent wildfire. The sagebrush had been browsed heavily in the past, and although it appeared healthy, its growth and seed production was below optimum. For now, there are few sagebrush plants within the sampled area. The current density is estimated at only 40 plants/acre. Under these conditions for key browse, it would no longer be considered a winter range for deer. There were a few individuals of undesirable increasers (snakeweed and pricklypear) sampled in previous years, but none were very common. Presently, the density of broom snakeweed has increased to 500 plants/acre, with pricklypear not fairing as well after the fire as none were sampled during 1998. The junipers, generally considered an undesirable increaser on this range type when in relatively high densities, appeared stable and not expanding. Currently, most of these will have been effected by the fire, however this will not be accurately determined until the next reading.

Perennial herbaceous vegetation was sparse in past readings, but with the wildfire and no seeding effort, cheatgrass and other weeds will dominate the site. In the previous two readings, the understory was dominated by annual cheatgrass, but even that species was not plentiful. After the fire, cheatgrass now makes up 86% of the grass cover. There is some bottlebrush squirreltail, Sandberg bluegrass, and Indian ricegrass present, but in very low numbers except for bottlebrush squirreltail which occurs a little more often. Utilization of these perennial grass species in the past was moderate, but it was not apparent whether the use is from wildlife or livestock. Forbs are still rarely found on this site except for coyote tobacco, which invariably comes onto sites that have recently burned. This species is never very competitive and will soon be crowded off the site by other herbaceous species.

1985 APPARENT TREND ASSESSMENT

The soil type is one of severe erosion potential, but is stabilized here by the extensive rock and pavement cover (53%). There is also no evidence of sedimentation. The vegetative community appears to have struck a

balance between the sagebrush and junipers and other increasers. However, if the site is grazed excessively by sheep while trailing in spring and fall, the desirable perennial grasses and sagebrush will decline.

1991 TREND ASSESSMENT

The soil trend is downward because bare soil has increased from only 2% to 11%. Most of this increase has come from a loss of litter cover. This condition should be watched closely, for with more drought, this condition could worsen. Wyoming big sagebrush has increased its density by 30% with only a slight increase in percent decadency which can change with normal precipitation patterns, rather than this extended drought. It should also be noted that the form class for heavily hedged sagebrush (>60% use) has increased from 8% to 38% with the percent exhibiting poor vigor also increasing from 0% to 31%. Average plant height and crown have also decreased substantially. Even with the increase in its density, the other measured parameters indicate the health of the community is declining with this prolonged drought. This condition could turn around with an end to the drought. The herbaceous understory is still almost nonexistent except for a few bottlebrush squirreltail.

TREND ASSESSMENT

soil - slightly downward

browse - slightly downward even with the increase in density because the overall health of the sagebrush community is declining

herbaceous understory - downward and very poor condition, few species with very low frequencies

1998 TREND ASSESSMENT

Trend for soil is down. Although percent bare soil has changed little, the fire has changed many other important parameters on the site. The most noticeable is that of protective herbaceous cover and litter cover which has been severely altered. At the present time, 80% of the herbaceous cover comes from only two weedy species becoming more dominant after the fire. Protective litter cover is now down to only 12%, while rock and pavement cover is up to 67%. The trend for browse is obviously down, as 99% of the Wyoming big sagebrush was lost to the fire in 1997. The trend for the herbaceous understory is also down, because without the major two weedy species, total herbaceous cover would be just over 2%, one of the lowest values we have measured.

TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - down

HERBACEOUS TRENDS --
Herd unit 23 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Bromus tectorum (a)	-	-	160	-	-	61	9.03
G	Oryzopsis hymenoides	4	-	1	2	-	1	.03
G	Poa secunda	7	7	5	2	3	2	.18
G	Sitanion hystrix	_b 77	_a 48	_{ab} 60	39	23	27	1.24
Total Annual Grasses		0	0	160	0	0	61	9.03
Total Perennial Grasses		88	55	66	43	26	30	1.45
F	Argemone munita	-	-	2	-	-	1	.15
F	Astragalus spp.	1	-	-	1	-	-	-
F	Calochortus nuttallii	-	-	1	-	-	1	.00
F	Castilleja spp.	-	-	1	-	-	1	.00
F	Descurainia spp. (a)	-	-	4	-	-	2	.04
F	Erigeron pumilus	1	3	-	1	1	-	-
F	Euphorbia spp.	_a -	_a -	_b 5	-	-	4	.04
F	Lappula occidentalis (a)	-	-	4	-	-	2	.01
F	Leucelene ericoides	_a -	_a -	_b 15	-	-	8	.33
F	Lupinus argenteus	-	-	3	-	-	1	.15
F	Nicotiana attenuata (a)	-	-	3	-	-	3	1.06
F	Sisymbrium altissimum (a)	-	1	-	-	1	-	-
F	Unknown forb-perennial	-	-	-	-	-	-	.38
Total Annual Forbs		0	1	11	0	1	7	1.11
Total Perennial Forbs		2	3	27	2	1	16	1.07

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

BROWSE TRENDS --
Herd unit 23 , Study no: 4

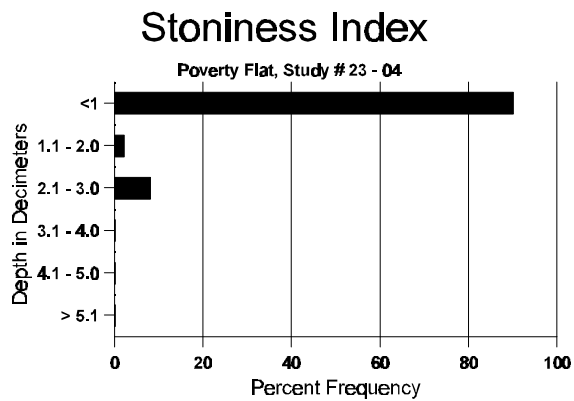
Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	2	-
B	Echinocereus spp.	0	-
B	Gutierrezia sarothrae	10	.16
B	Juniperus osteosperma	0	.63
B	Opuntia spp.	0	-
Total for Browse		12	0.79

BASIC COVER --
Herd unit 23 , Study no: 4

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	208	3.25	2.75	14.86
Rock	366	28.75	25.25	48.72
Pavement	227	24.00	28.00	18.13
Litter	315	41.50	33.25	11.90
Cryptogams	7	.25	0	.06
Bare Ground	221	2.25	10.75	9.93

SOIL ANALYSIS DATA --
Herd Unit 23, Study # 04, Study Name: Poverty Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.1	81.0 (12.6)	6.7	44.0	35.4	20.6	4.8	26.2	163.2	.8



PELLET GROUP FREQUENCY --
Herd unit 23 , Study no: 4

Type	Quadrat Frequency '98
Elk	1
Deer	3

BROWSE CHARACTERISTICS --

Herd unit 23 , 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 wyomingensis																		
S	85	6	2	-	-	-	-	-	-	-	8	-	-	-	533			8
	91	11	-	-	-	-	-	-	-	-	10	-	1	-	733			11
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	10	6	1	-	-	-	-	-	-	17	-	-	-	1133			17
	91	10	1	6	-	-	-	-	-	-	16	-	1	-	1133			17
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	85	14	31	3	-	-	-	-	-	-	48	-	-	-	3200	20	23	48
	91	9	21	21	-	6	3	-	-	-	42	1	17	-	4000	15	17	60
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	85	3	10	3	-	-	-	-	-	-	16	-	-	-	1066			16
	91	4	14	15	1	2	3	-	-	-	18	1	11	9	2600			39
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	660			33
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		58%			09%			00%			+30%							
'91		38%			41%			33%			-99%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	5399	Dec:	20%			
												'91	7733		34%			
												'98	40		50%			
Echinocereus spp.																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	5	6	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	66		-			
												'98	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>Gutierrezia sarothrae</i>									
S	85	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	0	0
	98	1	-	-	-	-	-	20	1
Y	85	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	0	0
	98	9	-	-	-	-	-	180	9
M	85	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	0	0
	98	16	-	-	-	-	-	320	16
X	85	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	0	0
	98	-	-	-	-	-	-	40	2
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>				
'85		00%	00%	00%					
'91		00%	00%	00%					
'98		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'85	0	Dec:	-	
					'91	0		-	
					'98	500		-	
<i>Juniperus osteosperma</i>									
X	85	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	0	0
	98	-	-	-	-	-	-	60	3
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>				
'85		00%	00%	00%					
'91		00%	00%	00%					
'98		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'85	0	Dec:	-	
					'91	0		-	
					'98	0		-	
<i>Opuntia spp.</i>									
Y	85	-	-	-	-	-	-	0	0
	91	2	-	-	-	-	-	133	2
	98	-	-	-	-	-	-	0	0
M	85	3	-	-	-	-	-	200	3
	91	1	-	-	-	2	-	200	3
	98	-	-	-	-	-	-	0	0
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>				
'85		00%	00%	00%	+40%				
'91		00%	00%	00%					
'98		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'85	200	Dec:	-	
					'91	333		-	
					'98	0		-	

Trend Study 23-5-98

Study site name: Smith Canyon .

Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 180 degrees.

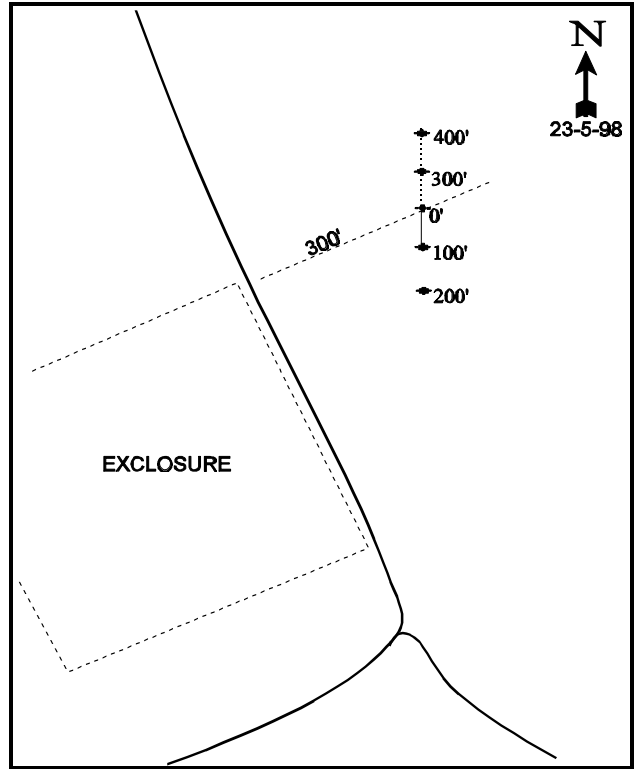
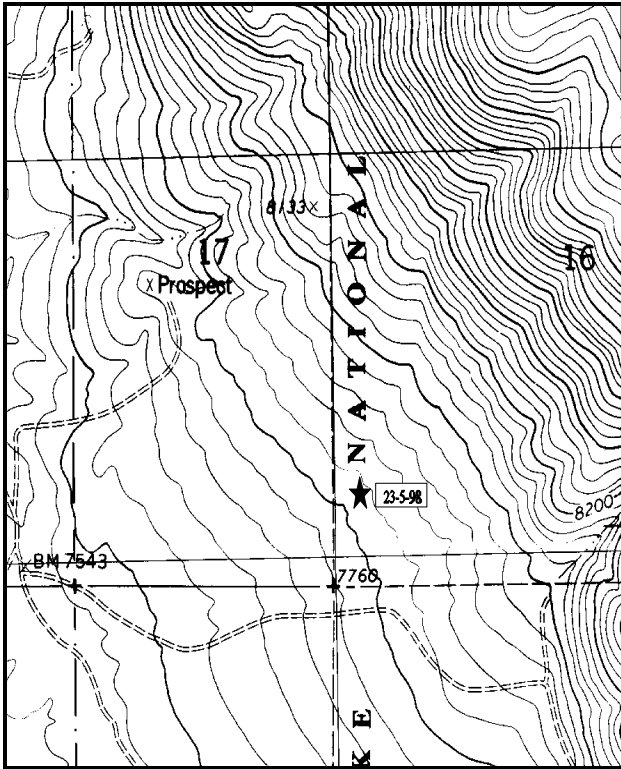
Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of Main Street (SR89) and Center Street in Marysvale, turn east and proceed 0.7 miles, crossing a bridge. At a three-way split in the road stay left and continue 1.9 miles. Keep right and go 0.8 miles. Keep right at the split, then go immediately right again. Proceed another 0.8 miles and make a left turn. Go 2.5 miles up this road to a "T" intersection. Turn right and go 0.8 miles to the Smith Canyon sign. Turn left here and drive 0.7 miles, passing through a gate. Turn north (left) and go along the east side of a cattle enclosure. From the northeast corner of the enclosure, walk 300 feet at 70 degrees (in line with the north side fence) to the start of the baseline. The 0-foot end is marked by a rebar with a browse tag #7043 attached.

Map Name: Marysvale, Utah

Diagrammatic Sketch



Township 27S , Range 2.5W , Section 16

UTM 4257083.229 N, 401194.169 E

DISCUSSION

Trend Study No. 23-5 (45-5)

The Smith Canyon trend study is located on the southwestern side of Marysvale Peak, at an elevation of about 7,800 feet. The foothills level out to form open, gentle sagebrush covered slopes (about 2-3% slope). Much of the area has been chained and seeded, and now there are scattered junipers, clumps of Gambel oak, and curlleaf mountain mahogany. An adjacent cattle enclosure displays similar vegetation, but the plants there appear slightly more vigorous. Grazing pressure from livestock appears light on this Forest Service land. Browsing pressure is often heavy at times. The Smith Canyon pellet group transect shows more use than any other transect on the herd unit with a 10-year average of over 41 deer days use/acre (Jense et al. 1985). From 1985 through 1990, average deer days use/hectare was up to 62 deer days use/acre. Although use is concentrated in winter, tracks and sightings indicate deer use is common year-round. Elk have been seen in the area and if the herd continues to increase, this may become an important elk wintering area as well. The pellet group transect read in conjunction with the vegetative transect indicated that deer days use/acre was up to 112, while for cows it was 14 cow days use/acre.

The soil appears to be well-developed and protected on this site. Litter cover is moderately high from the diverse and healthy plant community. Soil textural analysis indicates it to be a sandy loam with a moderately acidic pH (5.9). Effective rooting depth is almost 12 inches with a soil temperature of 60°F at 13 inches. There is a relatively dense cover of vegetation over much of the transect, leaving very little bare soil. Pavement occupies much of the space between vegetation. The area receives more precipitation than the other winter range study sites on this herd unit. Erosion could be severe on this soil type, but the ground cover and gentle slope tend to minimize the problem.

Mountain big sagebrush is the dominant shrub species as it makes up 80% of the browse cover. The subspecies *Artemisia tridentata vaseyana* is considered a very palatable sagebrush, yet it is not as utilized as the bitterbrush on this site. The sagebrush population shows a relatively large decrease in numbers from 1991 to 1998, however only about 25% of this decrease can be explained by the number of dead plants in the population. Therefore, most of the decrease is because of the much larger sampling design giving greater accuracy in estimating shrub populations that are discontinuous and/or clumped in their distributions. Currently, the sagebrush have a decrease in percent decadence, and those classified with poor vigor have decreased, but use is still moderate with no seedlings, and percent young are a very minor component (only 4%). The live to dead ratio is moderately high at 1:4.6, or 18%. The mature age class now makes up almost 80% of the population. The sagebrush shows mostly moderate hedging (from 46% to 54%), whereas bitterbrush currently has sustained heavier use, but still has a lower percentage of decadence. All the plants are large and generally in good vigor. However in 1985, leader growth on the bitterbrush appeared to be somewhat less than optimum and were probably effected by the heavy hedging during the winters of 1983 and 1984. Even with heavy use the bitterbrush has only 8% classified as decadent plants. Nineteen percent of the bitterbrush were young plants in 1985. This had gone down to only 5% in 1991. Now it is back up to 15%. Juniper, Gambel oak, and mountain mahogany are abundant nearby and appear to be spreading slowly. These trees provide the only good escape and thermal cover in the area.

Grasses include six perennial species, which are growing well and are fairly abundant, especially under the shrub crowns. The most common perennial species is bluebunch wheatgrass. Other species that commonly occur are muttongrass and bottlebrush squirreltail. Cheatgrass was present, but made up only a small percentage of the vegetation initially. Cheatgrass now contributes 68% of the grass cover and grass species make up 86% of the herbaceous cover. Utilization of grasses is generally light. Currently, the nest frequency value for the perennial grasses has gone down to its lowest value since 1985. The value for forbs has also gone down to its lowest value since the first measurements. Trend is down for the herbaceous understory.

There is good diversity of valuable perennial forbs on the site, but they are not very common. The most abundant is silky lupine, which grows tall and vigorous. Other useful forbs include: arrowleaf balsamroot,

redroot eriogonum, mulesears wyethia, and tapertip hawksbeard. Density is rather low and most of these plants are small and low-growing, but they are utilized by wildlife.

1985 APPARENT TREND ASSESSMENT

As this is such a heavily used and important winter range, it is vital to monitor the community to help prevent severe downward trends. Continued heavy use in conjunction with the drought could be detrimental to the bitterbrush population. Light spring cattle grazing or elk use can help to release young browse plants from grass competition, especially here where the grasses grow thick under the cover of the sagebrush. As the junipers and oaks increase, they will provide excellent cover, but a continuous stand would not be desirable. Generally, vegetative trend appears stable, or slightly downward because of the heavy pressure on the bitterbrush. The soil is stable and in good condition.

1991 TREND ASSESSMENT

Here again, as on other sites, percent bare ground has increased from 4 to 11% and vegetative basal cover has decreased from 8% to 4%. The common denominator appears to be the prolonged drought. This downward trend should be watched closely, but should improve with improved precipitation patterns. The two key browse species, mountain big sagebrush and bitterbrush, are both increasing in density, 16% and 20% respectively. Percent decadence has gone down in sagebrush, but has gone up sharply for bitterbrush. The increase for bitterbrush could be a combination of heavy use and again the extended drought. Even with the increase in decadence, the browse trend is still considered to be improving. With increased moisture, the degree of decadence for bitterbrush would be expected to go down. The herbaceous understory is also on an upward trend, with most of the grasses and forbs increasing in quadrat frequency.

TREND ASSESSMENT

soil - slightly down

browse - slightly up

herbaceous understory - up

1998 TREND ASSESSMENT

The trend for soil is slightly down because of significant decreases in grass and forb nested frequency values which are the lowest they have ever been. The browse trend is mixed, with a slight downward trend for sagebrush and a stable trend for bitterbrush. However, since sagebrush contributes 80% of the browse cover, trend would be slightly down. The trend for the herbaceous understory is also slightly down, because nested frequency values for both have significantly decreased since 1991.

TREND ASSESSMENT

soil - slightly down

browse - slightly down

herbaceous understory - slightly down

HERBACEOUS TRENDS --
Herd unit 23 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	<i>Agropyron spicatum</i>	179	176	195	71	68	74	4.20
G	<i>Bromus tectorum</i> (a)	-	-	305	-	-	92	10.56
G	<i>Hilaria jamesii</i>	-	-	3	-	-	1	.15
G	<i>Poa fendleriana</i>	_b 58	_a 78	_b 28	28	35	15	.25
G	<i>Poa secunda</i>	-	-	6	-	-	2	.01
G	<i>Sitanion hystrix</i>	_a 47	_b 64	_a 28	24	35	14	.22
G	<i>Stipa comata</i>	-	4	5	-	1	2	.18
Total Annual Grasses		0	0	305	0	0	92	10.56
Total Perennial Grasses		284	322	265	123	139	108	5.03
F	<i>Agoseris glauca</i>	_a -	_b 6	_a -	-	4	-	.00
F	<i>Alyssum alyssoides</i> (a)	-	-	3	-	-	1	.00
F	<i>Arabis</i> spp.	-	4	3	-	3	1	.00
F	<i>Astragalus convallarius</i>	17	6	9	7	4	5	.19
F	<i>Astragalus</i> spp.	-	12	3	-	4	2	.01
F	<i>Balsamorhiza sagittata</i>	-	5	2	-	2	1	.01
F	<i>Calochortus nuttallii</i>	_a -	_b 9	_a 1	-	6	1	.00
F	<i>Chaenactis douglasii</i>	-	-	5	-	-	2	.01
F	<i>Comandra pallida</i>	5	5	1	3	2	1	.03
F	<i>Collinsia parviflora</i> (a)	-	-	2	-	-	1	.00
F	<i>Crepis acuminata</i>	_{ab} 4	_b 14	_a -	3	7	-	-
F	<i>Cryptantha nana</i>	3	-	-	2	-	-	-
F	<i>Eriogonum racemosum</i>	_a 20	_b 59	_a 21	11	27	9	.29
F	<i>Eriogonum umbellatum</i>	-	-	3	-	-	1	.00
F	<i>Lonicera utahensis</i>	_a -	_a -	_b 16	-	-	6	.30
F	<i>Lotus utahensis</i>	-	1	-	-	1	-	-
F	<i>Lupinus argenteus</i>	_c 74	_b 46	_a 18	31	23	8	1.55
F	<i>Microsteris gracilis</i> (a)	-	-	11	-	-	4	.02
F	<i>Phlox longifolia</i>	_b 42	_b 50	_a 21	19	28	11	.11
F	<i>Sphaeralcea coccinea</i>	-	3	-	-	1	-	-
F	<i>Streptanthus cordatus</i>	4	2	1	2	1	1	.00
F	<i>Wyethia amplexicaulis</i>	_b 11	_a -	_a -	5	-	-	-
Total Annual Forbs		0	0	16	0	0	6	0.02
Total Perennial Forbs		180	222	104	83	113	49	2.54

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

BROWSE TRENDS --
Herd unit 23 , Study no: 5

Type	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	0	-
B	Artemisia tridentata vaseyana	88	24.61
B	Chrysothamnus nauseosus albicaulis	1	-
B	Chrysothamnus viscidiflorus viscidiflorus	2	-
B	Eriogonum microthecum	2	-
B	Opuntia spp.	0	-
B	Pinus edulis	1	-
B	Purshia tridentata	44	6.61
B	Sclerocactus	2	-
B	Symphoricarpos oreophilus	1	-
B	Tetradymia canescens	0	-
Total for Browse		141	31.22

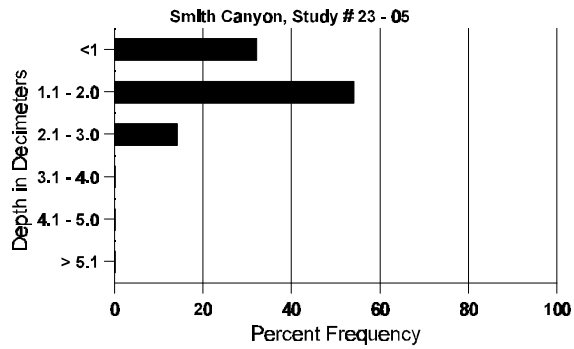
BASIC COVER --
Herd unit 23 , Study no: 5

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	344	8.00	4.25	40.73
Rock	130	1.00	1.25	2.75
Pavement	234	18.50	8.75	12.96
Litter	394	68.25	73.25	54.14
Cryptogams	9	.75	1.25	.12
Bare Ground	194	3.50	11.25	13.71

SOIL ANALYSIS DATA --
Herd Unit 23, Study # 05, Study Name: Smith Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.9	59.6 (13.3)	5.9	54.0	29.4	16.6	3.5	21.9	281.6	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 23 , Study no: 5

Type	Quadrat Frequency '98
Rabbit	26
Deer	34
Cattle	3

BROWSE CHARACTERISTICS --

Herd unit 23 , Study no: 5

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
Amelanchier utahensis																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	24	17	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	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	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	6	4	-	-	-	-	-	-	-	10	-	-	-	666			10
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	98	4	1	-	1	1	-	-	-	-	7	-	-	-	140			7
M	85	22	29	6	-	-	-	-	-	-	49	-	8	-	3800	24	27	57
	91	34	38	1	4	3	2	-	-	-	74	3	5	-	5466	22	30	82
	98	70	72	9	1	-	-	-	-	-	148	2	2	-	3040	32	44	152
D	85	4	16	4	-	-	-	-	-	-	18	-	4	2	1600			24
	91	11	12	-	-	1	-	-	-	-	16	-	1	7	1600			24
	98	15	14	4	-	-	1	-	-	-	27	-	-	7	680			34
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	840			42
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		54%			11%			15%			+16%							
'91		50%			03%			12%			-46%							
'98		46%			07%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	6066	Dec:	26%			
												'91	7199		22%			
												'98	3860		18%			
<i>Chrysothamnus nauseosus albicaulis</i>																		
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	0		0%			
												'98	20		100%			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	1	-	-	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	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					
Eriogonum microthecum										
Y	85	-	-	-	-	-	-	0		0
	91	2	-	-	-	-	-	133		2
	98	-	-	2	-	-	-	40		2
M	85	-	-	-	-	-	-	0	-	0
	91	-	-	1	-	-	-	66	1	1
	98	-	-	1	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
	'85	00%		00%		00%				
	'91	00%		33%		00%		-70%		
	'98	00%		33%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-	
						'91	199		-	
						'98	60		-	
Opuntia spp.										
M	85	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	0	-	0
	98	-	-	-	-	-	-	0	5	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
	'85	00%		00%		00%				
	'91	00%		00%		00%				
	'98	00%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-	
						'91	0		-	
						'98	0		-	
Pinus edulis										
Y	85	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
	'85	00%		00%		00%				
	'91	00%		00%		00%				
	'98	00%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-	
						'91	0		-	
						'98	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				
Purshia tridentata																		
S	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	-	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	-	-	-	-	-	1	-	-	-	1	-	-	-	66		1	
	98	-	2	3	-	3	1	-	-	-	9	-	-	-	180		9	
M	85	-	8	5	-	-	-	-	-	-	13	-	-	-	866	20 27	13	
	91	-	3	5	-	-	-	-	-	-	8	-	-	-	533	13 20	8	
	98	-	1	22	3	10	10	1	-	-	47	-	-	-	940	20 37	47	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	9	-	-	1	-	-	-	11	-	-	-	733		11	
	98	-	-	5	-	-	-	-	-	-	5	-	-	-	100		5	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		69%			31%			00%			+20%							
'91		15%			80%			00%			- 8%							
'98		26%			67%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	1066	Dec:	0%				
											'91	1332		55%				
											'98	1220		8%				
Sclerocactus																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	3	-	-	-	-	-	-	3	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			75%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	0%				
											'91	0		0%				
											'98	80		75%				

A G R E	Y R	Form Class (No. of 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	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	1	-	-	-	-	-	-	-	-	-	-	66		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	1	-	-	-	-	-	-	-	-	-	-	-	-	20	13 28	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			100%			00%			-70%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	66		-		
												'98	20		-		
Tetradymia canescens																	
Y	85	2	-	-	-	-	-	-	-	-	-	-	-	-	133		2
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	133	Dec:	-		
												'91	0		-		
												'98	0		-		

Trend Study 23-6-98

Study site name: Koosharem Canyon .

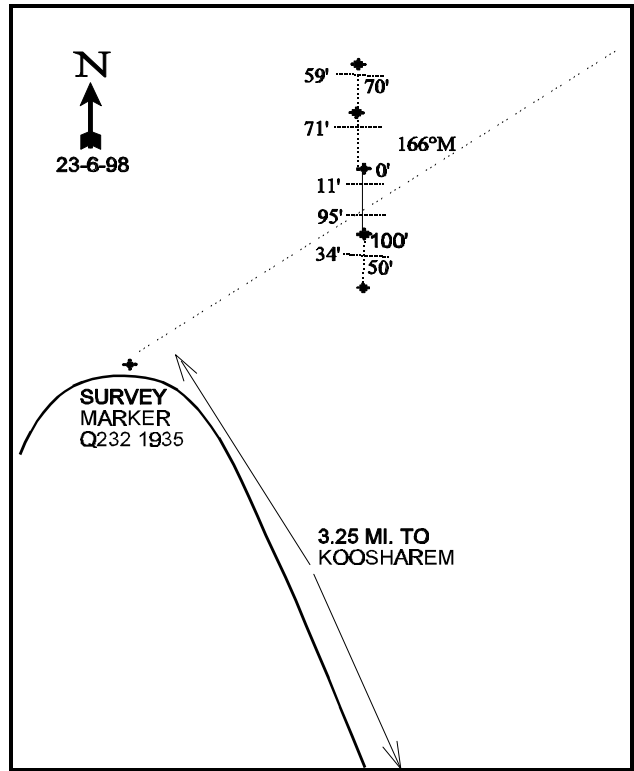
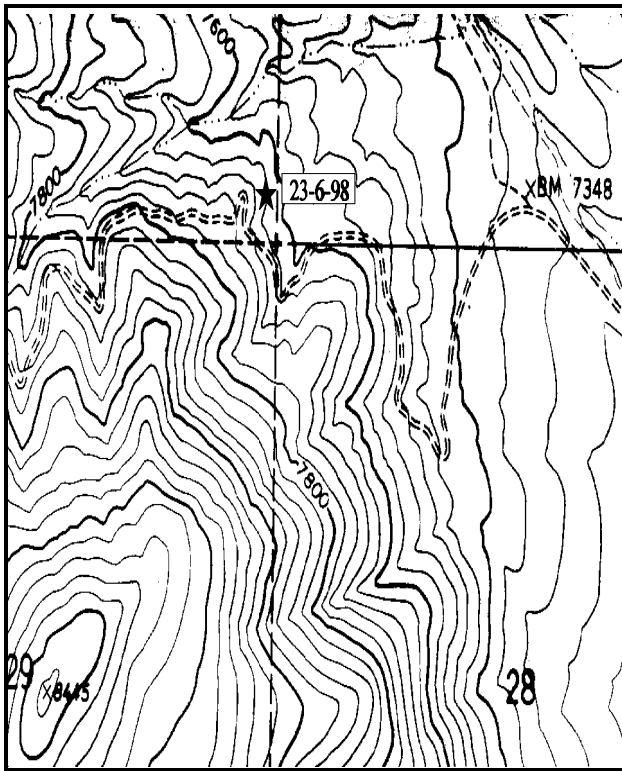
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (71ft), line 4 (59ft).

LOCATION DESCRIPTION

From the intersection next to the Koosharem LDS Ward Building go west 0.35 miles up the Koosharem Mountain Road. Bear right and go 0.05 miles to a fork. Take the left fork over a small bridge and proceed 1.85 miles to another fork. Turn left and go just over 1.0 mile to a hairpin turn that curves to the left. Stop at the apex of the curve. There is a benchmark here on the north side of the road. Take a bearing of 39 degrees and go 58 feet from the benchmark to find a short yellow rebar that marks a pellet group transect. From the first stake, the pellet group transect runs northeast (62-67 degrees) with stakes at intervals of about 50-60 feet. Count down 7 stakes, then go due north 50 feet to the baseline starting point. The 0-foot end of the baseline is marked by a steel rebar with browse tag #7042 attached. The baseline runs due south, crossing the pellet group transect.



Map Name: Koosharem, Utah

Diagrammatic Sketch

Township 26S, Range 1W, Section 20

UTM 4264699.016 N, 419545.308 E

DISCUSSION

Trend Study No. 23-6 (45-6)

The Koosharem Canyon study samples a moderately high elevation winter range on the east side of the Monroe Mountain herd unit. The site is located on a northeast, moderately steep slope (28%) at an elevation of 7,600 feet. The range type is mixed mountain brush with 10 browse species present. Wildlife use appears to be year-round. Data from pellet group counts on the site show an average over the last five years of 22 deer days use/acre (Jense et al. 1985). After this period, the deer days use/acre had gone up to 57 (Jense et al. 1991). Currently, the transect read in conjunction with the vegetation transect showed that deer days use/acre is now up to 63. Elk use is at 31 elk days use/acre and cattle at 5 days use/acre. Cattle graze this Forest Service land from June 1 to July 1. Under the current system, it is grazed two years in a row, then rested two years. Past grazing pressure appears to have been very heavy.

Ground cover is highly variable on the site. The vegetation and litter cover provides the majority of the ground cover. Soil movement is detectable on trails and shrub interspaces where rocks and pavement (24% of ground cover) and bare soil (24%) predominant. The soil is prone to erosion, as seen on some steeper areas nearby. The soil is rocky, but also contains a fair amount of organic matter. Soil textural analysis indicated that it was a clay loam with a neutral to slightly acidic pH (6.5). Effective rooting depth was moderate at just over 16 inches with a soil temperature of 59°F at 17 inches.

The hillside is dominated mainly by Wyoming big sagebrush and true mountain mahogany (*Cercocarpus montanus*). These two species alone contribute to 82% of the browse cover. Further up the hill and to the south, large mature Utah juniper and curlleaf mountain mahogany (*Cercocarpus ledifolius*) are more prominent. Both the sagebrush and the true mountain mahogany were initially vigorous and all available. There were a few decadent and less vigorous individuals, but both species had a healthy percentage of seedlings and young in 1985. Since then, mountain big sagebrush has shown many characteristics indicating a downward trend. These include: very low biotic potential, low percentage of plants in the young age class, high percent decadence (65% in 1991, currently 26%), and a high percentage of decadent plants classified as dying (43% in 1991). The downward trend for sagebrush has slowed down, but it is still going down. The large decrease in density for sagebrush is mostly because of the much larger sample size giving more accurate density estimates of shrub populations that have discontinuous and/or clumped distributions. Also, only about 21% of the drop in numbers can be explained by the number of dead in the population. True mountain mahogany, a long-lived species, is stable to slightly up. The oak and several other important browse species; Utah serviceberry, snowberry and Greenes rabbitbrush, show signs of light browsing. Pricklypear cactus, an increaser under cattle grazing, is fairly common but does not appear to be increasing rapidly.

Herbaceous vegetation is moderately abundant. The most abundant species except for mutton grass is sedge (*Carex spp.*) Muttongrass and bottlebrush squirreltail make up the balance of the most abundant grasses. These grass and grass-like species provide some spring and summer forage, but the community is lacking a desirable high-yielding herbaceous species. Bluebunch wheatgrass could fill this need, but it is presently in very low numbers and may not increase if spring cattle grazing continues at present levels. The perennial grass sum of nested frequency has decreased substantially since 1991.

There are a variety of forbs on the site, but density is very low and most are small and low-growing. Thus they are only a minor forage source. Some of the more common species that are utilized by deer are: longleaf phlox, scarlet globemallow, clover, dusty penstemon, and sulphur eriogonum. Utilization of these forbs appears to be light.

1985 APPARENT TREND ASSESSMENT

Soil trend on the site appears to be slightly downward as erosion continues on localized areas of the slope. An increase in basal vegetative cover from new growth of the grasses and forbs will help hold the soil in place. There does appear to be an increase in the grasses as they recover from past heavy grazing pressure. The key species may also be increasing; both the sagebrush and mountain mahogany have a high percentage of young plants. The upward vegetative trend is also shown by the good form, vigor and leader growth of the important browse species. However, encroachment of Gambel oak could become a problem in the future.

1991 TREND ASSESSMENT

The soil trend is considered slightly down because vegetative basal cover is down and percent bare ground is up to 29% . Serviceberry, mountain big sagebrush, and True mountain mahogany are all decreasing in density and increasing in rates of decadency. This would indicate a downward trend that should be watched closely. The majority of the grasses and forbs have shown increases in nested and quadrat frequency values, indicating an upward overall trend for the herbaceous understory.

TREND ASSESSMENT

- soil - slightly down
- browse - down
- herbaceous understory - up

1998 TREND ASSESSMENT

The soil trend is considered stable with a slight decrease in percent bare soil with a corresponding decrease in herbaceous cover, essentially canceling out each trend. Trend for key browse is mixed, but because mountain big sagebrush contributes the majority of the browse cover (about 60%), it is still showing some indications of downward trend. Therefor, trend for browse is slightly down. The trend for herbaceous species is down, with nested frequency values for both grasses and forbs.

TREND ASSESSMENT

- soil - stable
- browse - slightly down for sagebrush
- herbaceous understory - down for both the grasses and forbs

HERBACEOUS TRENDS --

Herd unit 23 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron smithii	a-	b24	a5	-	12	2	.03
G	Agropyron spicatum	a10	b49	a32	6	24	14	.83
G	Bouteloua gracilis	-	-	2	-	-	1	.00
G	Carex spp.	c221	b179	a109	81	63	39	2.02
G	Oryzopsis hymenoides	-	8	18	-	3	7	.70
G	Poa fendleriana	b176	c183	a138	75	68	53	8.00
G	Sitanion hystrix	a58	b110	a56	24	46	25	.98
Total Annual Grasses		0	0	0	0	0	0	0
Total Perennial Grasses		465	553	360	186	216	141	12.58

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	<i>Agoseris glauca</i>	-	6	-	-	2	-	-
F	<i>Antennaria rosea</i>	1	3	-	1	1	-	-
F	<i>Androsace septentrionalis</i> (a)	-	-	14	-	-	8	.06
F	<i>Arabis</i> spp.	-	-	3	-	-	1	.00
F	<i>Astragalus lentiginosus</i>	6	7	5	4	3	2	.03
F	<i>Castilleja chromosa</i>	a-	b16	a-	-	6	-	-
F	<i>Calochortus nuttallii</i>	a-	b17	a-	-	9	-	-
F	<i>Crepis acuminata</i>	ab3	b13	a-	2	6	-	-
F	<i>Cryptantha humilis</i>	4	5	1	3	3	1	.03
F	<i>Descurainia</i> spp. (a)	-	-	2	-	-	1	.00
F	<i>Erigeron eatonii</i>	5	3	-	3	2	-	-
F	<i>Eriogonum racemosum</i>	-	-	4	-	-	2	.03
F	<i>Eriogonum umbellatum</i>	a5	b16	a3	3	9	1	.03
F	<i>Lomatium</i> spp.	a-	b12	a-	-	6	-	-
F	<i>Machaeranthera canescens</i>	5	-	-	2	-	-	-
F	<i>Penstemon comarrhenus</i>	6	-	-	3	-	-	-
F	<i>Penstemon</i> spp.	a-	a-	b8	-	-	4	.04
F	<i>Penstemon watsonii</i>	-	2	-	-	2	-	-
F	<i>Phlox longifolia</i>	b40	c69	a7	19	34	3	.01
F	<i>Potentilla gracilis</i>	-	-	1	-	-	1	.03
F	<i>Sphaeralcea coccinea</i>	b28	ab17	a5	13	8	3	.04
F	<i>Taraxacum officinale</i>	1	-	-	1	-	-	-
F	<i>Tragopogon dubius</i>	-	-	1	-	-	1	.00
F	<i>Trifolium</i> spp.	b21	c37	a2	11	19	1	.00
F	Unknown forb-perennial	5	-	-	3	-	-	-
F	<i>Wyethia amplexicaulis</i>	5	-	-	2	-	-	-
F	<i>Zigadenus paniculatus</i>	2	-	-	2	-	-	-
Total Annual Forbs		0	0	16	0	0	9	0.06
Total Perennial Forbs		137	223	40	72	110	20	0.28

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

BROWSE TRENDS --
Herd unit 23 , Study no: 6

Type	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	10	.36
B	Artemisia tridentata wyomingensis	91	17.00
B	Cercocarpus ledifolius	1	-
B	Cercocarpus montanus	44	6.59
B	Chrysothamnus depressus	5	.33
B	Chrysothamnus greenei	0	-
B	Chrysothamnus viscidiflorus viscidiflorus	6	.03
B	Cowania mexicana stansburiana	1	.15
B	Echinocereus spp.	2	.01
B	Eriogonum microthecum	15	.42
B	Juniperus osteosperma	3	.00
B	Mahonia repens	1	-
B	Opuntia spp.	21	.23
B	Pinus edulis	3	.18
B	Purshia tridentata	8	.16
B	Quercus gambelii	11	1.54
B	Symphoricarpos oreophilus	31	1.77
Total for Browse		152	28.80

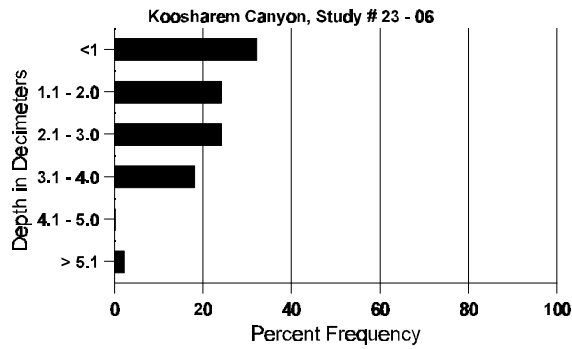
BASIC COVER --
Herd unit 23 , Study no: 6

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	299	9.25	5.25	37.37
Rock	191	11.25	10.25	9.54
Pavement	256	13.00	7.75	14.62
Litter	392	49.00	47.25	47.14
Cryptogams	1	0	.25	.00
Bare Ground	270	17.50	29.25	23.75

SOIL ANALYSIS DATA --
Herd Unit 23, Study # 06, Study Name: Koosharem Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.2	58.6 (17.1)	6.5	40.0	25.4	34.6	4.2	26.8	243.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 23 , Study no: 6

Type	Quadrat Frequency '98
Rabbit	50
Elk	10
Deer	45
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 23 , Study no: 6

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	6	2	-	-	-	-	-	-	-	8	-	-	-	533		8	
	91	-	-	2	-	-	-	2	-	-	4	-	-	-	266		4	
	98	2	-	-	2	-	-	-	-	-	4	-	-	-	80		4	
M	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66	13	9	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	1	-	3	2	-	-	-	-	8	-	-	-	160	25	21	8
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	1	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		33%			00%			00%			-45%							
'91		00%			60%			00%			-28%							
'98		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	599	Dec:	0%				
											'91	332		20%				
											'98	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				
<i>Artemisia tridentata wyomingensis</i>																		
S	85	16	-	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	-	2	-	1	-	60		3	
Y	85	39	6	1	-	-	-	-	-	-	42	-	4	-	3066		46	
	91	1	3	-	-	-	-	4	-	-	8	-	-	-	533		8	
	98	8	5	-	3	-	-	-	-	-	15	-	1	-	320		16	
M	85	25	19	-	-	-	-	-	-	-	43	-	1	-	2933	39 33	44	
	91	4	9	-	4	4	1	-	-	-	20	1	1	-	1466	31 26	22	
	98	65	33	2	2	6	-	-	-	-	109	1	-	-	2200	29 31	110	
D	85	6	17	1	-	-	-	-	-	-	22	-	2	-	1600		24	
	91	13	21	4	3	11	-	4	-	-	29	1	2	24	3733		56	
	98	21	12	9	2	1	-	-	-	-	42	-	1	2	900		45	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		37%			02%			06%			-25%							
'91		56%			06%			31%			-40%							
'98		33%			06%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	7599	Dec:	21%			
												'91	5732		65%			
												'98	3420		26%			
<i>Cercocarpus ledifolius</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	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				
Cercocarpus montanus																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	6	4	-	-	-	-	-	-	-	10	-	-	-	666			10
	91	-	1	-	-	1	2	1	-	-	5	-	-	-	333			5
	98	3	2	-	4	-	-	-	-	-	9	-	-	-	180			9
M	85	3	3	-	-	-	-	-	-	-	6	-	-	-	400	34	19	6
	91	-	-	3	-	1	1	-	-	-	5	-	-	-	333	49	21	5
	98	10	23	14	-	4	-	-	-	-	50	1	-	-	1020	36	40	51
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	4	2	-	-	-	-	-	-	5	-	-	1	120			6
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		44%			00%			00%			-38%							
'91		30%			60%			00%			+50%							
'98		50%			24%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1066	Dec:	0%			
												'91	666		0%			
												'98	1320		9%			
Chrysothamnus depressus																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	3	5	-	-	-	-	-	-	-	8	-	-	-	160	3	10	8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		63%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	160		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
Chrysothamnus greenei																		
Y	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	91	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	14	-	-	-	-	-	-	-	-	14	-	-	-	933	5	5	14
	91	-	-	2	-	-	-	-	-	-	2	-	-	-	133	2	3	2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	18	-	-	-	-	-	-	18	-	-	-	1200		18	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			-13%							
'91		00%			100%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	1599	Dec:	0%				
											'91	1399		86%				
											'98	0		0%				
Chrysothamnus viscidiflorus viscidiflorus																		
S	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133	10	7	2
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	4	-	-	-	-	-	6	-	-	-	120	15	14	6
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			14%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	266	Dec:	0%				
											'91	0		0%				
											'98	140		14%				
Cowania mexicana stansburiana																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	21	22	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-				
											'91	0		-				
											'98	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				
Echinocereus spp.																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	40		-			
Eriogonum microthecum																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66	7	4	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	26	1	-	4	-	-	-	-	-	31	-	-	-	620	10	12	31
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		03%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-			
												'91	0		-			
												'98	780		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
S	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	91	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133	69 157	2	
	91	1	-	-	1	-	-	-	1	-	3	-	-	-	200	71 43	3	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	- -	2	
D	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		14%			00%			00%			-28%							
'91		20%			00%			00%			-82%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	465	Dec:	14%				
											'91	333		0%				
											'98	60		0%				
Mahonia repens																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4 7	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-				
											'91	0		-				
											'98	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										
Opuntia spp.															
S	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	1	-	-	20		1
Y	85	2	-	-	-	-	-	-	-	2	-	-	133		2
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	5	-	-	-	-	-	-	-	3	-	2	100		5
M	85	12	-	-	-	-	-	-	-	12	-	-	800	7 10	12
	91	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	98	26	-	-	-	-	-	-	-	24	-	2	520	6 14	26
D	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	6	4	-	-	-	-	-	-	2	-	-	666		10
	98	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'85		00%		00%		00%		-29%							
'91		40%		00%		80%		- 7%							
'98		00%		00%		13%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	933	Dec:	0%		
										'91	666		100%		
										'98	620		0%		
Pinus edulis															
S	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	1	-	-	-	1	66		1
	98	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	1	-	-	20		1
M	85	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	98	2	-	-	-	-	-	-	-	2	-	-	40	- -	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'85		00%		00%		00%									
'91		00%		00%		00%									
'98		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-		
										'91	0		-		
										'98	60		-		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	3	-	1	-	2	1	-	-	-	7	-	-	-	140	24	35	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		33%			22%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	180		-			
Quercus gambelii																		
S	85	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	91	1	1	-	1	1	-	2	-	-	6	-	-	-	400		6	
	98	10	13	4	-	-	-	-	-	-	27	-	-	-	540		27	
M	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133	42	21	
	91	-	2	1	-	1	-	-	-	-	4	-	-	-	266	59	18	
	98	8	10	-	-	-	-	-	-	-	17	-	-	-	360	35	28	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	2	-	-	-	-	-	-	-	3	-	-	-	60		3	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			- 9%							
'91		50%			10%			00%			+31%							
'98		52%			08%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	733	Dec:	0%			
												'91	666		0%			
												'98	960		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				
Symphoricarpos oreophilus																		
S	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	9	-	-	-	-	-	-	-	9	-	-	-	600		9		
	91	16	9	-	4	-	-	3	-	32	-	-	-	2133		32		
	98	21	3	-	5	-	-	-	-	29	-	-	-	580		29		
M	85	8	-	-	-	-	-	-	-	8	-	-	-	533	14	10	8	
	91	-	-	1	-	1	-	1	-	3	-	-	-	200	11	11	3	
	98	33	10	-	4	-	-	-	-	46	1	-	-	940	12	19	47	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	-	-	-	-	-	-	2	-	2	-	-	-	133		2		
	98	-	-	-	1	-	-	-	-	1	-	-	-	20		1		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+54%							
'91		27%			03%			00%			-38%							
'98		17%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	1133	Dec:	0%				
											'91	2466		5%				
											'98	1540		1%				

SUMMARY

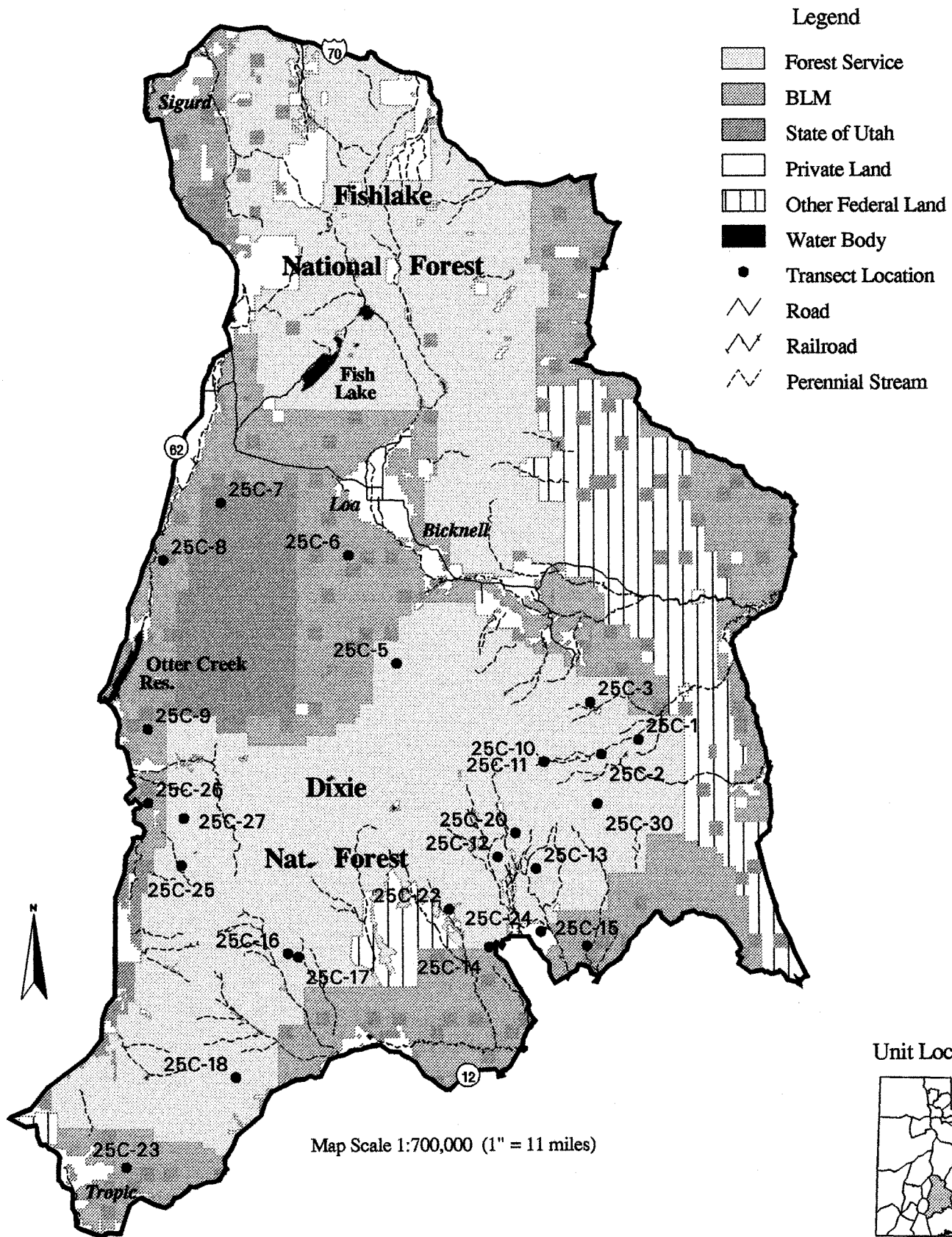
WILDLIFE MANAGEMENT UNIT - 23 (45) - MONROE MOUNTAIN

In 1991, trend for soils was slightly downward or downward for all sites. Now three of the six sites, sites #2, #3, and #6 show trends that are stable to improving. All others demonstrated signs of downward trends for soil. With the prolonged drought, as on most other sites, trend for the herbaceous understory is down on four of the sites. The sites with down or slightly downward trends make the sites more susceptible to soil loss with high intensity summer storms. All sites show the effects of these high intensity storms for the most part. For browse, only sites #1 and #2 show trends that are stable to improving. All the other sites display downward trends.

Site	1991			1998		
	Soil	Browse	Grass & Forb	Soil	Browse	Grass & Forb
23-1 Bear Ridge	-	-	+	-	-	0/+
23-2 Sols Meadow	-	0/-	+	+	-	0
23-3 Thompson Basin	-	-	+	0/+	-	-
23-4 Poverty Flat	-	-	-	-	-	-
23-5 Smith Canyon	-	+	+	-	-	-
23-6 Koosharem Canyon	-	-	+	0	-	-

(0) = stable, (+) = upward, (-) = downward, (0/-) = stable to slightly downward, (0/+) = stable to slightly upward

Management Unit 25C



WILDLIFE MANAGEMENT UNIT 25C (44) - BOULDER

Boundary Description

Wayne, Garfield and Piute counties - Boundary begins at the junction of Highway SR-62 and Highway SR-24; east on SR-24 to the Notom Road; south on the Notom Road to the Burr Trail; west on the Burr Trail to Highway SR-12 in Boulder; west on SR-12 to the Antimony-Widtsoe Road; north on this road to Highway SR-22; north on SR-22 to Highway SR-62; north on SR-62 to SR-24 and beginning point.

In 1991, herd unit 51A (north Boulder) and 51B (south Boulder) were combined and renamed deer herd unit 44 - Boulder in 1993. The unit was enlarged slightly and again renamed in 1996 as 25C - Boulder, which is now a subunit of Wildlife Management Unit 25. The other two subunits of Wildlife Management Unit 25 includes 25A Fishlake and 25B Thousand Lake. Herd Unit 51B formerly included the high country of the Aquarius Plateau, which is commonly known as Boulder Mountain. It slopes down to the south and west through variable desert terrain that makes up the major portion of the winter range in Deer Herd Unit 44. Herd unit 51A formerly enclosed areas to the north including Parker Mountain (Awapa Plateau), Boulder Mountain, Miners Mountain, and portions of the Waterpocket Fold and Capitol Reef National Park. Parker Mountain is an open rolling plateau with a maximum elevation of 9,600 feet and northeast exposure. The Aquarius Plateau is a high, lava-capped mountain plateau rising to 11,322 feet in elevation on Boulder Mountain. Miners Mountain is a large anticline located in the northeast corner of the unit. A small section along the west side of Parker Mountain drains west into Otter Creek. The remainder of the unit drains to the north into the Fremont River. Deer herd unit 25C now encompasses approximately 752,000 acres of summer range which is managed entirely by the Forest Service, and 896,700 acres of winter range, about 70% of which is managed by the BLM (Jense et al. 1992).

Precipitation ranges between 5 to 7 inches at Capitol Reef, 10 to 12 inches at Boulder and Escalante on the southern border, and 25 to 30 inches on Boulder Mountain. Municipalities located along the unit boundaries are Koosharem and Antimony on the west; Loa, Lyman, Bicknell, Teasdale, and Torrey on the north; with Escalante and Boulder on the south side.

The private land is found in the valleys around the small communities of Antimony, Escalante, Boulder, and Bryce Valley. This land is used mainly for ranching, livestock grazing, and raising alfalfa. Land uses on the federally managed winter range includes grazing and oil-gas exploration. Impacts to management can also come from wilderness designation, the proposed CO₂ project for the Antone Flat-Death Hollow area, and road building associated with resource extraction projects, including logging.

Winter Range Description

The winter range is large enough to support all of the deer summering on the unit. With a few localized exceptions, it is in mostly good condition. Huff and Coles (1966) drew the upper limits of the winter range between 8,000 and 8,400 feet and the lower limits between 6,500 and 7,000 feet. The pinyon-juniper and sagebrush types with various combinations of the two, dominates the winter range. An exception is the Ponderosa pine-bitterbrush type which also reportedly receives a significant amount of deer use during mild winters. South of Boulder Mountain, there is abundant winter range. However, much of the country is slickrock canyons and mesas that support few deer. Most wintering takes place on the lower slopes and at the base of the mountain. The upper limits of the normal winter range are fairly uniform at 8,000 feet across the south slopes of the Boulder Mountain. Seven thousand feet is the usual upper limit during severe winter conditions. The lower limit for most wintering deer on the south side of the unit is Highway 12.

On the west side of the Aquarius Plateau between Antimony and Widtsoe, winter range is more restricted. The mountain drops off steeply from Griffin Top to the river valley. Deer can typically utilize vegetation up to

9,000 feet during normal winters, but are limited to an upper limit of around 8,000 feet during severe winters. The lower boundary for severe winters is the bottom of the valley on the Sevier River, which is approximately 6,500 feet.

Pinyon-juniper encroachment and deer depredation of alfalfa fields and haystacks in Grover, Teasdale, and Government Creek areas have been reported to be the most serious problems. Revegetation projects by both the Forest Service and BLM have helped reduced the depredation problems and provided another important source of winter and spring forage. Further improvements are needed in Government Creek, Pine Creek, Birch Spring, Rabbitbrush Spring, Happy Valley, and Dry Bench.

Pinyon-juniper is the prevalent range type on most of the unit. There are different subtypes depending on elevation. These vegetative types range from dense pinyon-juniper on mountain slopes to sparse pinyon-juniper-grass, sparse pinyon-juniper-sagebrush-grass, and pinyon-juniper-mountain brush on slickrock. The sparse pinyon-juniper-sage-grass type covers the most land. Ponderosa pine and mountain brush occupy the upper edges of the winter range. The amount of open sagebrush flats is limited, but they are especially critical for survival in severe winters. Burned or chained and seeded areas provide important winter range. Most of these treatments were not completed before the initial range inventory in 1965.

Summer Range

Summer range is limited to specific areas on Parker Mountain and Boulder Mountain. The Boulder Mountain contains approximately 50,000 acres above 10,500 feet (Christensen and Bogedahl 1983). This high summer range is unsuitable for fawning and receives only light deer use in late summer. Most fawning and summer use is concentrated underneath the lava rock rim where stands of aspen, fir, and Englemann spruce are interspersed with sage flats and meadows. As a result of fire suppression, the trend is toward a more dense Englemann spruce climax community. Logging and/or prescribed burns will be necessary in the future to maintain this important habitat in a seral stage, which is more productive and more favorable to big game. Lower down the slopes, ponderosa pine with its associated mountain brush understory receives insignificant summer use. Summer range on Parker Mountain is more limited to the higher southern end, where aspen stands in association with big sagebrush and antelope bitterbrush provide excellent fawning areas. A vigorous predator control program would most likely help increase fawn survival in this area.

Key Areas

All along the south and west sides of Boulder Mountain there are areas that, due to their pattern of use, forage value, and location, have demonstrated their importance to big game in mild and severe winters. Key areas on the south side include: burns in the Deer Mountain area, ponderosa-mixed mountain brush flats, and ridges at around 8,000 feet at Nazer Draw, Whites Flat, and Allen Canyon. Chained areas are also key to their winter survival, and in severe winters, low pinyon-juniper-sage mesas are utilized. On the west side, deer winter at higher elevations if available. In hard winters, native range is severely limited with the low bench above Black Canyon being a key area.

The key areas for severe winter range are on the south, represented by studies on Antone Flat, Black Ridge, Steep Creek Bench, and New Home Bench. Salt Gulch is an important area for deer in late winter and much like New Home Bench, is managed by the Forest Service and allocated for summer cattle grazing (cow-calf operations on a three pasture rest rotation system from mid-June to mid-October). There is practically unlimited, low elevation pinyon-juniper range on BLM land. This type was not as thoroughly surveyed as the other types because of its almost unlimited abundance. One study was put in this type on Steep Creek Bench because cattle are moved through this area in spring and winter. Antone Flat supports one of the few large sagebrush flats on the south side and is used heavily by wintering deer. Due to access difficulties, the Antone Flat study was located outside the key area on a ponderosa pine-mountain brush-slickrock site. The flat has not been grazed by domestic livestock for 20 years. The study on Black Ridge, just southeast of Boulder,

samples a small sagebrush flat. This mesa is privately owned and was up for sale at the time the study was established in 1985. The one study on the Kanab Resource Area, Coal Bench, is a chained-seeded area grazed by cattle in the spring on a 3 pasture deferred-rotation grazing system.

The severe winter range sampled on the west side near Antimony is represented by the Black Canyon trend study. The area is open black sagebrush-Wyoming big sagebrush benches. The land is managed by the BLM and much is adjacent to privately owned hay fields. The BLM and state land is grazed by cattle in the spring (June 5-15).

Two studies were set up to monitor trends in the important aspen type on summer range. Some of the aspen areas are used heavily by both big game and cattle. The trend study areas receive deferred rotation summer cattle grazing. Timber harvest is on going or completed on areas near these study sites.

The winter range studies on the Boulder unit can be put into four general key vegetative types; low pinyon-juniper-sagebrush mesas, mid-elevation burns and chainings, and mixed mountain brush ranges up to 8,000-9,000 feet. Some general conclusions can be made with regard to these community types. The desired plant community for the lower elevation types would most likely have Wyoming big sagebrush as the key species. Low precipitation is the major limiting factor to the density and vigor of the vegetation. The key burned areas are important in the spring for their herbaceous component for deer and elk. These areas should support a high percentage of grasses, with suitable quantities of grass forage left standing after livestock grazing. Desirable browse species can be seeded or planted. The chainings provide some increased productivity and diversity to an understory typically almost nonexistent with the dense mature stands of pinyon-juniper. However, a monoculture of crested wheatgrass would also not be the most desirable for big game. Desirable species such as bitterbrush, cliffrose, serviceberry, and big sagebrush should be encouraged. Perennial forbs such as alfalfa, sweet clover and others are also desirable additions on the treated areas. The higher elevation ranges were sampled with five trend studies, which support a variety of range types and vegetation. The key browse species for these higher elevational ranges are bitterbrush and mountain big sagebrush. These sites typically have high diversity and a good mix of grasses, forbs, and browse.

Herd Unit Management Objectives

The current population management objective is to maintain a target winter herd size of 8,500 deer which would require an increase on the unit. The composition is to be managed for a postseason buck to doe ratio of 15:100, with 30% of these bucks being 3 point or better.

Elk are not subjected to the same winter constraints as deer, therefore, the elk herd is wintering well on most of the unit and increasing in numbers. This elk herd is the result of 87 elk that were transplanted from the Manti Unit in 1977 and another 72 more were brought from the same source in 1978. The first hunt took place in 1980 when 25 limited entry bull permits were issued. The herd has continued to increase and expand, allowing more liberal hunts until open bull hunts began in 1984. Most of these elk are located on the south side of the unit which was formerly 51B, but some elk do reside year-round on the east side of Boulder Mountain and a smaller number summers above Antimony. These elk winter near Otter Creek and on the northwest end of Parker Mountain. A number of elk which summer on the Fish Lake unit also winter on Parker Mountain. Current management objectives are to achieve a modeled population of 1,500 wintering elk. A minimum post season bull to cow ratio of 8:100, with at least 4 of these bulls being 2 ½ years of age or older is to be maintained.

The largest part of the Parker Mountain antelope unit is located within deer unit 44. This antelope herd is the result of transplants into the area in 1964 and 1965 and are the most productive in the state. Browse-forb dominated plant communities and a rigorous predator control program have created favorable conditions for the antelope to increase. Over 1,100 antelope have been moved from this unit to other areas of the state in past years. Additionally, the yearly harvest has increased from 36 in 1974 to 133 in 1984 with an average hunter success rate of 93 percent.

Study Establishment

Interagency personnel, including Forest Service, BLM, and DWR employees met in Teasdale in July 1985 and in Escalante in July 1987 to select several sites for permanent range trend studies on areas now identified as herd unit 25C (44). These sites include areas used by antelope, elk, and deer and were considered critical areas for monitoring range trend. Each site was read during the summer of either 1985 or 1987 and again in 1991, 1994 and 1998. In the past, sometimes there was not a consistent work plan as to which herd units would be done from year to year. While trying to get into a more consistent 5-year rotation for the state, herd unit 25C (44) would not be scheduled for reading until 1998. Therefore, we met with the Division, USFS, and BLM personnel and notified them that we had only enough time to read about two-thirds of the transects this time around, and had them determine which were the most critical to be read at this time. These selected sites were read in 1994. During the 1998 season all of the Boulder sites were reread and one new site established at Pole Corral Draw to monitor elk/livestock concentration area.

Trend Study 25C-1-98

Study site name: Yergy .

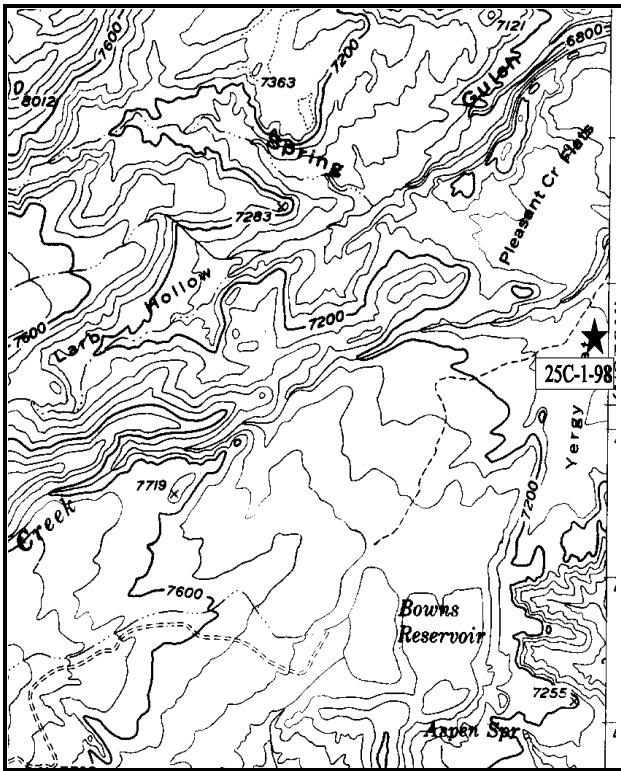
Range type: Chained, Cabled, Seeded P-J .

Compass bearing: frequency baseline 180 degrees.

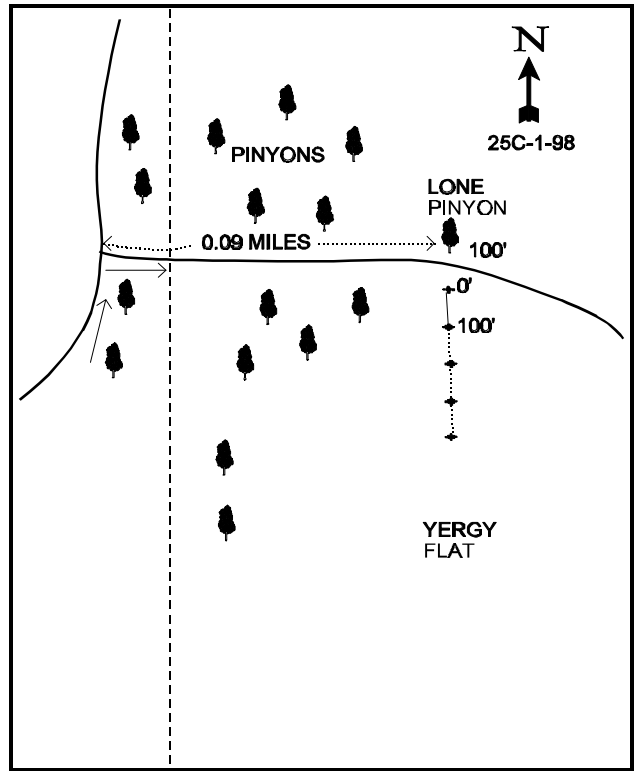
Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

LOCATION DESCRIPTION

From the Pleasant Creek Campground on the Boulder Grover Road, go south 100 feet to a left turn off the main road. Go down this road 2.2 miles to a cattleguard. From the cattleguard go 0.9 miles to a fork and go left toward Tantalus Creek. Go 1.1 miles on this road to a fork, stay left (the sign says toward Jorgenson Flat). Go 1.2 miles past a corral on the right to a cattleguard. Go 0.1 miles past the cattleguard to a faint road off to the right. Turn on this road and go 0.09 miles through a gate and out to a lone pinyon on the left. The frequency baseline starts 100 feet south of the lone pine. The 0-foot stake is a rebar tagged #7117.



Map Name: Grover, Utah (15')



Diagrammatic Sketch

UTM Coordinates: 4219493.732N, 477929.346 E

DISCUSSION

Trend Study No. 25C-1 (44-1)

The Yergy trend study is located in an open flat surrounded by slickrock cliffs and dense pinyon and juniper woodland. The flat is now a widely dispersed sagebrush-grass type which was chained and seeded in 1970. The site is basically flat, with a slight slope at the southern end of the transect. The elevation is approximately 7,000 feet, well within the normal and severe winter range limits on the east side of Boulder Mountain. According to the pellet group trend data for the Jorgensen Flat transect, deer use has steadily declined, averaging 8 deer days use/acre between 1990-91 and 1993-94 (Evans et al. 1995). Pellet group data taken along the study site baseline in 1998 estimate only 1 deer days use/acre, but elk used the area in larger numbers with 21 elk use days/acre. Deer are found in the area year-round. Pellet group quadrat frequency data from 1994 and 1998 indicate a large number of rabbits also utilizing the site. Cattle graze the area on a deferred rotation grazing system, spending 10 to 15 days in the area (600 cattle). Cattle use was estimated at 41 cow use days/acre. The cattle sign appeared to be from last summer or fall. Harvester ant hills are fairly common over much the area.

The soil depth is moderate and very sandy with about 84% fine red sand. Effective rooting depth (see methods) is estimated at almost 11 inches. Rock and pavement are uncommon on the soil surface and within the profile. Effective depth measurements were limited by the heavy texture of the soil which was very compacted at 10 to 12 inches. There did not appear to be any restrictive rooting barriers. Soil texture is a loamy sand with a slightly acid pH (6.2). Due to the high sand content (dryness of the soil), average soil temperature was high at 74°F at a depth of 12 inches. There is a thin layer of litter, mainly from grasses, which has ranged from 56% in 1985 (wet year) to 28% in 1994 (dry year). Average litter cover over the four readings is 42%. The declining trend from 1985 to 1994 is more of a result of drought than anything else. Bare soil cover values have increased between 1985 and 1994 from 36% to 54%, but it has since dropped to 47% due primarily to better precipitation in 1998. The litter and herbaceous vegetative cover, in addition to the levelness of the terrain, minimizes the erosion potential.

Although the flat is currently dominated by seeded grasses, sagebrush increased substantially between 1985 and 1991, due to good establishment of sagebrush seedlings during the wet years in the early 1980's. There were very few mature sagebrush plants sampled in 1985 with 98% of the population classified as young with an additional 3,666 seedlings/acre. Data from 1991 indicated a large increase in sagebrush density, from 8,000 to 11,531 plants/acre. Density of mature plants increased from 200 plants/acre to 4,133. Young plants were still the most common age class, yet no seedlings were found in 1991. With the much larger sample size taken in 1994 (see methods), the population was estimated at only 2,400 sagebrush plants/acre. This is a more accurate estimate of the true density of sagebrush on the flat since the shrubs grow in aggregated clumps with large areas of grass in between. The old method used three small 1/200 acre circular plots to estimate shrub density. The original frequency baseline was also placed in an area with few sagebrush, while the density plots happened to be in areas of fairly dense sagebrush and therefore overestimated the actual density of the sagebrush in the area. The population remained at similar densities in 1998 (2,320 plants/acre). Utilization of the sagebrush has been light to moderate since 1985 with some heavier use reported in 1991. Vigor has remained normal on most plants and percent decadence has remained relatively low, currently at 18%. Recruitment has declined considerably since 1991, but young plants, as of 1998, appear numerous enough to maintain the population.

Other browse species include small numbers of pinyon pine, broom snakeweed, and rabbitbrush. Data from 1991 shows a small, steady population of pinyon pine with snakeweed disappearing from the site altogether. Point quarter data taken in 1998 estimate a total of only 14 pinyon and juniper trees/acre with average basal diameters of 3.1 and 2.8 inches respectively.

The herbaceous understory is dominated by crested wheatgrass which currently ('98) makes up 96% of the grass cover and 77% of the total vegetative cover. Blue grama and Russian wildrye are present in low

numbers. Forbs are very sparse and make up less than 1/2 of 1% cover. The only forbs sampled in 1998 include silvery lupine and scarlet globemallow.

1985 APPARENT TREND ASSESSMENT

The soil appears stable and trend may even be up as vegetative cover increases with an accompanying buildup of litter. The vegetative community is changing as the sagebrush density appears to be increasing with a very high reproductive potential. An increase in mature sagebrush will be good for the winter range, as use is now quite concentrated in the more dense stands of the larger sagebrush. The crested wheatgrass provides spring forage and should continue to be a predominant part of the vegetation as long as it is not overgrazed during the early summer.

1991 TREND ASSESSMENT

The soil trend appears to be declining because percent bare ground has increased from 36% to 49% and litter has decreased from 56% to 39%. Percent bare ground should decrease with the end of the drought and a return to normal precipitation patterns, but should be watched closely. Browse trend is improving from 1985 with increased density for sagebrush and the disappearance of broom snakeweed. Herbaceous understory has declined in production, but nested frequencies have remained stable. The forb component of the herbaceous understory is still almost nonexistent.

TREND ASSESSMENT

soil - downward

browse - upward

herbaceous understory - stable, but forb component is poor

1994 TREND ASSESSMENT

Ground cover characteristics have continued to decline due to increased percent bare ground and reduced litter cover. This will likely change when normal precipitation patterns return to this area. Even with the increased bare ground, erosion is not a problem on this site. The browse trend is stable for now. The new larger sample size used in 1994 gives a better idea of actual population density of sagebrush on the entire flat. Percent decadency of the sagebrush is very low and vigor is good. Trend for the herbaceous understory is stable. Nested frequency of crested wheatgrass has remained stable since 1985. Production also looks much better than 1991. A few more forb species were picked up with the larger sample taken in 1994, but they are still very scarce.

TREND ASSESSMENT

soil - downward due to the continuing drought

browse - stable

herbaceous understory - stable, but forb component is very poor

1998 TREND ASSESSMENT

Trend for soil has improved with a return to normal precipitation patterns during the 1997 and 1998 seasons. Percent bare ground declined from 54% in 1994 to 47% in 1998. Litter cover also increased from 28% to 45% and vegetative cover increased from 22% to 38%. Erosion is not a problem on the site due to adequate vegetation and litter cover combined with the level terrain and the high infiltration capacity of the soil. It appears that the population of basin big sagebrush has stabilized at about 2,300 plants/acre. Utilization is currently moderate, vigor normal, and percent decadence low at 18%. No seedlings were encountered but young plants represent 15% of the population, numerous enough to maintain the stand with good survival. The herbaceous understory trend is stable. Crested wheatgrass still dominates the site by providing 96% of

the grass cover and 77% of the total vegetation cover. Production is up as grass cover is nearly double that of 1994. However, the sum of nested frequency of grasses and forbs has remained similar to 1994 levels. Forbs are still lacking with only two species found in 1998.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - stable, but forb component is very poor

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 1

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'94	'98
G	Agropyron cristatum	311	312	311	326	100	100	98	99	16.90	29.39
G	Agropyron elongatum	3	-	-	-	1	-	-	-	-	-
G	Agropyron intermedium	3	-	-	-	1	-	-	-	-	-
G	Agropyron smithii	-	23	-	-	-	8	-	-	-	-
G	Bouteloua gracilis	_{bc} 41	_c 60	_a 48	_{ab} 55	17	25	18	23	.29	.87
G	Elymus junceus	27	26	6	7	10	15	2	3	.18	.18
G	Munroa squarrosa (a)	-	16	-	-	-	8	-	-	-	-
G	Poa secunda	-	-	3	-	-	-	1	-	.00	-
G	Sitanion hystrix	1	-	-	-	1	-	-	-	-	-
G	Sporobolus cryptandrus	14	7	-	-	6	3	-	-	-	-
G	Vulpia octoflora (a)	-	-	-	1	-	-	-	1	-	.00
Total Annual Grasses		0	16	0	1	0	8	0	1	0	0
Total Perennial Grasses		400	428	368	388	136	148	119	125	17.38	30.46
F	Eriogonum cernuum (a)	-	-	4	-	-	-	2	-	.01	-
F	Erigeron pumilus	-	-	4	-	-	-	2	-	.01	-
F	Lupinus argenteus	-	-	13	18	-	-	7	9	.22	.20
F	Penstemon spp.	-	-	-	-	-	-	-	-	.00	-
F	Sphaeralcea coccinea	9	14	7	12	3	6	5	7	.20	.08
F	Sphaeralcea parvifolia	-	2	-	-	-	1	-	-	-	-
Total Annual Forbs		0	0	4	0	0	0	2	0	0.01	0
Total Perennial Forbs		9	16	24	30	3	7	14	16	0.44	0.28

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

BROWSE TRENDS --
Herd unit 25C, Study no: 1

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Artemisia tridentata tridentata	43	50	4.75	7.37
B	Chrysothamnus nauseosus	0	0	-	-
B	Chrysothamnus viscidiflorus	1	1	-	-
B	Gutierrezia sarothrae	0	0	-	-
B	Opuntia spp.	1	0	-	-
B	Pinus edulis	0	0	-	-
Total for Browse		45	51	4.75	7.37

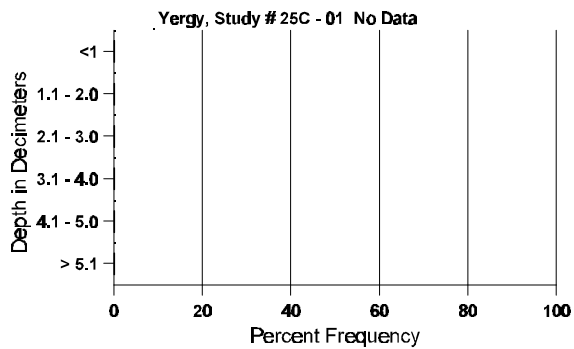
BASIC COVER --
Herd unit 25C, Study no: 1

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'85	'91	'94	'98
Vegetation	331	340	8.00	12.00	21.68	38.29
Rock	8	4	0	0	.16	.15
Pavement	31	43	0	.25	.06	.22
Litter	391	396	56.25	39.25	27.68	44.88
Cryptogams	-	-	0	0	0	0
Bare Ground	377	360	35.75	48.50	54.40	47.36

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 01, Study Name: Yergy

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.8	74.0 (11.9)	6.2	84.0	7.4	8.6	1.1	10.8	64.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 1

Type	Quadrat Frequency	
	'04	'08
Rabbit	51	58
Elk	3	8
Deer	32	38
Cattle	10	19

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 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				
Artemisia tridentata tridentata																		
S	'85	54	1	-	-	-	-	-	-	-	54	-	1	-	3666			55
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	'85	116	1	-	-	-	-	-	-	-	114	-	2	1	7800			117
	'91	32	33	18	5	2	-	-	-	-	84	2	4	-	6000			90
	'94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	'98	8	9	-	-	-	-	-	-	-	17	-	-	-	340			17
M	'85	3	-	-	-	-	-	-	-	-	3	-	-	-	200	10	8	3
	'91	6	29	23	3	-	1	-	-	-	57	-	5	-	4133	12	12	62
	'94	76	37	-	-	-	-	-	-	-	113	-	-	-	2260	28	41	113
	'98	44	34	-	-	-	-	-	-	-	75	-	3	-	1560	23	34	78
D	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	6	11	3	1	-	-	-	-	-	10	-	1	10	1400			21
	'94	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
	'98	3	14	4	-	-	-	-	-	-	20	-	1	-	420			21
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		.83%			00%			03%			+31%							
'91		43%			26%			12%			-79%							
'94		31%			00%			.83%			- 3%							
'98		49%			03%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	8000	Dec:	0%			
												'91	11533		12%			
												'94	2400		3%			
												'98	2320		18%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus nauseosus</i>																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	35	71	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	0		-			
<i>Chrysothamnus viscidiflorus</i>																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	1	-	-	-	-	-	1	-	-	-	20	22	10	1
	'98	-	-	-	1	-	-	-	-	-	1	-	-	-	20	18	19	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%			+ 0%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	20		-			
												'98	20		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
<i>Gutierrezia sarothrae</i>																		
S	85	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	22	-	-	-	-	-	-	-	-	22	-	-	-	1466		22	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	11	-	-	-	-	-	-	-	-	11	-	-	-	733	7	7	11
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	9	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	2332	Dec:	6%			
												'91	0		0%			
												'94	0		0%			
												'98	0		0%			
<i>Opuntia spp.</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	1	2	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%			-70%							
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	66		-			
												'94	20		-			
												'98	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
Y	'85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'85	00%			00%			00%			+ 0%						
	'91	00%			00%			00%									
	'94	00%			00%			00%									
	'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-		
												'91	66		-		
												'94	0		-		
												'98	0		-		

Trend Study 25C-2-98

Study site name: Wildcat .

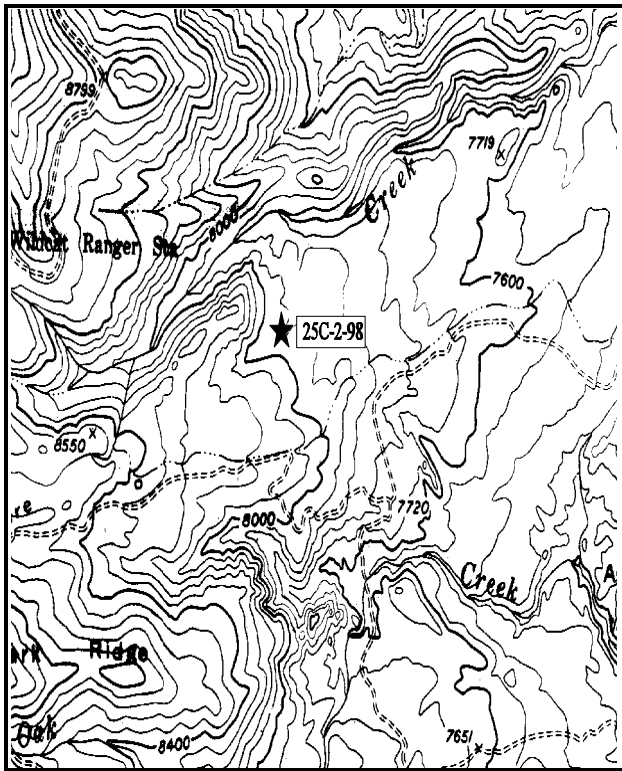
Range type: Chained, Railed Shrubland .

Compass bearing: frequency baseline 165 M degrees.

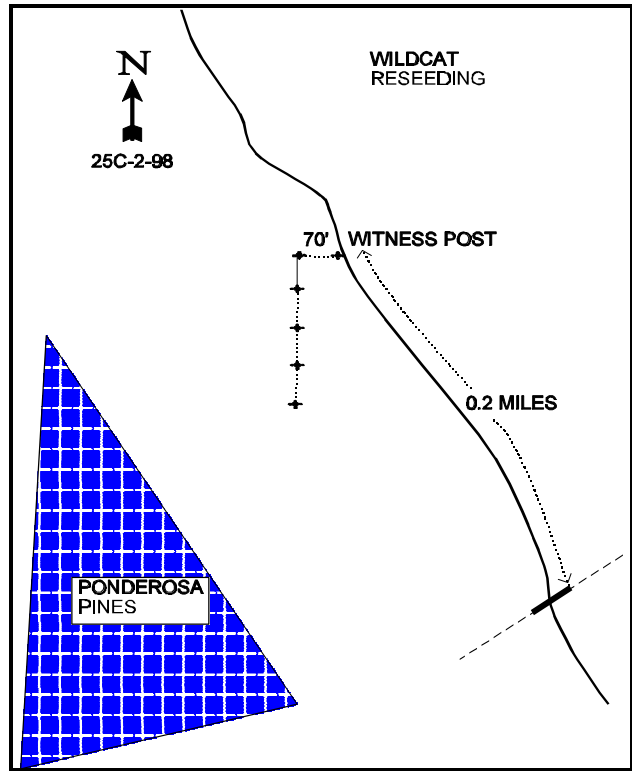
Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

On SR12 south of Torrey, go about 50 yards south of Pleasant Creek Campgrounds then turn east onto the Lower Bowns Reservoir Road. Proceed 2.1 miles and turn left. Continue 0.1 miles. From here the road is closed. Walk across the creek and down the ATV trail approximately 0.4 miles to the witness post on the left side of the road. The stakes are full-high fenceposts. The 0-foot stake is marked by browse tag #7116. Ignore the fencepost that was misplaced near the south end of the baseline.



Map Name: Lower Bowns Reservoir, Utah



Diagrammatic Sketch

UTM Coordinates: 4217658.480 N, 473257.820 E

DISCUSSION

Trend Study No. 25C-2 (44-2)

The Wildcat transect area was chained and seeded in 1970 and is now a sagebrush-grass type. This open flat is bordered by large ponderosa pines and scattered pinyon-juniper at an elevation of 8,000 feet. It has a slight slope to the northeast. This area is on the same cattle allotment as site number 25C-1. The Wildcat seeding pellet group transect indicates that winter deer use varies considerably from year to year, with a low of <1 deer days use/acre in 1976-77 and a high of 43 days use the next winter (Jense et al. 1981). An average of 25 deer days use/acre has been recorded between 1985 and 1990 (Jense et al. 1991). It has since declined to only 2 in 1992-93 and 4 during 1993-94 (Evans et al. 1995). Fresh pellet groups were found on the first of September in 1985 indicating some summer deer use also occurs. Sign of wintering elk was also found on the permanent pellet group transect. Between 1990-91 and 1993-94 an average of 9 elk days use/acre were recorded (Evans et al. 1995). Pellet group data taken along the study site baseline in 1998 estimate 17 deer, 45 elk and 33 cattle use days/acre. Cattle have used the site earlier this season.

Soil at the site is moderately deep with an effective rooting depth of just over 18 inches. The surface is smooth, with few large rocks or pavement. Soil texture is a loamy sand with a slightly acid pH (6.4). Basal vegetative ground cover was high (20%) in 1985, and litter cover was good (44%), leaving 31% bare soil in small patches. Due primarily to the drought, basal vegetative cover decreased by half to 10% and litter cover dropped to 40%, leaving 47% of the surface as bare ground in 1991. Bare ground cover has since declined steadily to 35% in 1994 and 28% by 1998. Litter and vegetation cover have increased. There are some very small gullies through the area and some wind and water erosion was evident in 1991. Currently, erosion is not a problem on this site.

The key browse species is Wyoming big sagebrush which is the dominant and most abundant browse present. Some black sagebrush is also mixed in and hybridizing with the population. All sagebrush was classified as Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) in 1994, but both black sagebrush and Wyoming big sagebrush were listed in the 1985, 1991 and 1998 readings. Both of these species will be lumped together for this summary. Population density of sagebrush was estimated at 6,265 plants/acre in 1985. One third of these were young plants. By 1991, density increased to 7,598 plants/acre. Density declined to 5,540 plants/acre in 1994 partly due to the larger sample used that year. However, this much larger sample estimates shrub densities much more accurately. Canopy cover was estimated at 10%. Dead plants, first counted in 1994, number only 240 plants/acre which would suggest that sample size is the primary cause for the change in density for the dead plants cannot explain the differences. By 1998, the combined sagebrush density was estimated at 3,580. Canopy cover was estimated at 1% for black sagebrush and 7% for Wyoming big sagebrush. Utilization has been mostly light to moderate over the years with the exception of heavier use reported in 1991. Vigor continues to be normal on most plants and percent decadence has remained low averaging 19% since 1985. Recruitment has fluctuated, but seedlings and young appear to be numerous enough to maintain the population at current levels.

Broom snakeweed and gray horsebrush were also fairly common, yet both have declined considerably in density since 1991. Slenderbush eriogonum also occurs in small numbers. It provides some additional forage and displayed heavy use in 1991. Current use ('98) is moderate.

The grass composition is made up mostly of seeded crested wheatgrass and blue grama. Together they make up almost 100% of the grass cover. Crested wheatgrass is abundant and produces substantial amounts of forage especially in the spring since it greens-up early. The blue grama, a native warm season grass, is also quite abundant, but due to its low growing habit, provides limited forage. Both grasses are vigorous and lightly utilized. Bottlebrush squirreltail is also found on the site but in low numbers.

The forb component is diverse, but only a few species occur more than occasionally. The most prominent forb species is silvery lupine which currently ('98) accounts for 92% of the forb cover. Due to drought

conditions, production was limited in 1994, with forbs combining to produce less than 2% cover and grasses only 15%. More normal precipitation patterns in 1997 and 1998 have dramatically increased production doubling grass cover to 32% and increasing forb cover to 13%.

1985 APPARENT TREND ASSESSMENT

Soil trend is stable to improving as vegetative cover increases and grazing appears to be closely regulated. There appears to be excessive camping and ORV use in the area which should be monitored to insure that irreversible soil and vegetation damage is not allowed. Vegetative trend is upward with a healthy, moderately used and diverse key species population. The increaser species do not appear to be increasing at unmanageable levels.

1991 TREND ASSESSMENT

In the last survey, it was noted that there was excellent basal vegetative cover, which has now gone down to only 10%. Percent bare ground has gone from 31% to 47%. This trend should be monitored closely for the soil trend would have to be considered down with this latest information, but this could turn around quickly with near normal precipitation patterns. The browse trend would be considered up with the increase for sagebrush. The herbaceous understory would also be considered up with a slight increase in the grasses. There was a slight decrease in the forbs, but they make up less than 10% of the herbaceous cover.

TREND ASSESSMENT

soil - down

browse - up

herbaceous understory - slightly up

1994 TREND ASSESSMENT

Ground cover characteristics have improved since 1991 with percent bare ground decreasing from 47% to 35%. Litter has continued to decline which would be expected with the continuing drought. Trend for black/Wyoming big sagebrush is stable. Population density has declined slightly mostly due to the larger sample used in 1994. The decadency rate has remained low. Broom snakeweed and gray horsebrush have also declined significantly. Photos indicate a definite decrease in production of grasses since 1985, but the sum of nested frequencies for perennial grasses and forbs have remained fairly stable since 1991 indicating a steady trend. Normal precipitation patterns will improve future production and cover values.

TREND ASSESSMENT

soil - improved

browse - stable

herbaceous understory - stable

1998 TREND ASSESSMENT

The soil trend continues to improve as percent bare ground declined from 35% to 28% and percent litter cover increased from 31% to 48%. In addition, vegetation cover doubled since 1994 from 25% to 55%. Erosion is not currently a problem on the site. Density of the combined black and Wyoming big sagebrush population has declined slightly, but percent decadence is lower, vigor improved and utilization is mostly light to moderate. Recruitment is currently adequate to maintain the population. Trend is considered stable. Trend for the herbaceous understory is up slightly due to a slight increase in the sum of nested frequency of perennial grasses and a large increase in frequency of forbs. In addition, production increased dramatically since 1994 with cover of grasses doubling and cover of forbs increasing from 2% to 13%. The increase in forb cover and nested frequency comes primarily from silvery lupine.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - up slightly

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 2

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'84	'98
G	Agropyron cristatum	_b 268	_a 302	_{ab} 293	_a 303	91	96	98	96	7.61	13.10
G	Aristida purpurea	-	-	-	3	-	-	-	1	-	.03
G	Bouteloua gracilis	_a 186	_b 234	_{bc} 255	_c 282	70	80	84	90	7.39	18.85
G	Sitanion hystrix	_b 44	_a 9	_a 4	_a 4	20	5	2	1	.01	.00
G	Sporobolus cryptandrus	-	-	3	6	-	-	1	3	.00	.06
Total Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total Perennial Grasses		498	545	555	598	181	181	185	191	15.02	32.04
F	Allium spp.	6	3	-	2	2	3	-	1	-	.00
F	Antennaria rosea	3	3	-	-	1	1	-	-	-	-
F	Arenaria fendleri	-	-	-	27	-	-	-	11	-	.15
F	Artemisia ludoviciana	-	3	-	-	-	1	-	-	-	-
F	Astragalus spp.	2	1	-	2	1	1	-	1	-	.00
F	Cryptantha spp.	-	-	1	12	-	-	1	5	.00	.02
F	Descurainia pinnata (a)	-	-	1	-	-	-	1	-	.00	-
F	Eriogonum alatum	2	2	-	-	1	1	-	-	-	-
F	Erigeron pumilus	9	5	-	3	4	3	-	1	-	.00
F	Eriogonum racemosum	_a 12	_c 25	_{ab} 19	_{bc} 25	6	13	8	12	.18	.26
F	Gayophytum ramosissimum (a)	-	-	-	6	-	-	-	2	-	.01
F	Gilia hutchinifolia (a)	-	-	52	-	-	-	23	-	.19	-
F	Lepidium spp. (a)	-	-	-	71	-	-	-	31	-	.21
F	Lupinus argenteus	_b 139	_a 59	_a 81	_b 128	61	32	36	60	.94	11.93
F	Lygodesmia spp.	3	1	-	2	1	1	-	1	-	.00
F	Oenothera spp.	_a -	_{ab} 2	_b 4	_c 22	-	1	4	13	.02	.23
F	Orthocarpus spp. (a)	-	-	20	14	-	-	12	6	.08	.03
F	Penstemon spp.	_{ab} 11	_b 15	_a 1	_a 3	4	9	1	2	.00	.01
F	Phlox longifolia	_{ab} 28	_b 46	_{ab} 20	_a 6	13	20	11	4	.05	.02
F	Polygonum douglasii (a)	-	-	_a 2	_b 26	-	-	1	14	.00	.07
F	Sphaeralcea coccinea	-	4	2	1	-	2	1	1	.00	.00
F	Tragopogon dubius	-	-	-	1	-	-	-	1	-	.00
F	Unknown forb-perennial	-	4	-	-	-	2	-	-	-	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'04	'08
	Total Annual Forbs	0	0	75	117	0	0	37	53	0.27	0.32
	Total Perennial Forbs	215	173	128	234	94	90	62	113	1.23	12.67

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

BROWSE TRENDS --

Herd unit 25C, Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Amelanchier utahensis	0	0	-	-
B	Artemisia nova	0	17	-	1.29
B	Artemisia tridentata wyomingensis	92	79	9.67	6.50
B	Chrysothamnus nauseosus	0	1	-	-
B	Chrysothamnus viscidiflorus stenophyllus	3	0	.00	-
B	Eriogonum microthecum	9	3	.09	.06
B	Gutierrezia sarothrae	12	5	.07	.07
B	Opuntia spp.	2	0	.01	-
B	Pinus edulis	-	-	.30	-
B	Tetradymia canescens	26	27	.45	.21
	Total for Browse	144	132	10.60	8.14

BASIC COVER --

Herd unit 25C, Study no: 2

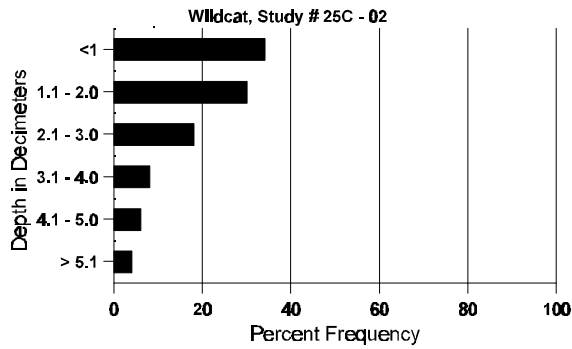
Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'85	'91	'94	'98
Vegetation	349	364	19.50	9.50	25.40	55.13
Rock	106	28	2.00	2.75	1.31	2.17
Pavement	241	200	3.75	1.25	2.27	3.62
Litter	392	390	44.25	39.50	31.28	47.79
Cryptogams	-	-	0	.25	0	0
Bare Ground	353	339	30.50	46.75	34.77	27.63

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 02, Study Name: Wildcat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.4	61.2 (16.5)	6.4	82.0	9.4	8.6	1.2	13.6	91.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 2

Type	Quadrat Frequency	
	04	08
Rabbit	28	17
Elk	41	41
Deer	32	31
Cattle	18	16

BROWSE CHARACTERISTICS --

Herd unit 25C, 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.					
Amelanchier utahensis												
M	'85	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	0	25	37	0
	'98	-	-	-	-	-	-	-	0	40	52	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
	'85	00%		00%		00%						
	'91	00%		00%		00%						
	'94	00%		00%		00%						
	'98	00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'85	0	Dec:	-			
						'91	0		-			
						'94	0		-			
						'98	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 nova																		
S	'85	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	'91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	6	1	-	-	-	-	-	-	-	7	-	-	-	140		7	
Y	'85	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	'91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	12	1	-	-	-	-	-	-	-	13	-	-	-	260		13	
M	'85	8	-	-	-	-	-	-	-	-	8	-	-	-	533	14	13	8
	'91	22	7	-	-	-	-	-	-	-	26	2	1	-	1933	11	18	29
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	10	16	-	-	-	-	-	-	-	21	5	-	-	520	14	21	26
D	'85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	1	5	1	1	-	-	-	-	-	7	-	-	1	160		8	
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+45%							
'91		21%			00%			03%										
'94		00%			00%			00%										
'98		47%			02%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	1199	Dec:	11%				
											'91	2199		6%				
											'94	0		0%				
											'98	940		17%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total						
		1	2	3	4									
<i>Artemisia tridentata wyomingensis</i>														
S	85	3	-	-	-	-	-	-	3	-	-	200		3
	91	-	-	-	-	-	-	-	-	-	-	0		0
	94	2	-	-	-	-	-	-	2	-	-	40		2
	98	5	-	-	-	-	-	-	5	-	-	100		5
Y	85	21	-	-	-	-	-	-	21	-	-	1400		21
	91	3	5	2	1	-	-	-	10	1	-	733		11
	94	28	1	-	-	-	-	-	19	-	10	580		29
	98	12	3	-	1	-	-	-	16	-	-	320		16
M	85	32	7	1	-	-	-	-	40	-	-	2666	23 20	40
	91	9	25	12	2	5	-	-	44	9	-	3533	15 21	53
	94	86	77	7	-	-	-	-	150	-	20	3400	15 24	170
	98	58	31	3	1	-	-	-	89	1	3	1860	22 30	93
D	85	9	3	3	-	-	-	-	14	-	1	1000		15
	91	-	6	2	-	6	1	2	10	3	-	1133		17
	94	34	29	4	-	-	-	-	55	-	1	1340		67
	98	13	7	3	-	-	-	-	20	-	-	460		23
X	85	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	240		12
	98	-	-	-	-	-	-	-	-	-	-	240		12
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
'85		13%		05%		01%		+ 6%						
'91		58%		21%		05%		- 1%						
'94		40%		04%		16%		-50%						
'98		31%		05%		05%								
Total Plants/Acre (excluding Dead & Seedlings)									'85	5066	Dec:	20%		
									'91	5399		21%		
									'94	5320		25%		
									'98	2640		17%		
<i>Chrysothamnus nauseosus</i>														
M	85	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	-	1	-	-	-	-	-	1	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
'85		00%		00%		00%								
'91		00%		00%		00%								
'94		00%		00%		00%								
'98		100%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)									'85	0	Dec:	-		
									'91	0		-		
									'94	0		-		
									'98	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							
Chrysothamnus viscidiflorus stenophyllus															
Y	'85	1	-	-	-	-	-	-	1	-	-	66		1	
	'91	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	1	-	-	-	-	-	-	1	-	-	20		1	
	'98	-	-	-	-	-	-	-	-	-	-	0		0	
M	'85	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	2	-	-	-	-	2	-	-	133	2	3	2
	'94	-	3	-	-	-	-	-	3	-	-	60	-	-	3
	'98	-	-	-	-	-	-	-	-	-	-	0	8	22	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>				
'85		00%			00%			00%			+50%				
'91		00%			100%			00%			-40%				
'94		75%			00%			00%							
'98		00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	66	Dec:	-		
										'91	133		-		
										'94	80		-		
										'98	0		-		
Eriogonum microthecum															
Y	'85	1	-	-	-	-	-	-	1	-	-	66		1	
	'91	1	1	-	-	-	-	-	2	-	-	133		2	
	'94	-	-	1	-	-	-	-	1	-	-	20		1	
	'98	3	-	-	-	-	-	-	3	-	-	60		3	
M	'85	1	-	-	-	-	-	-	1	-	-	66	6	7	1
	'91	2	1	-	-	-	-	-	3	-	-	200	5	6	3
	'94	4	-	20	-	-	-	-	24	-	-	480	3	5	24
	'98	6	3	-	-	-	-	-	9	-	-	180	4	7	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>				
'85		00%			00%			00%			+60%				
'91		40%			00%			00%			+33%				
'94		00%			84%			00%			-52%				
'98		25%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	132	Dec:	-		
										'91	333		-		
										'94	500		-		
										'98	240		-		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
<i>Gutierrezia sarothrae</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	85	21	-	-	-	-	-	-	-	21	-	-	-	1400		21	
	91	11	-	-	-	-	-	-	-	11	-	-	-	733		11	
	94	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	49	-	-	-	-	-	-	-	49	-	-	-	3266	10	8	49
	91	81	-	-	1	-	-	-	-	82	-	-	-	5466	6	6	82
	94	11	-	-	-	-	-	-	-	11	-	-	-	220	5	4	11
	98	5	1	-	-	-	-	-	-	6	-	-	-	120	10	8	6
D	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	1	-	-	-	-	-	2	-	133		2	
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		00%		00%		+26%									
'91		01%		00%		02%		-96%									
'94		00%		00%		00%		-57%									
'98		17%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	4666	Dec:	0%				
										'91	6332		2%				
										'94	280		7%				
										'98	120		0%				
<i>Opuntia spp.</i>																	
S	85	5	-	-	-	-	-	-	-	5	-	-	-	333		5	
	91	26	-	-	-	-	-	-	-	26	-	-	-	1733		26	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	85	4	-	-	-	-	-	-	-	4	-	-	-	266		4	
	91	7	-	-	-	-	-	-	-	7	-	-	-	466		7	
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	1	-	-	-	-	-	-	-	1	-	-	-	66	2	5	1
	91	1	-	-	-	-	-	-	-	1	-	-	-	66	2	5	1
	94	1	-	-	-	-	-	-	-	1	-	-	-	20	3	11	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		00%		00%		+38%									
'91		00%		00%		00%		-92%									
'94		00%		00%		00%											
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	332	Dec:	-				
										'91	532		-				
										'94	40		-				
										'98	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	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	'85	20	-	-	-	-	-	-	-	-	20	-	-	-	1333		20	
	'91	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12	
	'94	9	3	1	-	-	-	-	-	-	11	-	-	2	260		13	
	'98	6	7	-	1	-	-	-	-	-	14	-	-	-	280		14	
M	'85	14	-	-	-	-	-	-	-	-	14	-	-	-	933	7	7	14
	'91	3	5	1	1	-	-	-	-	-	10	-	-	-	666	6	10	10
	'94	6	7	10	-	-	-	-	-	-	21	-	2	-	460	4	5	23
	'98	2	9	11	-	1	-	-	-	-	23	-	-	-	460	5	8	23
D	'85	5	1	-	-	-	-	-	-	-	4	-	2	-	400		6	
	'91	1	5	2	-	-	-	-	-	-	6	-	2	-	533		8	
	'94	1	1	2	-	-	-	-	-	-	3	-	-	1	80		4	
	'98	2	-	2	-	-	-	-	-	-	3	-	1	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		03%			00%			05%			-25%							
'91		33%			10%			07%			-60%							
'94		28%			33%			13%			+ 2%							
'98		41%			32%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	2666	Dec:	15%			
												'91	1999		27%			
												'94	800		10%			
												'98	820		10%			

Trend Study 25C-3-98

Study site name: Happy Valley .

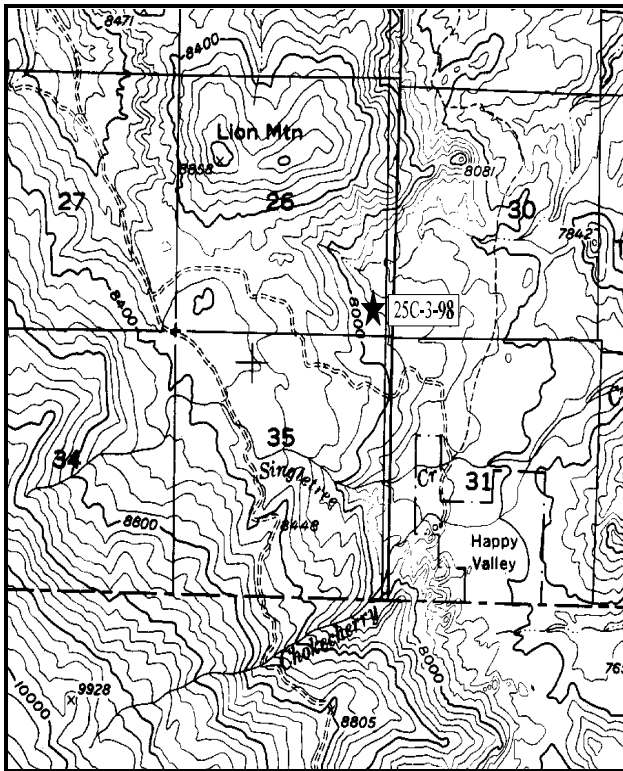
Range type: Selective Logged Ponderosa Pine.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

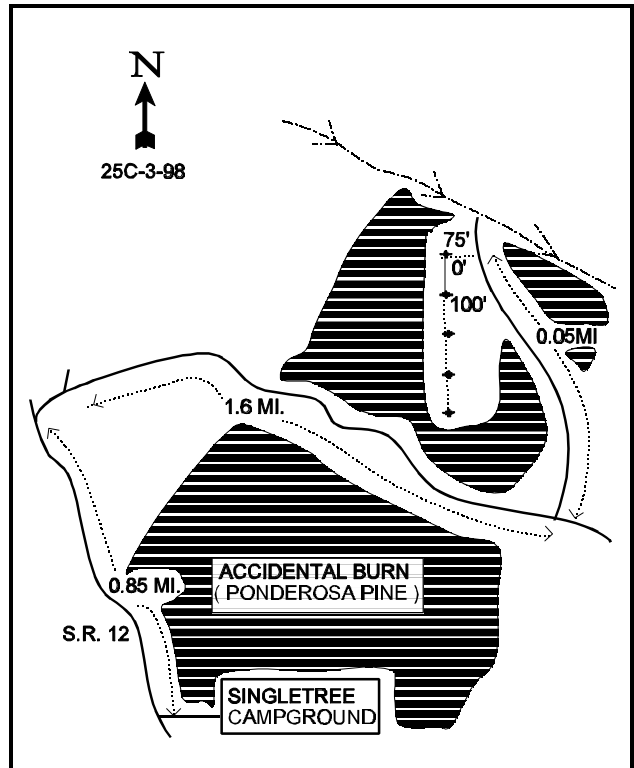
LOCATION DESCRIPTION

From the entrance to Singletree Campground on SR12, drive 0.85 miles north to the turnoff to Happy Valley turn east and go 1.6 miles staying on the main road until a minor fork. Turn left onto a two-track faint road 0.05 miles to a PIPO and a rebar witness stake located 15 feet off the left side of the road. The baseline starts 75 feet west of the witness post and then runs south. The 0-foot baseline stake is marked with a browse tag #7066.



Map Name: Grover, Utah (15')

Township 30S , Range 6E , Section 26



Diagrammatic Sketch

UTM 4224250.489 N, 471865.194 E

DISCUSSION

Trend Study No. 25C-3 (44-3)

The Happy Valley study is located in ponderosa pine that burned in late June of 1984. The fire killed a majority of the ponderosa on the site, but many of the large mature trees appear to have survived. A salvage operation by the Forest Service removed some trees and a nearby area has been planted with ponderosa seedlings. The site is near the upper limits of normal winter range at an elevation of 8,000 feet. The transect angles up the side of a hill with a slope of 10% to 15% and an eastern aspect. A pellet group transect located nearby at the same elevation shows moderate, but variable deer use between 1985 and 1991 (Jense et al. 1991). Deer days use has steadily declined since 1991 when 9 days use/acre was estimated. During the 1993-94 reading, only 2 deer days use/acre was estimated. Deer use appears to be year-long, yet the most prominent use is during the winter and spring. A small amount of elk use was also observed at the Happy Valley transect. Pellet group data from the trend study site in 1998 estimates 11 deer, 15 cow and only 1 elk days use/acre. Some of the cattle sign appeared several months old and the rest looked to be from last year.

Soil at the site is moderate with an estimated effective rooting depth (see methods) at 12 inches. The ground is very rocky with scattered large rocks and pavement currently ('98) covering 39% of the ground surface. Rock is also common in the soil profile with most concentrated in the top 8 inches. Soil texture is a sandy loam with a neutral pH (6.5). Organic matter is relatively high at 3.3%. Bare soil has steadily declined from 37% in 1985 to 13% by 1994. Burned wood, downed trees, and pine needles comprise the bulk of the litter. The bare spots show some signs of erosion as do the roads and other disturbed areas, but overall erosion is not a serious problem.

Ponderosa pine still gives the site its vegetative aspect. Tree density, using point quarter method, estimated 25 pine trees/acre with an average basal diameter of 6.75 inches in 1994. By 1998, tree density has increased to 140 trees/acre with an average basal diameter of 4.7 inches. Overhead canopy cover varies on the site, but currently averages 6%. There are also a few scattered juniper, pinyon, and Douglas fir trees on the site.

The understory is currently dominated by a variety of browse species including: antelope bitterbrush, several species of rabbitbrush, broom snakeweed, and Harriman yucca. There are several other species which occur in limited numbers. Only bitterbrush occurs in sufficient numbers and is palatable enough to be considered key species. Fire damage to the low-spreading ecotype of bitterbrush appears to be variable as there was an estimated 1,666 plants/acre estimated in 1985. Most of these were young (88%) but 200 mature plants/acre were estimated. Density of bitterbrush declined in 1991 to 1,465 plants/acre, yet the number of mature plants doubled. A new, much larger sample size was taken in 1994 which estimated bitterbrush density at 940 plants/acre. Ninety-six percent of this population estimate was classified as mature. Density has continued to decline down to 760 plants/acre. The number of mature plants also declined for the first time from 900 to 700 plants/acre. Utilization of bitterbrush is moderate to heavy over the years with heavier use reported in 1991 and 1998. Vigor continues to be good and percent decadence very low.

Several increaser and invader species including three species of rabbitbrush, gray horsebrush, and broom snakeweed are increasing in the disturbed area. Broom snakeweed has increased dramatically from 866 plants/acre in 1985 to 5,532 plants/acre in 1991, and 7,280 by 1994. Reproductive potential of snakeweed was high and 27% of the population consisted of young plants. By 1998, density of broom snakeweed declined 49% to 3,700 plants/acre. Age class composition indicates a stable to slightly expanding population. Rubber rabbitbrush, Parry rabbitbrush, dwarf rabbitbrush, and mountain low rabbitbrush had a combined estimated density of only 466 plants/acre in 1985. By 1991, density of these increaser shrubs rose 84% to 2,997 plants/acre. Numbers have since declined to 1,980 plants/acre in 1994 and 1,320 by 1998. Biotic and reproductive potentials have also declined considerably since 1991 indicating possible further reductions in density in the future. During the 1994 and 1998 readings, many of the rabbitbrush species displayed some moderate and heavy use.

Perennial grasses are diverse and provided 40% of the total vegetative cover and 68% of the herbaceous cover in 1998. Common species include: bottlebrush squirreltail, mutton bluegrass, blue grama, Indian ricegrass and a sedge. Most grasses showed no evidence of use, although the sedge (*Carex* spp) did show some use. Cattle use was not noted in 1985, but spring use was evident in 1991. Forbs also show good diversity. Diversity of all herbaceous species is lower up the hill where the ponderosa are more dominant. Most forbs occur only occasionally and 78% of the forb cover is provided by redroot eriogonum and Louisiana sagebrush.

1985 APPARENT TREND ASSESSMENT

The soil has been disturbed by fire and subsequent planting and salvaging operations, but the protective ground cover is increasing and the soil appears stable. As the vegetation continues to increase and disturbance is kept to a minimum, the soil should improve. Opening up the tree canopy has stimulated growth of herbaceous species. Bitterbrush (a key species) is increasing and vigorous, although heavily hedged. One downward indicator is the presence of several species of undesirable increaser browse which also includes yucca. However, as the site recovers from the fire, the trend appears to be upward.

1991 TREND ASSESSMENT

Percent bare ground has decreased since the last reading, while rock cover has slightly increased. Litter cover has increased by 33%. This site should be considered stable, but should be monitored closely for any unusual impacts or changes. A violent ecological event has opened up the once almost closed community to many invader species, which include: rabbitbrush, horse brush, broom snakeweed, and yucca. These have all increased since the fire, except for bitterbrush which has declined slightly because most ecotypes do not resprout after fire and it will take time for it to fully recover. The herbaceous understory is quite variable with many species of grasses and forbs. Overall, the trend here would be stable, with it improving over time.

TREND ASSESSMENT

soil - stable

browse - slightly downward for the key species bitterbrush

herbaceous understory - stable

1994 TREND ASSESSMENT

Ground cover characteristics are still improving on this site. Bare ground has declined by 35% since 1991 to 13%. Some of the decline in litter cover may be due to the new cover estimation procedure used in 1994, but the downward pattern is consistent with prolonged drought. Erosion is not a problem on this site. The only abundant and desirable browse species is antelope bitterbrush. The new shrub density estimation procedure, which takes a much larger sample size, estimated 940 mostly mature plants/acre. This lower estimate is due to a reduction in the number of young plants sampled. Density of mature plants actually increased from 466 to 900 plants/acre. No seedlings were encountered and only 2% of the population consists of young plants. On the positive side, percent decadency is low and the proportion of plants heavily hedged declined from 45% in 1991 to only 11% in 1994. The site is still dominated by broom snakeweed and rabbitbrush. Trend for browse is still down slightly with the dominance of increaser species. Sum of nested frequencies for perennial grasses have increased since 1991 while sum of nested frequencies for perennial forbs declined by 48%. Some of this change in composition can be explained by the very dry springs and summers of 1993 and 1994. Combined nested frequencies of grasses and forbs have declined by 20% since 1991. Trend for the herbaceous understory is down slightly but the decline is likely a combination of the dry conditions and natural post fire succession.

TREND ASSESSMENT

soil - still improving

browse - slightly downward for bitterbrush, too much of the browse is composed of increaser species, this is expected to improve with time

herbaceous understory - slightly improved for the grasses but downward for the forbs, stable overall

1998 TREND ASSESSMENT

Trend for soil appears stable. Percent bare ground is low and protective ground cover is abundant and well dispersed. Trend for the key browse species, bitterbrush, is down slightly as the population continues to decline. Population density has gone down from 940 plants/acre to 760. In addition, use is more intense with heavy use reported on 37% of the bitterbrush and 45% showing moderate use. On the positive side, vigor is normal and there are no decadent plants sampled. Recruitment is also improved with biotic potential at 5% and 8% of the population consisting of young plants. Another positive sign is the reduction in the population density of broom snakeweed and various rabbitbrush species. Several new browse species were identified on the site in small numbers including: mountain big sagebrush, true mountain mahogany, dwarf rabbitbrush, wax currant and elderberry. Overall, browse trend is considered stable. Trend for the herbaceous understory is up with an increase in the sum of nested frequency of grasses and forbs. Production is also up with increased herbaceous cover but not to the degree of sites 25C-1 and 25C-2.

TREND ASSESSMENT

soil - stable

browse - stable overall, but continuing to be slightly down for bitterbrush

herbaceous understory - up

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 3

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'04	'08
G	Agropyron cristatum	a-	a-	a5	b15	-	-	3	6	.21	.42
G	Agropyron intermedium	-	3	6	5	-	1	3	2	.04	.03
G	Bouteloua gracilis	a51	a66	a61	b97	19	26	26	35	2.81	4.43
G	Bromus tectorum (a)	-	-	a1	b14	-	-	1	4	.00	.33
G	Carex spp.	a23	ab67	b64	b69	9	27	27	27	.96	1.41
G	Oryzopsis hymenoides	a3	ab18	bc29	c43	2	10	15	18	2.22	1.81
G	Poa fendleriana	a48	a85	b98	c143	25	39	41	54	2.85	5.14
G	Poa secunda	-	-	-	4	-	-	-	2	-	.03
G	Sitanion hystrix	a62	ab90	a62	b108	31	45	30	50	.57	2.12
G	Sporobolus cryptandrus	42	27	29	19	19	12	18	10	.77	.42
G	Stipa comata	a5	a3	b36	a15	2	1	16	7	.87	.55
Total Annual Grasses		0	0	1	14	0	0	1	4	0	0.33
Total Perennial Grasses		234	359	390	518	107	161	179	211	11.33	16.39
F	Allium spp.	-	-	a1	b10	-	-	1	5	.00	.10
F	Antennaria parvifolia	11	5	3	3	4	3	2	3	.15	.04
F	Arabis demissa	a1	b42	a-	a3	1	17	-	1	-	.00

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'04	'08
F	<i>Artemisia ludoviciana</i>	_a 81	_{ab} 121	_a 110	_b 144	36	50	42	59	3.82	4.50
F	<i>Astragalus convallarius</i>	13	-	-	-	7	-	-	-	-	-
F	<i>Astragalus</i> spp.	-	-	7	-	-	-	2	-	.09	-
F	<i>Chenopodium album</i> (a)	-	-	5	-	-	-	2	-	.01	-
F	<i>Chaenactis douglasii</i>	2	-	-	-	1	-	-	-	-	-
F	<i>Cirsium</i> spp.	-	-	-	3	-	-	-	1	-	.00
F	<i>Cryptantha</i> spp.	_a -	_c 105	_b 6	_a -	-	47	4	-	.02	-
F	<i>Cymopterus</i> spp.	-	-	-	2	-	-	-	1	-	.03
F	<i>Descurainia pinnata</i> (a)	-	-	-	5	-	-	-	3	-	.04
F	<i>Eriogonum alatum</i>	3	1	3	-	1	1	2	-	.03	-
F	<i>Eriogonum cernuum</i> (a)	-	-	2	-	-	-	1	-	.00	-
F	<i>Erigeron eatonii</i>	10	7	6	6	4	3	3	3	.01	.04
F	<i>Eriogonum alatum</i>	-	-	-	6	-	-	-	2	-	.03
F	<i>Erigeron pumilus</i>	_a -	_a 2	_{ab} 3	_b 8	-	1	1	3	.00	.01
F	<i>Eriogonum racemosum</i>	_a 65	_b 118	_a 63	_{ab} 85	34	51	31	42	.35	1.52
F	<i>Gilia</i> spp. (a)	-	-	-	3	-	-	-	2	-	.03
F	<i>Hedysarum boreale</i>	-	-	3	5	-	-	2	2	.06	.33
F	<i>Hymenoxys acaulis</i>	-	3	-	1	-	1	-	1	-	.03
F	<i>Hymenoxys richardsonii</i>	_a 8	_b 32	_{ab} 18	_a 9	5	15	10	6	.67	.25
F	<i>Lappula occidentalis</i> (a)	_a -	_a -	_a 7	_b 18	-	-	3	9	.01	.04
F	<i>Lepidium</i> spp. (a)	-	-	-	13	-	-	-	7	-	.03
F	<i>Lotus utahensis</i>	-	-	-	2	-	-	-	1	-	.00
F	<i>Lupinus argenteus</i>	5	-	7	2	4	-	4	2	.04	.03
F	<i>Lygodesmia spinosa</i>	5	6	10	5	2	4	5	3	.48	.16
F	<i>Machaeranthera grindelioides</i>	-	-	-	2	-	-	-	1	-	.15
F	<i>Penstemon comarrhenus</i>	2	-	-	-	1	-	-	-	-	-
F	<i>Penstemon</i> spp.	_a 1	_b 20	_a -	_a -	1	10	-	-	-	-
F	<i>Phlox longifolia</i>	-	-	-	3	-	-	-	1	-	.00
F	<i>Polygonum douglasii</i> (a)	-	-	-	3	-	-	-	2	-	.01
F	<i>Potentilla gracilis</i>	-	6	5	2	-	2	3	2	.01	.03
F	<i>Senecio</i> spp.	17	-	-	-	10	-	-	-	-	-
F	<i>Sphaeralcea coccinea</i>	10	12	7	15	5	7	3	8	.02	.29
F	<i>Tragopogon dubius</i>	-	-	-	1	-	-	-	1	-	.00
F	Unknown forb-perennial	2	-	-	-	2	-	-	-	-	-
Total Annual Forbs		0	0	14	42	0	0	6	23	0.02	0.15
Total Perennial Forbs		236	480	252	317	118	212	115	148	5.81	7.61

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

BROWSE TRENDS --
Herd unit 25C, Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Artemisia nova	4	2	.03	.00
B	Artemisia tridentata vaseyana	0	0	-	.15
B	Cercocarpus montanus	0	1	-	.03
B	Chrysothamnus depressus	0	7	-	.34
B	Chrysothamnus nauseosus	28	20	.73	.82
B	Chrysothamnus parryi	5	9	.15	.21
B	Chrysothamnus viscidiflorus lanceolatus	17	17	1.57	2.08
B	Gutierrezia sarothrae	70	56	1.87	1.45
B	Opuntia spp.	4	1	.00	.03
B	Pinus edulis	-	-	.01	-
B	Pinus ponderosa	0	10	1.48	3.84
B	Purshia tridentata	22	28	4.10	4.51
B	Quercus gambelii	0	0	-	-
B	Ribes spp.	0	0	-	.03
B	Sambucus racemosa	3	1	-	.03
B	Tetradymia canescens	6	9	.15	.33
B	Yucca harrimaniae	15	19	2.90	2.58
Total for Browse		174	180	13.01	16.46

CANOPY COVER --
Herd unit 25C, Study no: 3

Species	Percent Cover '08
Pinus ponderosa	6

BASIC COVER --
Herd unit 25C, Study no: 3

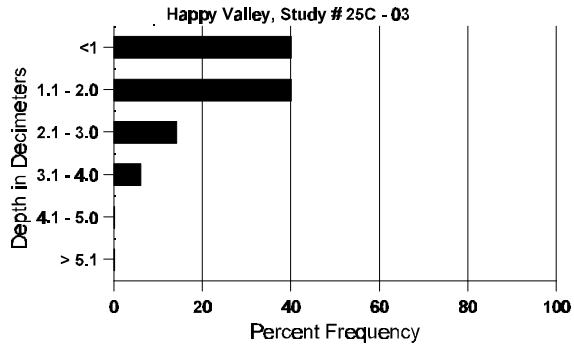
Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'85	'91	'94	'98
Vegetation	295	331	7.00	7.50	25.82	39.38
Rock	332	315	18.50	27.75	23.07	30.28
Pavement	202	254	11.25	4.75	1.36	8.40
Litter	368	377	26.75	40.00	30.78	39.38
Cryptogams	-	17	0	0	0	.29
Bare Ground	277	280	36.50	20.00	13.10	15.55

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 03, Study Name: Happy Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.7	61.4 (13.8)	6.5	56.0	21.4	22.6	3.3	21.4	153.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 3

Type	Quadrat Frequency	
	04	08
Rabbit	4	4
Elk	2	4
Deer	14	16
Cattle	-	4

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 3

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia nova</i>																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	11	18	4
	'98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	15	22	3
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'94		00%			00%			00%			-25%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	80		-			
												'98	60		-			
<i>Artemisia tridentata vaseyana</i>																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	8	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	9	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			None							
'91		00%			00%			00%			None							
'94		00%			00%			00%			None							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	0		-			
<i>Cercocarpus montanus</i>																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	15	0
	'98	-	1	-	-	-	-	-	-	-	1	-	-	-	20	13	24	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			None							
'91		00%			00%			00%			None							
'94		00%			00%			00%			Appeared							
'98		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	20		-			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total																																																																																										
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Total Plants/Acre (excluding Dead & Seedlings)																																																																																																											
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														'94	860		2%																																																																																										
														'98	600		3%																																																																																										

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 parryi																	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	4	4	-	-	-	-	-	9	-	-	-	180	4	11	9
	98	9	-	-	-	-	-	-	-	9	-	-	-	180	9	15	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%			+63%						
'94		44%			44%			00%			+18%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-				
										'91	66		-				
										'94	180		-				
										'98	220		-				
Chrysothamnus viscidiflorus lanceolatus																	
S	85	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	4	-	-	-	-	-	-	-	4	-	-	-	266	9	7	4
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	38	6	-	-	-	-	-	-	44	-	-	-	880	12	27	44
	98	4	3	2	-	1	-	-	-	10	-	-	-	340	7	22	17
D	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	-	-	1	66		1	
	94	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%			-57%						
'91		00%			00%			33%			+79%						
'94		13%			00%			00%			-62%						
'98		22%			11%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	466	Dec:	0%				
										'91	199		33%				
										'94	940		4%				
										'98	360		6%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total							
		1	2	3	4										
<i>Gutierrezia sarothrae</i>															
S	85	12	-	-	-	-	-	-	11	-	1	-	800		12
	91	14	-	-	2	-	-	-	16	-	-	-	1066		16
	94	23	-	-	-	-	-	-	23	-	-	-	460		23
	98	22	-	-	-	-	-	-	22	-	-	-	440		22
Y	85	4	-	-	-	-	-	-	4	-	-	-	266		4
	91	10	-	-	-	-	-	-	10	-	-	-	666		10
	94	99	-	-	-	-	-	-	99	-	-	-	1980		99
	98	11	-	-	-	-	-	-	11	-	-	-	220		11
M	85	9	-	-	-	-	-	-	9	-	-	-	600	9 7	9
	91	68	1	-	-	-	-	-	69	-	-	-	4600	10 12	69
	94	252	-	-	-	-	-	-	252	-	-	-	5040	6 6	252
	98	174	-	-	-	-	-	-	174	-	-	-	3480	9 8	174
D	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	3	1	-	-	-	-	-	2	-	1	1	266		4
	94	12	-	-	1	-	-	-	9	-	-	4	260		13
	98	-	-	-	-	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	1320		66
	98	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>					
'85		00%		00%		00%				+84%					
'91		02%		00%		02%				+24%					
'94		00%		00%		01%				-49%					
'98		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)									'85	866	Dec:	0%			
									'91	5532		5%			
									'94	7280		4%			
									'98	3700		0%			
<i>Opuntia spp.</i>															
Y	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	1	-	-	-	-	-	-	1	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	-	-	0		0
M	85	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	15	-	-	-	-	-	-	15	-	-	-	300	2 7	15
	98	1	-	-	-	-	-	-	1	-	-	-	20	2 4	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>					
'85		00%		00%		00%									
'91		00%		00%		00%									
'94		00%		00%		00%				-94%					
'98		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)									'85	0	Dec:	-			
									'91	0		-			
									'94	320		-			
									'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Pinus ponderosa																		
S	'85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	'85	-	-	-	-	-	-	1	1	-	-	-	1	1	133	69	79	2
	'91	-	-	-	-	-	-	1	1	-	2	-	-	-	133	234	89	2
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1
D	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	1	-	-	-	-	-	-	1	66		1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			100%			+67%							
'91		00%			17%			17%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	133	Dec:	0%			
												'91	399		17%			
												'94	0		0%			
												'98	200		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						
Purshia tridentata											
S	85	7	-	-	-	-	-	7	466		7
	91	-	-	-	-	-	-	0	0		0
	94	-	-	-	-	-	-	0	0		0
	98	2	-	-	-	-	-	2	40		2
Y	85	20	2	-	-	-	-	21	1466		22
	91	3	3	5	1	1	-	13	866		13
	94	1	-	-	-	-	-	1	20		1
	98	3	-	-	-	-	-	3	60		3
M	85	-	1	2	-	-	-	3	200	10 19	3
	91	-	3	1	-	-	3	7	466	5 15	7
	94	25	15	5	-	-	-	43	900	14 41	45
	98	4	16	9	-	1	5	33	700	17 49	35
D	85	-	-	-	-	-	-	-	0		0
	91	-	1	1	-	-	-	1	133		2
	94	1	-	-	-	-	-	-	20		1
	98	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	20		1
	98	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'85		12%		08%		04%		-12%			
'91		36%		45%		05%		-36%			
'94		32%		11%		02%		-19%			
'98		45%		37%		00%					
Total Plants/Acre (excluding Dead & Seedlings)								'85	1666	Dec:	0%
								'91	1465		9%
								'94	940		2%
								'98	760		0%
Quercus gambelii											
M	85	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	0	-	0
	98	-	-	-	-	-	-	-	0	40 75	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'85		00%		00%		00%					
'91		00%		00%		00%					
'94		00%		00%		00%					
'98		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)								'85	0	Dec:	-
								'91	0		-
								'94	0		-
								'98	0		-

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				
Ribes spp.																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			None							
'91		00%			00%			00%			None							
'94		00%			00%			00%			None							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	0		-			
Sambucus racemosa																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	7	-	-	-	-	-	-	-	-	7	-	-	-	140	23	22	7
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	25	32	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%			-86%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	140		-			
												'98	20		-			
Tetradymia canescens																		
S	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	'85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	1	-	-	-	-	-	-	-	1	-	-	-	66	6	9	1
	'94	3	2	-	-	-	-	-	-	-	5	-	-	-	100	7	13	5
	'98	5	3	-	1	-	-	-	-	-	9	-	-	-	180	9	14	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+50%							
'91		50%			00%			00%			- 9%							
'94		33%			00%			00%			+40%							
'98		30%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-			
												'91	132		-			
												'94	120		-			
												'98	200		-			

A Y G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Yucca harrimaniae																		
S	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	91	-	-	-	5	-	-	-	-	-	5	-	-	-	333		5	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	17	-	-	-	-	-	-	-	-	17	-	-	-	1133		17	
	91	25	-	-	5	-	-	-	-	-	30	-	-	-	2000		30	
	94	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
	98	10	-	-	2	-	-	-	-	-	12	-	-	-	240		12	
M	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200	8	9	3
	91	5	-	-	-	-	-	-	-	-	5	-	-	-	333	9	15	5
	94	77	-	-	-	-	-	-	-	-	77	-	-	-	1540	13	22	77
	98	62	-	-	-	-	-	-	-	-	62	-	-	-	1240	14	23	62
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+43%							
'91		00%			00%			00%			-32%							
'94		00%			00%			00%			-4%							
'98		00%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1333	Dec:	0%			
												'91	2333		0%			
												'94	1580		0%			
												'98	1520		3%			

Trend Study 25C-4-98

Study site name: North Slope .

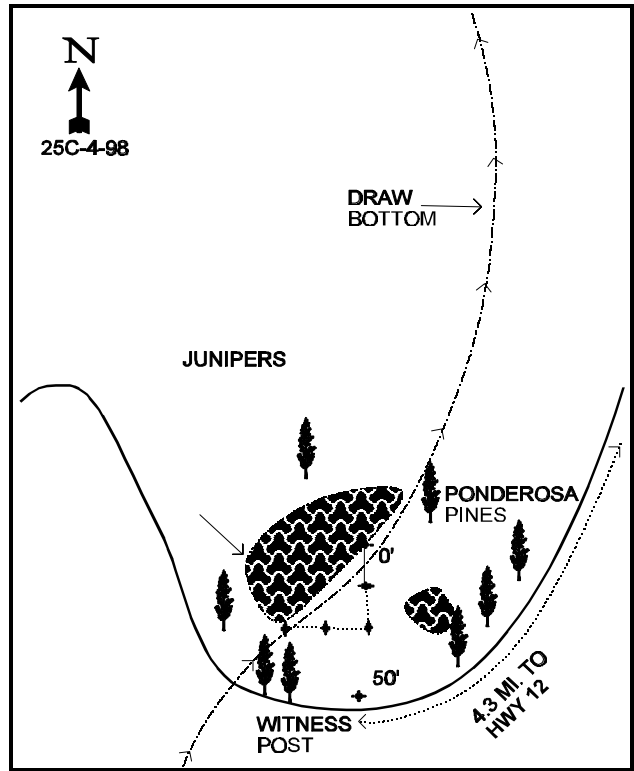
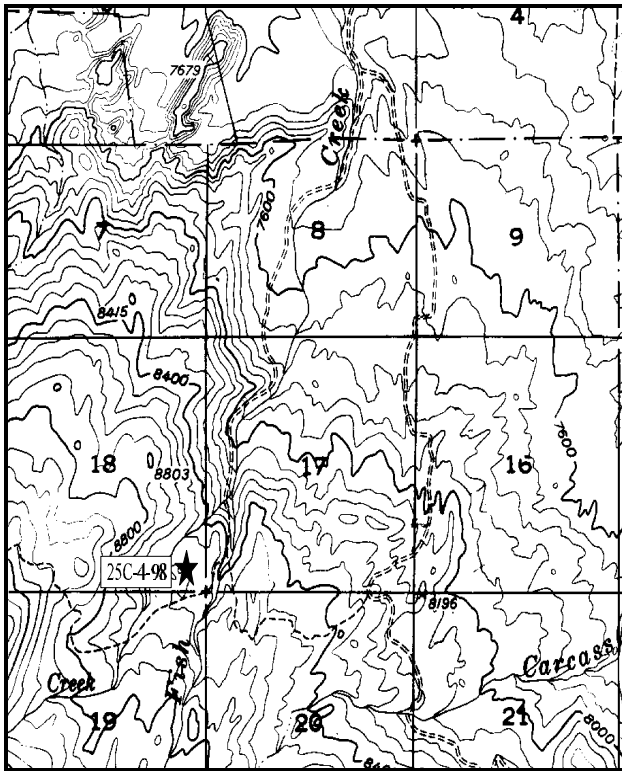
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 167 M degrees. Lines 3-4 270 °M.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 71ft), line 2 (34ft), line 3 (95ft), line 4 (59ft).

LOCATION DESCRIPTION

From Grover, Utah go 1.5 miles northwest on SR12 to the North Slope Road. Turn up this road and go 0.1 miles to a fork. Stay left on the main road and continue for 4.2 miles. Stop before you get to a bend in the road near the head of a draw. Look for a witness post at the base of a Ponderosa Pine 10 feet below the road. The witness post is a 2 1/2-foot steel rebar tagged #7181. The 200-foot stake is a full-high post 50 feet from the witness post. The 0-foot baseline stake has a browse tag #7077 attached.



Map Name: Grover, Utah (15')

Diagrammatic Sketch

Township 30S , Range 5E , Section 18

DISCUSSION

Trend Study No. 25C-4 (51A-4)

The North Slope study is located on the north slope of Boulder Mountain above Fish Creek. The general exposure is north, but the original frequency baseline established in 1985 goes down an east facing slope and the density plots are on the other side of a small draw with a northwest aspect. The slopes average 15% to 20% with an elevation of 8,500 feet. During the 1998 reading, the old frequency baseline was moved to better sample the site. It was originally established entirely within a thick juniper stand with little herbaceous understory while the density plots sampled the more open area across a wash. The new baseline is entirely within the more open area where the key browse and herbaceous understory are more numerous. Although the northern aspect, elevation, and high precipitation would appear to indicate that the area is unsuitable for winter range, the area is used by deer. Pellet group counts from the nearby Wide Hollow pellet group transect (8,000 ft.) indicate moderate deer use with an average of 15 deer days use/acre over the past 6 years, 1985-1990 (Jense et al. 1991). Additional pellet group data taken along the vegetative trend study in 1991 shows heavier use with 40 deer days use/acre and 9 elk days use/acre estimated. No recent livestock grazing was apparent in the immediate area in 1991. Pellet group data from the site in 1998 estimate 50 deer, 36 cow and only 3 elk days use/acre. Some of the deer sign was recent and cattle had been on the site prior to study site reading on July 22, 1998.

The vegetative community is composed of pinyon and juniper and some ponderosa pine with an understory of antelope bitterbrush, rabbitbrush, and perennial grass. Point quarter data from 1998 estimate 27 pinyon, 20 ponderosa pine, 16 Utah juniper, and 17 rocky mountain juniper trees/acre. Basal diameter of the pinyon and juniper trees are similar and average 4.5 inches. Average diameter of ponderosa pine is estimated at 15 inches. The pinyon and juniper provide good escape and thermal cover. Nearby Forest Service chainings provide excellent deer winter range, and more pinyon-juniper chainings have been proposed by DWR for the North Slope area.

Soil at the site is very rocky on the surface and throughout the profile. Effective rooting depth (see methods) is estimated at 10 inches. Rooting restrictions are evident in some places where black sagebrush occurs. Soil texture is a sandy loam with a moderately acid pH (5.9). There is a very small amount of bare soil exposed on the site. Some soil movement was noticeable in 1985, but erosion is currently not a problem due to the high percentage of litter and thick vegetation.

A variety of browse species are present, but only bitterbrush is available and palatable enough to be considered a key species. Bitterbrush makes up approximately 50% of the browse cover in 1998. Bitterbrush densities have changed little since 1985 when 1,598 plants/acre were estimated. Currently ('98) 2000 plants/acre are estimated. Many of the older plants which are above the snow cover in the winter have been heavily hedged in the past. Utilization was moderate to heavy in 1985 and 1991, but mostly moderate in 1998. Vigor has remained normal over the years and percent decadence low, currently at only 3%.

Black sagebrush and a few mountain big sagebrush are mixed in with the bitterbrush. Both species show an increase in density between 1991 and 1998, but the larger sample used in 1998 is the major reason for the difference. Both species show mostly light use with the exception of moderate use on mountain big sagebrush in 1991. Three species of rabbitbrush are found on the site including: dwarf rabbitbrush, Parry rabbitbrush, and mountain low rabbitbrush. Of these, mountain low rabbitbrush is the most abundant with a density that has ranged between 3,000 and 4,000 plants/acre since 1985. Most of these are unutilized. The increaser broom snakeweed significantly increased in density from 666 plants/acre in 1985 to 3,065 plants/acre in 1991. By 1998, density had declined 54% to 1,400 plants/acre.

Several perennial grasses were encountered on the site with blue grama, a sedge, mutton bluegrass, and bottlebrush squirreltail being most numerous. All grasses combined produce 23% cover ('98). There are a

large variety of forbs on the site, although Louisiana sage, silvery lupine, and pussytoes are the most abundant and provide 70% of the forb cover.

1985 APPARENT TREND ASSESSMENT

Good litter and vegetative cover provides protection for the soil and buildup appears to exceed any loss. Vegetative trend is also stable. Some increasers are present, but appear to be stable. The bitterbrush is heavily hedged, but mostly protected by snow during the season of heaviest use and has good reproduction.

1991 TREND ASSESSMENT

This site continues to have excellent basic cover characteristics. Bare ground is only 6% with litter at 62%. Soil condition is stable. The key browse, antelope bitterbrush, is fairly stable at around 1,500 plants per acre, but has a decadency rate that has gone from 4 to 17 percent. This percent decadency would not be unexpected because of the extended drought, but of real concern is that the increaser species have expanded during this same period. The browse trend is considered stable. The herbaceous understory is stable at this time with about as many species increasing as decreasing.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

1998 TREND ASSESSMENT

The original frequency baseline was moved out of a thick juniper stand in order to sample the more important bitterbrush-grass vegetation. For this reason direct comparisons should not be made between 1991 and 1998 with regard to soil trends and herbaceous trends. The original baseline had a much higher pinyon and juniper density with considerable litter cover around these trees. Herbaceous vegetation was lacking. With this in mind, the soil trend on the expanded baseline appears stable with little bare ground exposed. Protective cover is abundant and well dispersed and no erosion is evident. Trend for the key bitterbrush is stable. There were less young plants sampled in 1998, but density of mature plants is similar to 1985 estimates. Utilization is more moderate, vigor normal, and percent decadence is low at only 3%. Density of increasers, including broom snakeweed and three species of rabbitbrush, are up for the rabbitbrush, although down for snakeweed. More sagebrush, black sagebrush and mountain big sagebrush, was sampled in the larger sample of 1998. Trend for browse is considered stable. The herbaceous understory is diverse and abundant. Sum of nested frequency has increased dramatically, but much of the improvement is due to the relocation of the original frequency baseline. Trend is considered stable until data is available for direct comparison.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	<i>Agropyron spicatum</i>	a1	ab5	b16	1	3	7	.35
G	<i>Bouteloua gracilis</i>	b172	a139	b206	57	54	73	8.07
G	<i>Bromus anomalus</i>	2	3	-	1	1	-	-
G	<i>Carex</i> spp.	28	29	51	14	14	23	1.17
G	<i>Oryzopsis hymenoides</i>	3	3	-	1	1	-	-
G	<i>Poa fendleriana</i>	a46	a48	b192	20	22	65	11.08
G	<i>Sitanion hystrix</i>	a43	a56	b104	21	24	51	2.24
G	<i>Stipa comata</i>	-	-	23	-	-	10	.41
Total Annual Grasses		0	0	0	0	0	0	0
Total Perennial Grasses		295	283	592	115	119	229	23.33
F	<i>Allium</i> spp.	-	-	1	-	-	1	.00
F	<i>Antennaria parvifolia</i>	a5	a8	b31	2	3	13	1.68
F	<i>Androsace septentrionalis</i> (a)	-	-	95	-	-	41	.93
F	<i>Arabis demissa</i>	8	17	8	5	9	4	.07
F	<i>Artemisia dracunculus</i>	c54	a-	b23	25	-	12	.91
F	<i>Artemisia ludoviciana</i>	b70	a2	c116	34	2	48	3.14
F	<i>Castilleja linariaefolia</i>	-	3	-	-	1	-	-
F	<i>Chaenactis douglasii</i>	-	-	6	-	-	2	.01
F	<i>Cirsium</i> spp.	-	-	2	-	-	1	.00
F	<i>Cryptantha</i> spp.	3	-	-	1	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	8	-	-	5	.02
F	<i>Echinocereus</i> spp.	6	-	-	2	-	-	-
F	<i>Erigeron eatonii</i>	a6	a3	b17	3	1	10	.34
F	<i>Erigeron flagellaris</i>	-	-	10	-	-	5	.25
F	<i>Eriogonum</i> spp.	-	-	2	-	-	1	.03
F	<i>Erigeron pumilus</i>	-	-	10	-	-	5	.24
F	<i>Eriogonum racemosum</i>	a5	a1	b32	3	1	18	.30
F	<i>Gilia</i> spp. (a)	-	-	2	-	-	2	.01
F	<i>Hymenoxys richardsonii</i>	5	-	3	3	-	1	.03
F	<i>Lappula occidentalis</i> (a)	-	-	9	-	-	5	.02
F	<i>Lepidium</i> spp. (a)	-	-	31	-	-	16	.11
F	<i>Lupinus argenteus</i>	b29	a-	c82	13	-	40	5.08
F	<i>Lychnis drummondii</i>	-	4	-	-	2	-	-
F	<i>Lygodesmia</i> spp.	-	-	17	-	-	10	.44
F	<i>Penstemon</i> spp.	-	2	8	-	1	3	.18
F	<i>Petradoria pumila</i>	2	1	1	2	1	1	.15
F	<i>Polygonum douglasii</i> (a)	-	-	5	-	-	2	.01
F	<i>Potentilla gracilis</i>	-	18	14	-	10	5	.12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	<i>Pteridium aquilinum</i>	-	1	-	-	1	-	-
F	<i>Sphaeralcea coccinea</i>	4	10	10	3	6	4	.07
F	<i>Taraxacum officinale</i>	-	-	1	-	-	1	.00
F	<i>Tragopogon dubius</i>	-	-	3	-	-	1	.01
F	Unknown forb-perennial	-	3	1	-	3	1	.00
Total Annual Forbs		0	0	141	0	0	66	1.11
Total Perennial Forbs		197	73	407	96	41	192	13.33

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

BROWSE TRENDS --

Herd unit 25C, Study no: 4

Type	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia nova</i>	15	1.84
B	<i>Artemisia tridentata vaseyana</i>	4	.30
B	<i>Chrysothamnus depressus</i>	7	.19
B	<i>Chrysothamnus parryi</i>	22	.81
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	80	7.83
B	<i>Echinocereus</i> spp.	3	.09
B	<i>Gutierrezia sarothrae</i>	29	.80
B	<i>Juniperus scopulorum</i>	0	1.48
B	<i>Pinus edulis</i>	2	.78
B	<i>Pinus ponderosa</i>	-	.00
B	<i>Purshia tridentata</i>	51	14.16
B	<i>Tetradymia canescens</i>	4	.15
Total for Browse		217	28.46

CANOPY COVER --

Herd unit 25C, Study no: 4

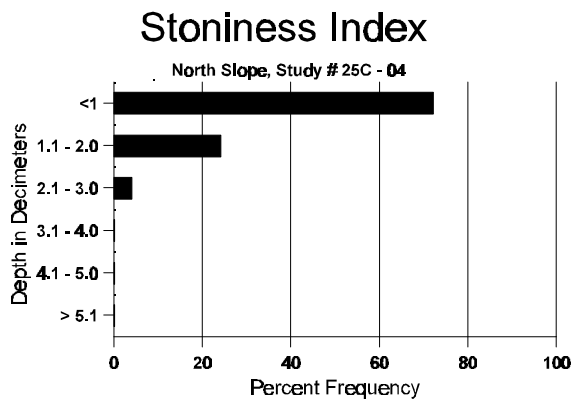
Species	Percent Cover '98
<i>Juniperus osteosperma</i>	3
<i>Pinus edulis</i>	2

BASIC COVER --
Herd unit 25C, Study no: 4

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	346	4.00	3.25	54.93
Rock	236	21.00	22.25	14.30
Pavement	219	9.00	5.25	8.15
Litter	384	60.00	62.00	49.14
Cryptogams	135	1.75	1.50	4.07
Bare Ground	226	4.25	5.75	9.61

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 04, Study Name: North Slope

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.0	54.8 (11.7)	5.9	64.0	19.4	16.6	2.8	12.0	137.6	.5



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 4

Type	Quadrat Frequency '98
Rabbit	25
Elk	4
Deer	30
Cattle	12

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 4

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia nova</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	24	-	-	1	-	-	-	-	-	25	-	-	-	500		25	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	200	7	8	
	98	22	1	-	1	-	-	-	-	-	24	-	-	-	480	12	19	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%			+73%							
'98		02%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	266		0%			
												'98	1000		2%			
<i>Artemisia tridentata vaseyana</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	5	-	-	3	-	-	-	-	-	8	-	-	-	160	19	27	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		100%			00%			00%			+70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	66		-			
												'98	220		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus depressus																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	2	-	2	-	-	-	-	-	-	4	-	-	-	266	4	7	4
	98	12	-	-	-	-	-	-	-	-	12	-	-	-	240	8	11	12
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			60%			00%			-22%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	0%				
											'91	332		20%				
											'98	260		8%				
Chrysothamnus parryi																		
Y	85	6	-	-	-	-	-	-	-	-	5	1	-	-	400			6
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	85	29	1	-	-	-	-	-	-	-	28	2	-	-	2000	8	7	30
	91	7	-	-	-	-	-	-	-	-	7	-	-	-	466	6	9	7
	98	35	-	-	1	-	-	-	-	-	36	-	-	-	720	10	10	36
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		03%			00%			00%			-81%							
'91		00%			00%			00%			+50%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	2400	Dec:	0%				
											'91	466		0%				
											'98	940		17%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
S	85	9	-	-	-	-	-	9	600		9	
	91	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	0		0	
Y	85	8	2	-	-	-	-	10	666		10	
	91	6	-	2	-	-	-	8	533		8	
	98	15	-	-	-	-	-	14	300		15	
M	85	42	3	-	-	-	-	44	3000	19 13	45	
	91	20	6	1	-	-	-	27	1800	13 16	27	
	98	151	4	-	9	-	-	165	3300	18 20	165	
D	85	2	1	-	-	-	-	3	200		3	
	91	5	2	-	1	-	-	7	533		8	
	98	20	-	-	3	-	-	22	460		23	
X	85	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		10%		00%		02%		-26%				
'91		19%		07%		02%		+29%				
'98		02%		00%		.98%						
Total Plants/Acre (excluding Dead & Seedlings)									'85	3866	Dec:	5%
									'91	2866		19%
									'98	4060		11%
<i>Echinocereus spp.</i>												
S	85	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	1	20		1	
M	85	-	-	-	-	-	-	-	0	- -	0	
	91	-	-	-	-	-	-	-	0	- -	0	
	98	4	-	-	-	-	-	4	80	1 4	4	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		00%		00%		00%						
'91		00%		00%		00%						
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'85	0	Dec:	-
									'91	0		-
									'98	80		-

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	14	-	-	-	-	-	2	-	-	16	-	-	-	1066		16	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600	9	7	9
	91	25	1	-	-	-	-	-	-	-	26	-	-	-	1733	6	5	26
	98	63	-	-	-	-	-	-	-	-	61	-	2	-	1260	9	11	63
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+78%							
'91		02%			00%			00%			-54%							
'98		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	666	Dec:	0%			
												'91	3065		9%			
												'98	1400		6%			
<i>Juniperus scopulorum</i>																		
M	85	-	-	-	1	-	-	-	-	-	1	-	-	-	66	69	89	1
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	109	125	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+ 0%							
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-			
												'91	66		-			
												'98	0		-			
<i>Pinus edulis</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	1	-	-	2	-	-	-	133		2	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	40		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
S	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	85	3	1	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	5	1	-	-	-	-	-	-	-	6	-	-	-	400			6
	98	6	3	-	-	-	-	-	-	-	9	-	-	-	180			9
M	85	1	11	7	-	-	-	-	-	-	19	-	-	-	1266	24	35	19
	91	-	2	1	-	4	6	-	-	-	13	-	-	-	866	14	28	13
	98	15	48	1	1	23	-	-	-	-	88	-	-	-	1760	21	45	88
D	85	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	2	-	-	2	-	-	-	-	3	-	-	1	266			4
	98	-	3	-	-	-	-	-	-	-	3	-	-	-	60			3
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		50%			33%			00%			- 4%							
'91		48%			30%			04%			+23%							
'98		77%			01%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1598	Dec:	4%			
												'91	1532		17%			
												'98	2000		3%			
Tetradymia canescens																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	12	15	3
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	0		0%			
												'98	80		25%			

Trend Study 25C-5-98

Study site name: Giles Hollow .

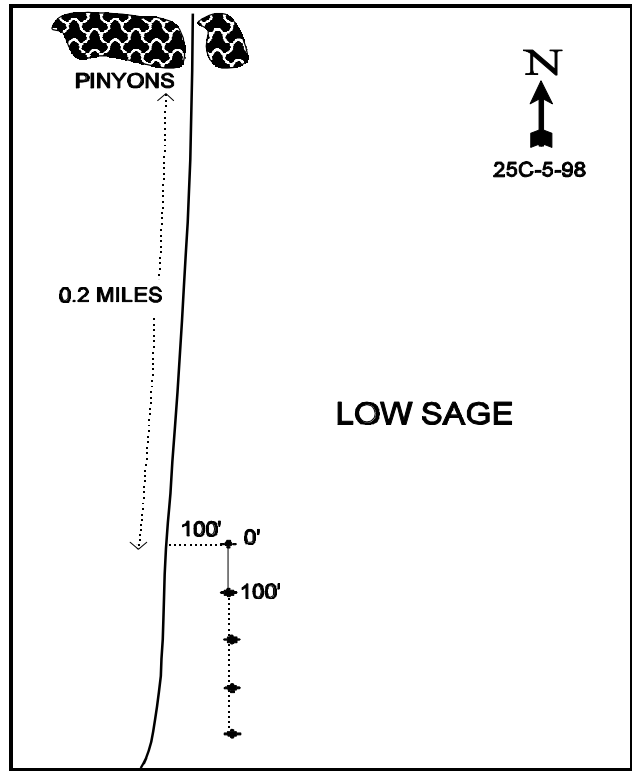
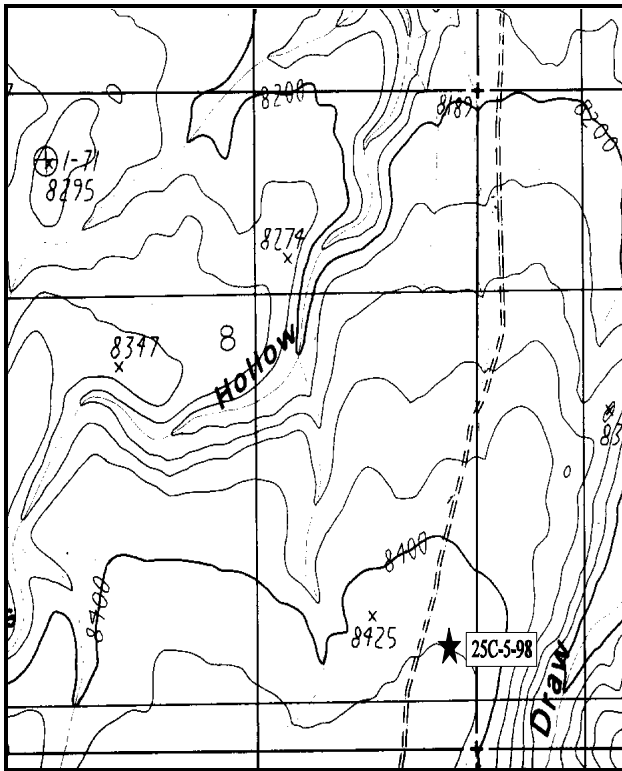
Range type: Small Rabbitbrush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Egan Fish Hatchery south of Bicknell, travel southwest 1.45 miles on a paved road to a gravel road forking to the right (the left fork goes to King Ranch). Follow the right fork for 3.6 miles to where the road forks again. Turn left and go 0.8 miles where you take another left fork onto the Aquarius Ranger Station Road and go 1.6 miles to a cattleguard at the USFS boundary. Continue for 0.7 miles, then turn right and go 1.6 miles south to a green fencepost 100 feet off the road to the left. The fencepost has a browse tag #7180 attached, and is the 0-foot baseline stake. The 100-foot end is also marked by a fencepost. The other three stakes are marked by rebar.



Map Name: Government Point

Diagrammatic Sketch

Township 30S, Range 3E, Section 8

UTM 4229206.294 N, 447555.559 E

DISCUSSION

Trend Study No. 25C-5 (44-5)

The Giles Hollow study is located on Forest Service land on the northwest slope of the Aquarius Plateau. The area is a wide open windswept expanse of low-growing vegetation. It has a 5% slope to the northeast and an elevation of approximately 8,400 feet. The range type has been identified as low rabbitbrush-grass. Heavy cattle and sheep grazing have had a major impact on the vegetation here. A deferred rotation system of grazing is used on the allotment, with 1,105 AUMs (cattle) scheduled for a period between mid-June and mid-October on 4 pastures. Pronghorn antelope use the range year-round. A pellet group transect in Giles Hollow shows increasing deer use in the area with an average of 19 deer days use/acre between 1985 and 1991. During the winter of 1990-1991, deer days use/acre was estimated at 33 (Jense et al. 1991). A pellet group transect read along the study baseline in 1998 estimates 14 deer, 4 elk, and 10 cow days use/acre. Most of these groups appear to be from the past winter, however cattle were on the site during the 1998 reading (7/22/98).

The soil is shallow, compact, and rocky below the surface. Effective rooting depth (see methods) is estimated at only just over 8 inches. Soil texture is a loam with a neutral pH (6.7). Rocks and pavement currently ('98) cover 41% of the ground surface and have averaged 34% cover since 1985. The soil infiltration capacity appears to be good, and with adequate vegetation and litter cover, erosion is not a problem on this site.

The browse composition is dominated by the increasers, narrowleaf low rabbitbrush and broom snakeweed, which currently ('98) make up 71% and 14% of the browse cover respectively. Density of the more desirable species, black sagebrush, fourwing saltbush, and winterfat, are low due to a long history of overgrazing. These plants have displayed moderate to heavy hedging and are preferred by both livestock and big game. Biotic and reproductive potentials are low for these species with continued heavy use making it difficult for them to compete with the aggressive increasers. Winterfat is a very low growing form, averaging only 4 inches in height due to continued hedging. Rabbitbrush and broom snakeweed show little indication of any utilization with good numbers of seedlings and young. Rabbitbrush nearly doubled in density between 1985 and 1991 from 6,333 to 11,132 plants/acre. The population appears to have stabilized at around 10,000 plants/acre. Broom snakeweed declined 67% between 1985 and 1991, but rebounded in 1994 with a density of 5,100 plants/acre. It's density declined to 3,500 plants/acre by 1998. There may have been some problems in identification between these two similar looking plants during the 1985 reading.

The total cover for grasses is high compared to the cover contributed by forbs and browse, due largely to an abundance of blue grama which contributes 85% of the herbaceous cover and 62% of the total vegetative cover. This warm season grass, an increaser with livestock grazing, produces high quality forage, but in small amounts. These plants are very short (about 1 inch tall) and often escape grazing. The most desirable grass, Indian ricegrass, is present in very low numbers. Bottlebrush squirreltail is also common which has significantly decreased in frequency since the 1985 reading, but increased slightly since then. Frequency and diversity of forbs is very low with only two species encountered in 1985, 1991 and 1994. Six additional forbs were encountered in 1998 but in very low numbers. Total forb cover averaged less the ½ of 1%. Low fleabane and globemallow may provide limited forage to antelope in spring and summer. The rather abundant lichens may also provide some forage, especially after rain (Smith and Beale, 1980).

1985 APPARENT TREND ASSESSMENT

The soil trend appears to be stable to slightly downward and could be expected to deteriorate if the present vegetative trend continues. The vegetative trend is downward. The desirable browse species, black sagebrush and winterfat, may be replaced by low-value increasers. Composition of the herbaceous component is also poor. Reduced livestock grazing and time are required for this plant community to heal naturally.

1991 TREND ASSESSMENT

The soil trend appears to be stable. Percent rock and pavement cover have increased, probably because of some minor erosion and loss of litter cover. Vegetation basal cover has increased from 13% to 15%, with cryptogamic cover also slightly increasing. Litter cover loss, as it has been reported on most other sites throughout the state, appears to be more of a function of the extended drought. The fringed sagebrush populations are about the same as they were in 1985. Black sagebrush and winterfat numbers have both decreased by 36% and 6% respectively. Black sagebrush's decadency rate has gone from near zero to 57 percent in 1991. Even with the dramatic decrease in broom snakeweed population (67%), the browse trend would still be considered down. The overall trend for the herbaceous understory is also downward, for out of seven species of grasses and forbs, only two of them are showing signs of stability or increase.

TREND ASSESSMENT

soil - stable

browse - downward

herbaceous understory - downward

1994 TREND ASSESSMENT

Ground cover characteristics are slightly down since 1991. Bare ground has increased slightly, while litter and cryptogam cover have declined somewhat. Erosion is not a problem, but the soil trend is still stable to slightly down due to the prolonged dry conditions. The site is still dominated by undesirable increaser shrubs. However, the trend for black sagebrush health is up due to declining rates of decadency and better vigor. Winter fat density has slightly increased. Overall browse trend is slightly down for key species. Over 80% of the herbaceous understory cover is made up of one species, blue grama, which will act as an increaser with moderate to heavy grazing. Forbs are almost nonexistent. Trend is slightly down for the herbaceous understory and should be considered in poor condition because of the poor composition with increaser species.

TREND ASSESSMENT

soil - stable

browse - slightly downward trend, dominated by increasers

herbaceous understory - slightly down

1998 TREND ASSESSMENT

Trend for soil is up slightly. Percent bare ground declined from 17% to 13% and litter cover increased from 18% to 26%. Vegetation and cryptogamic cover also increased. On the negative side, rock and pavement cover increased from 28% to 41% perhaps due to some soil loss. Trend for browse appears stable with similar population densities for key species, black sagebrush and winterfat, since 1994. Utilization of black sagebrush is currently light with normal vigor and no decadent plants sampled. Recruitment has improved slightly since 1994 with a biotic potential (percentage of seedlings to the population) of 30% and young plants making up 4% of the population. Winterfat is still low growing, averaging only 4 inches in height. Utilization has remained moderate to heavy since 1994, but the population has remained stable at about 1,500 plants/acre. Both increasers, narrowleaf low rabbitbrush and broom snakeweed, have declined slightly in density. However, reproduction of rabbitbrush remains high with abundant seedlings and young. Trend for the herbaceous understory is up slightly. Blue grama still dominates the understory by providing 85% of the herbaceous cover. Both blue grama and bottlebrush squirreltail have increased slightly in nested frequency. Forbs are still severely depleted although more species were picked up in 1998 and sum of nested frequency of forbs nearly doubled from 46 to 80.

TREND ASSESSMENT

soil - up slightly

browse - stable, but still dominated by increasers

herbaceous understory - up slightly, but poor composition

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 5

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	04	08
G	<i>Bouteloua gracilis</i>	317	337	307	329	96	98	93	95	21.54	25.74
G	<i>Oryzopsis hymenoides</i>	13	4	1	6	7	2	1	3	.00	.06
G	<i>Sitanion hystrix</i>	315	207	221	226	100	84	88	89	4.83	4.11
Total Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total Perennial Grasses		645	548	529	561	203	184	182	187	26.38	29.92
F	<i>Arabis</i> spp.	-	-	-	2	-	-	-	1	-	.00
F	<i>Astragalus</i> spp.	-	-	-	1	-	-	-	1	-	.00
F	<i>Draba</i> spp. (a)	-	-	-	4	-	-	-	1	-	.00
F	<i>Erigeron pumilus</i>	7	3	7	7	6	3	4	4	.02	.02
F	<i>Lappula occidentalis</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Penstemon</i> spp.	-	-	-	1	-	-	-	1	-	.00
F	<i>Polygonum douglasii</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Sphaeralcea coccinea</i>	38	45	39	61	17	22	18	27	.09	.36
F	Unknown forb-perennial	1	-	-	-	1	-	-	-	-	-
Total Annual Forbs		0	0	0	8	0	0	0	3	0	0
Total Perennial Forbs		46	48	46	72	24	25	22	34	0.10	0.40

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

BROWSE TRENDS --
Herd unit 25C, Study no: 5

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Artemisia frigida	5	0	.00	-
B	Artemisia nova	10	11	.36	1.21
B	Atriplex canescens	3	1	.00	-
B	Ceratoides lanata	37	34	.19	.47
B	Cercocarpus ledifolius	0	1	-	-
B	Chrysothamnus viscidiflorus stenophyllus	88	85	4.82	7.94
B	Echinocereus spp.	0	3	-	.02
B	Gutierrezia sarothrae	73	69	.32	1.57
B	Opuntia spp.	0	3	-	-
B	Tetradymia canescens	0	1	-	-
B	Yucca harrimaniae	1	0	.00	-
Total for Browse		217	208	5.71	11.22

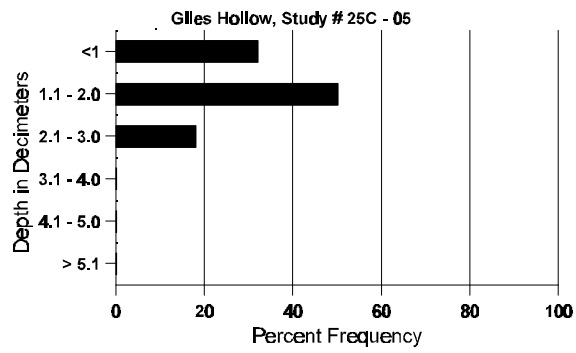
BASIC COVER --
Herd unit 25C, Study no: 5

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'85	'91	'94	'98
Vegetation	347	364	12.75	15.25	31.80	46.57
Rock	340	288	6.00	10.75	19.31	10.92
Pavement	329	358	23.25	28.00	8.79	30.21
Litter	370	379	34.00	26.00	18.34	26.23
Cryptogams	116	237	3.75	5.00	2.25	4.61
Bare Ground	336	335	20.25	15.00	16.75	13.10

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 05, Study Name: Giles Hollow

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.3	54.8 (9.1)	6.7	44.0	33.4	12.6	2.6	19.3	89.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 5

Type	Quadrat Frequency	
	04	08
Rabbit	58	16
Elk	-	4
Deer	15	11
Antelope	3	-

BROWSE CHARACTERISTICS --

Herd unit 25C, 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 frigida																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	21	-	-	-	-	-	-	-	-	21	-	-	-	1400		21	
	91	25	1	1	-	-	-	-	-	-	27	-	-	-	1800		27	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	36	-	-	-	-	-	-	-	-	36	-	-	-	2400	2	4	36
	91	14	6	-	-	-	-	2	-	-	22	-	-	-	1466	3	4	22
	94	7	-	-	-	-	-	-	-	-	7	-	-	-	140	2	4	7
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	4	5	2	-	-	-	-	-	-	10	-	1	-	733		11	
	94	-	-	-	-	-	1	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'85		00%			00%			00%			+ 5%							
'91		20%			05%			02%			-95%							
'94		00%			11%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	3800	Dec:	0%			
												'91	3999		18%			
												'94	180		11%			
												'98	0		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Artemisia nova													
S	85	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	0		0
	98	10	-	-	-	-	-	-	-	-	200		10
Y	85	7	-	-	-	-	-	-	-	-	466		7
	91	-	1	1	-	-	-	1	-	-	200		3
	94	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	20		1
M	85	2	2	-	-	-	-	-	-	-	266	5 11	4
	91	-	-	-	-	-	-	-	-	-	0	- -	0
	94	17	1	1	-	-	-	-	-	-	380	5 9	19
	98	22	-	-	-	-	-	-	-	-	440	6 12	22
D	85	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	1	1	2	-	-	266		4
	94	1	-	-	-	-	-	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>			
'85		18%		00%		00%				-36%			
'91		29%		29%		29%				-14%			
'94		05%		05%		00%				+13%			
'98		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	732	Dec:	0%
										'91	466		57%
										'94	400		5%
										'98	460		0%

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Atriplex canescens																		
Y	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	'94	2	1	-	-	-	-	-	-	-	3	-	-	-	60	9	13	
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	11	
D	'85	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'91	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		100%			00%			00%			+67%							
'91		67%			00%			00%			-70%							
'94		33%			00%			00%			-67%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	100%			
												'91	199		33%			
												'94	60		0%			
												'98	20		0%			
Ceratoides lanata																		
S	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	'85	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'91	3	2	-	-	-	-	-	-	-	5	-	-	-	333		5	
	'94	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	'98	2	3	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	'85	5	7	4	-	-	-	-	-	-	16	-	-	-	1066	4	5	
	'91	6	4	2	-	-	-	-	-	-	12	-	-	-	800	4	5	
	'94	30	23	13	2	-	3	-	-	-	71	-	-	-	1420	2	4	
	'98	23	29	19	1	-	-	-	-	-	72	-	-	-	1440	4	7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		44%			22%			00%			- 6%							
'91		35%			12%			00%			+25%							
'94		30%			21%			00%			+ 1%							
'98		42%			25%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	1199	Dec:	-			
												'91	1133		-			
												'94	1520		-			
												'98	1540		-			

A G R E	Y R	Form Class (No. of 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																	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'85	00%			00%			00%									
	'91	00%			00%			00%									
	'94	00%			00%			00%									
	'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-			
											'91	0		-			
											'94	0		-			
											'98	20		-			
Chrysothamnus viscidiflorus																	
S	85	16	-	-	-	-	-	-	-	-	16	-	-	-	1066		16
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
	98	120	-	-	-	-	-	-	-	-	120	-	-	-	2400		120
Y	85	42	-	-	-	-	-	-	-	-	42	-	-	-	2800		42
	91	86	11	-	-	-	-	-	-	-	96	1	-	-	6466		97
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10
	98	56	-	-	-	-	-	-	-	-	56	-	-	-	1120		56
M	85	44	-	-	-	-	-	-	-	-	44	-	-	-	2933	8 10	44
	91	48	4	4	-	-	-	-	-	-	56	-	-	-	3733	6 9	56
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	98	400	-	-	-	-	-	-	-	-	400	-	-	-	8000	7 12	400
D	85	7	2	-	-	-	-	-	-	-	8	-	-	1	600		9
	91	6	8	-	-	-	-	-	-	-	14	-	-	-	933		14
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	4	-	-	-	-	-	-	-	-	3	-	-	1	80		4
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'85	02%			00%			01%			+43%						
	'91	14%			02%			00%			-98%						
	'94	00%			00%			00%			+98%						
	'98	00%			00%			.21%									
Total Plants/Acre (excluding Dead & Seedlings)											'85	6333	Dec:	9%			
											'91	11132		8%			
											'94	200		0%			
											'98	9200		1%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Chrysothamnus viscidiflorus stenophyllus													
Y	85	-	-	-	-	-	-	-	0	-	0		
	91	-	-	-	-	-	-	-	0	-	0		
	94	52	-	-	-	-	-	-	52	-	52		
	98	-	-	-	-	-	-	-	0	-	0		
M	85	-	-	-	-	-	-	-	0	-	0		
	91	-	-	-	-	-	-	-	0	-	0		
	94	449	-	-	-	-	-	-	447	5	11	449	
	98	-	-	-	-	-	-	-	0	-	-	0	
D	85	-	-	-	-	-	-	-	0	-	0		
	91	-	-	-	-	-	-	-	0	-	0		
	94	20	1	-	-	-	-	-	15	-	6	420	21
	98	-	-	-	-	-	-	-	0	-	-	0	
X	85	-	-	-	-	-	-	-	0	-	0		
	91	-	-	-	-	-	-	-	0	-	0		
	94	-	-	-	-	-	-	-	20	-	1		
	98	-	-	-	-	-	-	-	0	-	0		
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>								
'85		00%	00%	00%									
'91		00%	00%	00%									
'94		.19%	00%	02%									
'98		00%	00%	00%									
Total Plants/Acre (excluding Dead & Seedlings)				'85	0	Dec:	0%						
				'91	0		0%						
				'94	10440		4%						
				'98	0		0%						
Echinocereus spp.													
M	85	-	-	-	-	-	-	-	0	-	0		
	91	-	-	-	-	-	-	-	0	-	0		
	94	-	-	-	-	-	-	-	0	-	0		
	98	3	-	-	-	-	-	-	3	1	2	60	3
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>								
'85		00%	00%	00%									
'91		00%	00%	00%									
'94		00%	00%	00%									
'98		00%	00%	00%									
Total Plants/Acre (excluding Dead & Seedlings)				'85	0	Dec:	-						
				'91	0		-						
				'94	0		-						
				'98	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											
Gutierrezia sarothrae																
S	85	17	-	-	-	-	-	-	17	-	-	-	1133		17	
	91	2	-	-	-	-	-	-	2	-	-	-	133		2	
	94	5	-	-	-	-	-	-	5	-	-	-	100		5	
	98	42	-	-	-	-	-	-	42	-	-	-	840		42	
Y	85	33	-	-	-	-	-	-	33	-	-	-	2200		33	
	91	18	-	-	-	-	-	-	18	-	-	-	1200		18	
	94	97	-	-	-	-	-	-	95	-	-	2	1940		97	
	98	14	-	-	-	-	-	-	14	-	-	-	280		14	
M	85	121	-	-	-	-	-	-	121	-	-	-	8066	7	7	121
	91	33	-	-	-	-	-	-	33	-	-	-	2200	4	4	33
	94	136	1	-	-	-	-	-	137	-	-	-	2740	3	4	137
	98	161	-	-	-	-	-	-	161	-	-	-	3220	7	8	161
D	85	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	11	-	-	1	-	-	-	11	-	-	1	240		12	
	98	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	360		18	
	98	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'85		00%			00%			00%			-67%					
'91		00%			00%			00%			+31%					
'94		.40%			00%			01%			-29%					
'98		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'85	10266	Dec:	0%			
										'91	3400		0%			
										'94	4920		5%			
										'98	3500		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Opuntia spp.													
S	85	-	-	-	-	-	-	-	-	-	0		0
	91	1	-	-	-	-	-	-	-	-	66		1
	94	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	0		0
Y	85	1	-	-	-	-	-	-	-	-	66		1
	91	5	-	-	-	-	-	-	-	-	333		5
	94	-	-	-	-	-	-	-	-	-	0		0
	98	2	-	-	-	-	-	-	-	-	40		2
M	85	4	-	-	-	-	-	-	-	-	266	4 8	4
	91	-	-	-	-	-	-	-	-	-	0	- -	0
	94	-	-	-	-	-	-	-	-	-	0	- -	0
	98	1	-	-	-	-	-	-	-	-	20	2 9	1
D	85	1	-	-	-	-	-	-	-	-	66		1
	91	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'85		00%		00%		00%		-16%					
'91		00%		00%		00%							
'94		00%		00%		00%							
'98		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	398	Dec:	17%
										'91	333		0%
										'94	0		0%
										'98	60		0%
Tetradymia canescens													
M	85	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	0	- -	0
	94	-	-	-	-	-	-	-	-	-	0	- -	0
	98	-	-	2	-	-	-	-	-	-	40	- -	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'85		00%		00%		00%							
'91		00%		00%		00%							
'94		00%		00%		00%							
'98		00%		100%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-
										'91	0		-
										'94	0		-
										'98	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				
Yucca harrimaniae																		
Y	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	5	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	40		-			
												'98	0		-			

Trend Study 25C-6-98

Study site name: Terza Flat .

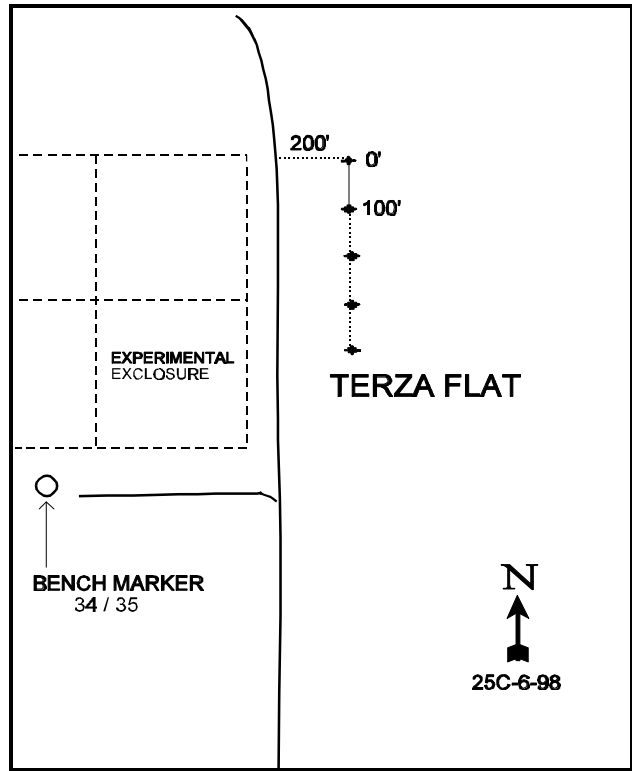
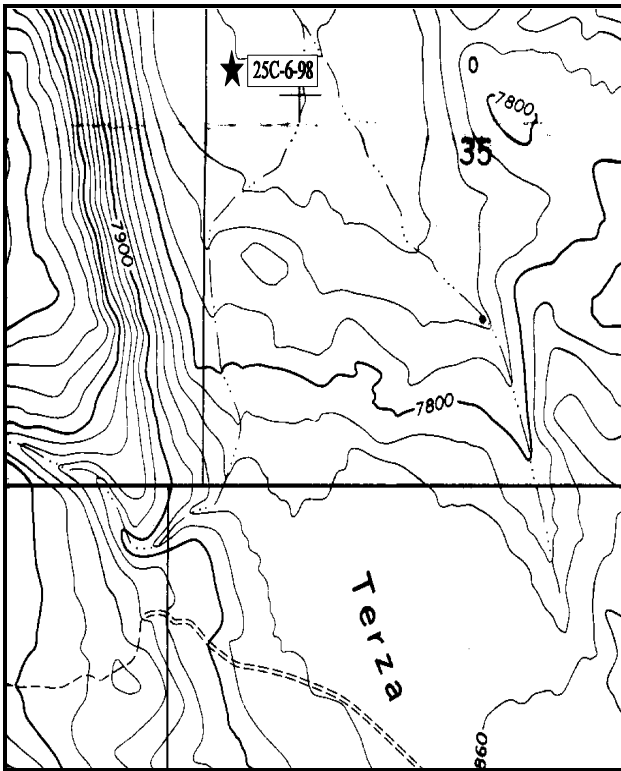
Range type: Snakeweed .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Turn south at the curve in SR24 in the middle of Loa. After 0.85 miles turn west on a gravel road. Continue on this road for 3.3 miles as it turns and heads south past the road to the dump and the road to a TV tower. Turn left at the intersection and go 0.5 miles. Bear left at the fork. Proceed 2.95 miles then turn left. Go 2.2 miles and turn left again. Go 0.475 miles to a section marker post on the east side of the road. Continue 0.875 miles to a BLM experimental enclosure. Drive to the northeast corner of the enclosure. The 0-foot end of the baseline is 200 feet east of the corner in line with the fence. The 0-foot stake is a fencepost with a browse tag #7178 attached. The other stakes are marked by rebar.



Map Name: Moroni Peak, Utah

Diagrammatic Sketch

Township 29S, Range 2E, Section 35

UTM 4242904.180 N, 441560.364 E

DISCUSSION

Trend Study No. 25C-6 (44-6)

The Terza Flat study is on BLM land which was reportedly the most abused site encountered during the 1985 field season. An experimental enclosure located near the transect contains vigorous stands of winterfat and sagebrush where livestock have been excluded. In contrast, Russian thistle, snakeweed, halogeton, and narrowleaf low rabbitbrush are dominant outside the enclosure. Sheep are allowed to graze the allotment each winter, followed by cattle each spring. Antelope are present in the area year-round. Pellet group data from the site in 1998 estimate 56 deer, 9 elk and 3 cow days use/acre. Sheep sign was also noted in small numbers. It was difficult to differentiate between antelope, deer and sheep sign on this site. Deer days use also includes some antelope. Rabbits are also present in high numbers. A colony of Utah prairie dogs was reported to be present 1/4 mile southeast of the Terza Flat study site in 1985.

The soil is moderately deep with an effective rooting depth (see methods) of 14 inches. There may be a hardpan between 12 to 18 inches below the surface. Soil texture is a sandy clay loam with a neutral pH (7.2). Phosphorus may be limiting to plant growth and development at 7.7 ppm, when 10 ppm is considered to be the minimum. There are a few large rocks on the surface, but erosion pavement is abundant and currently ('98) provides 37% cover. Percent bare ground is also high, increasing from 29% in 1985 to 44% in 1998. Although ground cover is highly variable and the soil cover broken, soil movement and erosion is kept to a minimum by the levelness of the terrain. Wind erosion could be a factor when the surface is sufficiently disturbed.

This site is dominated by invaders and increasers. Together, the increaser forbs and shrubs make up 88% of the total vegetative cover in 1994 and 77% in 1998. The dominant browse plants, as determined by the percent total vegetative cover in 1998 are: narrowleaf low rabbitbrush (62%), Wyoming big sagebrush (13%), and black sagebrush (6%). Winterfat is also an important browse species on the site but plants are small, measuring only 3 inches in height. Total cover of winterfat is less than 1/2 of 1%. Judging from scattered stumps found throughout the area, Wyoming big sagebrush was once the dominant species in the area, but has now declined to only 520 plants/acre by 1998 with its present patchy distribution. This patchy distribution has partially contributed to the changes in population between 1991 and 1994 when a larger sample was used to give a better estimate of population density. The Wyoming big sagebrush plants were moderately to heavily hedged in 1991 but more lightly used in 1994 and 1998. The larger sample also picked up some black sagebrush in 1994 and 1998. There were only 360 plants/acre estimated in 1998, but use was heavier on the black sagebrush compared to the Wyoming big sagebrush.

Winterfat appears to have a stable population of around 1,000 plants/acre. Utilization was heavy in 1991 but more moderate in 1994 and 1998. Vigor is normal on most plants and percent decadence currently low at only 1%. Fourwing saltbush appears to be declining. In 1991, 100% of the fourwing were heavily hedged and all were considered decadent. Density declined by 57% from 932 plants/acre to 400 between 1985 and 1991. Density continued to decline by 1994 and 1998 to only 200 and 80 plants/acre respectively. Use was heavy in 1994, although mostly light to moderate in 1998. Winterfat is as dense in the livestock enclosure as rabbitbrush is on the outside. Plants are large and vigorous measuring about 12 inches in height.

Fringed sagebrush increased its density between 1985 and 1991, from 5,933 plants/acre to an incredible 35,799 by 1991. This population then decreased partly due to the larger sample used in 1994 and 1998, to 4,260 and then 1,320 plants/acre.

Narrowleaf low rabbitbrush and broom snakeweed are increasers of little value and both increased substantially in 1991. By 1994, rabbitbrush increased by 300%, while broom snakeweed declined 96%. Density of broom snakeweed continued to decline to only 120 plants/acre by 1998. Rabbitbrush also declined from 12,460 plants/acre to 10,920 by 1998. There may have been some identification problems with these two similar looking species in the past.

Composition of the herbaceous vegetation is extremely poor. Russian thistle and halogeton dominate the site. Halogeton was noted growing only along the road and was not encountered on the frequency belts or the density plots in 1985. By 1994, halogeton had spread throughout the site and had a quadrat frequency of 32%. Nested frequency declined significantly by 1998, but halogeton is still the most numerous herbaceous plant on the site. Locoweed (*Astragalus* spp.) and one low fleabane were the only other perennial forbs found on the transect. Grasses are rare and only two species were encountered in 1998, bottlebrush squirreltail and Indian ricegrass. Grasses provide less than ½ of 1% cover on the site.

1985 APPARENT TREND ASSESSMENT

Although there is a lot of bare soil and pavement exposed, the soil trend is basically stable because of the levelness of the terrain. Vegetative trend is downward. Desirable herbaceous perennials have been almost totally replaced by Russian thistle, an annual. The desirable browse species are being replaced by low-value invaders and increasers. This site should be rested from livestock grazing to allow the vegetative community to heal while there is still seed within the native seed bank for desirable browse species.

1991 TREND ASSESSMENT

The soil trend would have to be considered slightly downward because percent cover for pavement and bare ground have both increased, while litter cover decreased from 35 to only 13%. The more desirable species, Wyoming big sagebrush and winterfat, have contradicting changes in trend. The Wyoming big sagebrush has increased by 39%, up to 3,732 plants per acre, while winterfat has decreased by 36%, now down to only 466 plants per acre. Twenty-nine percent of the winterfat is decadent and is not reproducing. Overall, there was a gain in browse, but low rabbitbrush and broom snakeweed both increased by a remarkably large 62% and 93% respectively. The trend for browse is going down with the large increases for weedy increaser species. There is only one perennial grass, bottlebrush squirreltail, which is quite small and only has a quadrat frequency of 21%. The forbs are mostly weedy invaders. Russian thistle has decreased significantly in nested frequency from 216 down to 41, which would have to be considered an improvement. However, halogeton has invaded the site and now has a nested frequency value of 74. The trend for the herbaceous understory is considered downward.

TREND ASSESSMENT

soil - slightly downward

browse - downward

herbaceous understory - downward

1994 TREND ASSESSMENT

The soil trend now appears to be slightly improving with decreasing values for bare ground and rock cover with a slight increase in litter cover. Density of the key browse, Wyoming big sagebrush, declined from 3,732 plants/acre to 440, while winterfat density increased 58%, from 466 to 1,120 plants/acre. Fourwing saltbush also declined in density from 400 to 200 plants/acre. The larger sample used in 1994 is responsible for most of the changes in density. Shrubs on this site, especially sagebrush, occur in scattered clumps. The new, larger sample better estimates shrub populations which have this type of distribution. With this in mind, the key browse species appear to have stable populations. Wyoming big sagebrush displays lighter use and no decadence. Fourwing and winterfat also show lighter use and improved decadency rates. Increasers, narrowleaf low rabbitbrush and broom snakeweed, appear to have been misidentified during past readings. Combined, these species had a density of 25,264 plants/acre. This high density has declined to 13,760 plants/acre by 1994. These species are widespread over the whole site and density estimates between the old and new, larger sample should be comparable. With all of this in mind, trend for browse is stable. Trend for the herbaceous understory is stable but with continued dominance by weedy species. Grasses are rare and produced less than ½ of 1% cover. Forbs are also lacking and dominated by halogeton and Russian thistle which provide 99% of the forb cover.

TREND ASSESSMENT

soil - slightly improving

browse - stable

herbaceous understory - stable

1998 TREND ASSESSMENT

Trend for soil is down slightly with an increase in percent bare ground and pavement cover combined with a slight decline in litter cover. Erosion is not a problem however, due to the level terrain. Trend for the key browse species, black sagebrush, Wyoming big sagebrush, and winterfat appears stable. Use of these species is moderate, vigor is good and decadence low. Fourwing saltbush does appear to be declining however. One positive trend indicator is the decline in abundance of narrowleaf low rabbitbrush and broom snakeweed. Rabbitbrush still has a high number of seedlings and young however. Trend for the herbaceous understory is stable even with a decline in the sum of nested frequency of forbs. Nested frequency of halogeton and Russian thistle have both declined significantly which is an improvement, but there are no forbs or grasses to replace them.

TREND ASSESSMENT

soil - down slightly

browse - stable

herbaceous understory - stable, but severely depleted

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 6

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'94	'98
G	Oryzopsis hymenoides	-	-	-	2	-	-	-	1	-	.00
G	Sitanion hystrix	_a 17	_b 50	_{ab} 41	_{ab} 36	10	21	18	18	.44	.39
Total Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total Perennial Grasses		17	50	41	38	10	21	18	19	0.43	0.39
F	Astragalus spp.	8	5	4	-	3	2	2	-	.01	-
F	Chenopodium fremontii (a)	-	-	7	-	-	-	4	-	.02	-
F	Descurainia spp. (a)	-	-	-	1	-	-	-	1	-	.01
F	Draba spp. (a)	-	-	4	-	-	-	2	-	.01	-
F	Erigeron pumilus	2	2	-	-	1	1	-	-	-	-
F	Halogeton glomeratus (a)	_a -	_{bc} 74	_c 97	_b 69	-	32	32	20	2.83	1.65
F	Lappula occidentalis (a)	-	-	-	7	-	-	-	3	-	.01
F	Polygonum douglasii (a)	-	-	4	-	-	-	1	-	.00	-
F	Salsola iberica (a)	_c 216	_b 41	_b 55	_a -	76	20	17	-	1.01	-
Total Annual Forbs		216	115	167	77	76	52	56	24	3.87	1.67
Total Perennial Forbs		10	7	4	0	4	3	2	0	0.02	0

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

BROWSE TRENDS --
Herd unit 25C, Study no: 6

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Artemisia frigida	50	27	.56	.78
B	Artemisia nova	7	8	.36	.96
B	Artemisia tridentata wyomingensis	13	15	1.05	2.27
B	Atriplex canescens	9	4	-	-
B	Ceratoides lanata	29	30	.15	.37
B	Chrysothamnus viscidiflorus stenophyllus	77	79	7.21	10.93
B	Gutierrezia sarothrae	25	5	.23	.09
B	Opuntia spp.	0	0	-	-
B	Rosa woodsii	0	0	-	-
Total for Browse		210	168	9.56	15.42

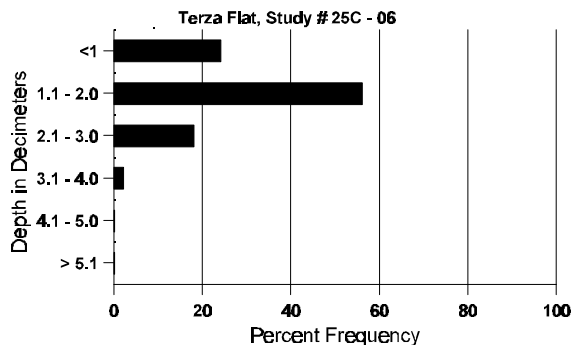
BASIC COVER --
Herd unit 25C, Study no: 6

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'85	'91	'94	'98
Vegetation	233	225	2.50	6.50	13.80	17.43
Rock	277	216	2.50	3.75	6.61	6.38
Pavement	355	365	30.50	38.25	25.40	30.49
Litter	351	351	35.25	13.25	16.29	12.10
Cryptogams	7	31	0	0	.01	.20
Bare Ground	360	349	29.25	38.25	33.95	43.59

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 06, Study Name: Terza Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.7	58.6 (13.0)	7.2	50.0	25.4	24.6	1.4	7.7	128.0	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 6

Type	Quadrat Frequency	
	'04	'08
Rabbit	74	64
Elk	4	6
Deer	15	51
Cattle	-	1
Antelope	5	1

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 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				
Artemisia frigida																		
S	'85	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	'91	14	-	-	2	-	-	2	-	-	18	-	-	-	1200			18
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	212	-	-	-	-	-	-	-	-	212	-	-	-	4240			212
Y	'85	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	'91	115	1	-	30	-	-	6	-	-	152	-	-	-	10133			152
	'94	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	'98	6	4	3	2	-	-	-	-	-	15	-	-	-	300			15
M	'85	80	-	-	-	-	-	-	-	-	80	-	-	-	5333	11	12	80
	'91	236	22	4	101	3	-	15	-	-	381	-	-	-	25400	4	6	381
	'94	146	-	-	3	-	-	-	-	-	149	-	-	-	2980	2	4	149
	'98	36	8	-	5	1	-	-	-	-	50	-	-	-	1000	4	6	50
D	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	1	-	2	1	-	-	-	-	-	3	-	1	-	266			4
	'94	56	-	-	-	-	-	-	-	-	17	-	-	39	1120			56
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	980			49
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			+83%							
'91		05%			01%			.18%			-88%							
'94		00%			00%			18%			-69%							
'98		20%			05%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	5933	Dec:	0%			
												'91	35799		1%			
												'94	4260		26%			
												'98	1320		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 nova																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	23	-	-	-	-	-	-	-	-	23	-	-	-	460	12	21	23
	98	8	7	-	-	-	-	-	-	-	15	-	-	-	300	11	18	15
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%			-22%							
'98		39%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	0		0%			
												'94	460		0%			
												'98	360		6%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total							
		1	2	3	4										
Artemisia tridentata wyomingensis															
S	85	36	-	-	-	-	-	-	36	-	-	-	2400		36
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	85	28	-	-	-	-	-	-	28	-	-	-	1866		28
	91	-	1	1	1	-	-	1	4	-	-	-	266		4
	94	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	3	-	-	-	60		3
M	85	5	-	-	-	-	-	-	5	-	-	-	333	15 17	5
	91	16	24	8	-	-	-	-	47	-	1	-	3200	9 15	48
	94	20	2	-	-	-	-	-	22	-	-	-	440	11 20	22
	98	14	5	-	-	-	-	-	19	-	-	-	380	17 29	19
D	85	1	-	-	-	-	-	-	1	-	-	-	66		1
	91	2	-	-	2	-	-	-	3	-	-	1	266		4
	94	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	4	-	-	-	80		4
X	85	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	160		8
	98	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>					
'85		00%		00%		00%				+39%					
'91		45%		16%		04%				-88%					
'94		09%		00%		00%				+15%					
'98		19%		04%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	2265	Dec:	3%		
										'91	3732		7%		
										'94	440		0%		
										'98	520		15%		

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				
Atriplex canescens																		
Y	'85	1	-	1	-	-	-	-	-	-	2	-	-	-	133			2
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	3	1	-	-	-	-	-	-	-	4	-	-	-	80			4
M	'85	9	2	-	-	-	-	-	-	-	11	-	-	-	733	12	12	11
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	5	1	3	-	-	1	-	-	-	10	-	-	-	200	6	6	10
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	'85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'91	-	-	5	-	-	1	-	-	-	-	-	6	400			6	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		14%			07%			00%			-57%							
'91		00%			100%			100%			-50%							
'94		10%			40%			00%			-60%							
'98		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	932	Dec:	7%				
											'91	400		100%				
											'94	200		0%				
											'98	80		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				
Ceratoides lanata																		
S	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	2	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	'85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	3	1	1	3	-	-	-	-	-	8	-	-	-	160		8	
M	'85	10	-	-	-	-	-	-	-	-	10	-	-	-	666	5	4	10
	'91	1	1	1	-	1	1	-	-	-	5	-	-	-	333	4	4	5
	'94	21	20	-	2	-	-	-	-	-	43	-	-	-	860	4	5	43
	'98	12	30	13	4	1	-	-	-	-	59	-	-	1	1200	3	5	60
D	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	1	1	-	-	1	-	-	1	133		2	
	'94	13	-	-	-	-	-	-	-	-	8	-	-	5	260		13	
	'98	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			-36%							
'91		29%			43%			14%			+58%							
'94		36%			00%			09%			+19%							
'98		48%			20%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	732	Dec:	0%				
											'91	466		29%				
											'94	1120		23%				
											'98	1380		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			
Chrysothamnus viscidiflorus stenophyllus																	
S	85	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	33	-	-	-	-	-	-	-	-	33	-	-	-	660		33
	98	36	-	-	-	-	-	-	-	-	36	-	-	-	720		36
Y	85	15	-	-	-	-	-	-	-	-	15	-	-	-	1000		15
	91	9	8	1	7	-	-	-	-	-	25	-	-	-	1666		25
	94	74	-	-	-	-	-	-	-	-	74	-	-	-	1480		74
	98	137	2	-	1	-	-	-	-	-	140	-	-	-	2800		140
M	85	11	-	-	-	-	-	-	-	-	11	-	-	-	733	7 11	11
	91	27	8	-	1	-	-	1	-	-	37	-	-	-	2466	8 13	37
	94	446	-	-	-	-	-	-	-	-	446	-	-	-	8920	6 14	446
	98	332	2	-	-	-	-	-	-	-	334	-	-	-	6680	8 14	334
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	5	-	1	-	-	1	-	-	-	6	-	-	1	466		7
	94	36	-	-	1	-	-	-	-	-	20	-	-	15	740		37
	98	72	-	-	-	-	-	-	-	-	57	-	7	8	1440		72
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	960		48
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	420		21
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%			+62%						
'91		23%			04%			01%			+59%						
'94		00%			00%			03%			- 2%						
'98		.73%			00%			03%									
Total Plants/Acre (excluding Dead & Seedlings)											'85	1733	Dec:	0%			
											'91	4598		10%			
											'94	11140		7%			
											'98	10920		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												
Gutierrezia sarothrae																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	94	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
	98	29	-	-	-	-	-	-	-	29	-	-	-	580		29	
Y	85	8	-	-	-	-	-	-	-	8	-	-	-	533		8	
	91	60	-	-	12	-	-	-	-	72	-	-	-	4800		72	
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	22	-	-	-	-	-	-	-	22	-	-	-	1466	9 11	22	
	91	347	-	-	28	-	-	8	-	382	-	1	-	25533	7 10	383	
	94	51	-	-	2	-	-	-	-	53	-	-	-	1060	5 6	53	
	98	6	-	-	-	-	-	-	-	6	-	-	-	120	5 6	6	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	5	-	-	-	-	-	-	-	2	-	1	2	333		5	
	94	11	-	-	-	-	-	-	-	6	-	-	5	220		11	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	2020		101	
	98	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		00%		00%		+93%									
'91		00%		00%		.86%		-96%									
'94		00%		00%		08%		-91%									
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	1999	Dec:	0%				
										'91	30666		1%				
										'94	1300		17%				
										'98	120		0%				
Opuntia spp.																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	6 12	0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		00%		00%											
'91		00%		00%		00%											
'94		00%		00%		00%											
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-				
										'91	0		-				
										'94	0		-				
										'98	0		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Rosa woodsii																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	16	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	0		-			

Trend Study 25C-7-98

Study site name: Cedar Grove .

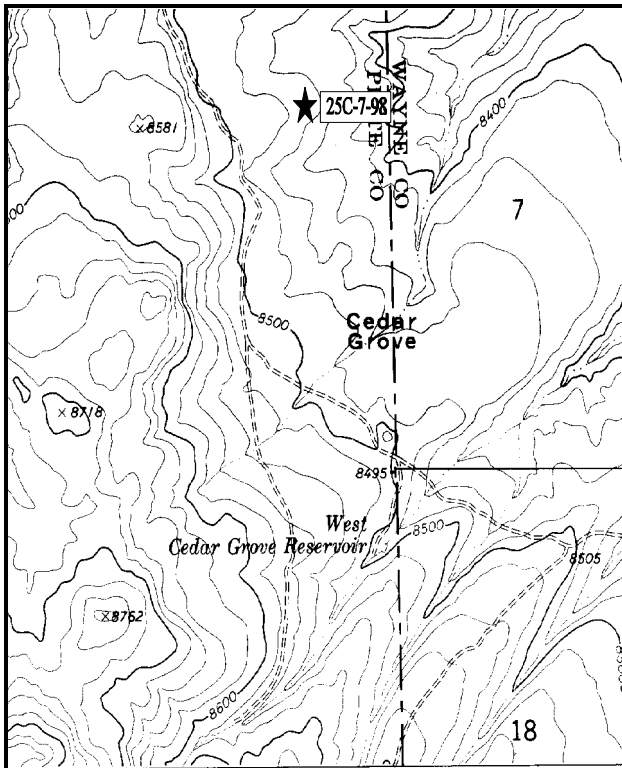
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

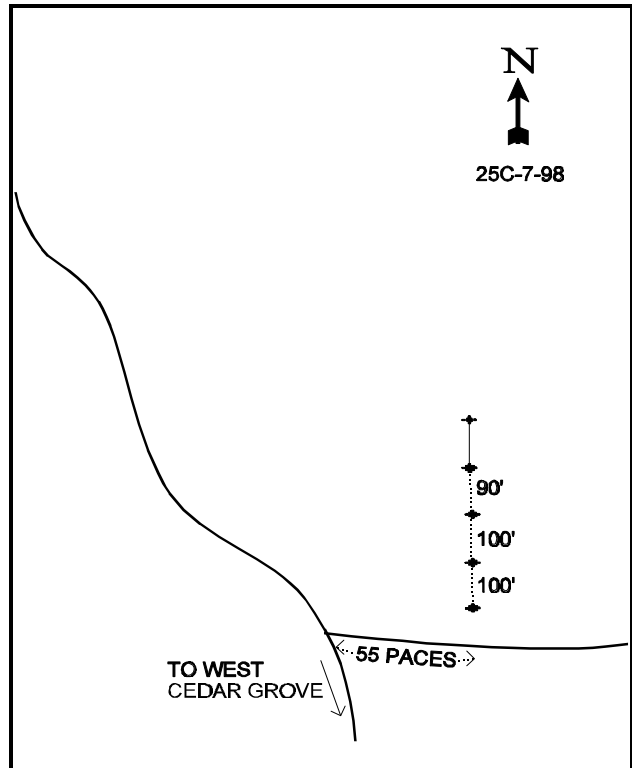
LOCATION DESCRIPTION

Head northwest out of Loa on SR24 for about 11 miles to the summit (marked by a sign, elevation 8410). Turn left on a gravel road (Cedar Grove Road) and go 4.25 miles to a fork (West Cedar Grove Road). Turn left and continue 0.75 miles to a faint road to the left. Turn onto this road and go down 0.05 miles (about 55 paces) to a rebar 50 feet to the north of the road. This rebar is tagged #7179 and marks the 400-foot stake. The other stakes are marked by short (1-foot) rebar. The 0-foot baseline stake is 390 feet true north of the 400-foot stake. The 100-foot stake has a red browse tag #7178 attached.



Map Name: Abes Knoll, Utah

Township 28S , Range 1W , Section 1



Diagrammatic Sketch

UTM 4249579.229 N, 425523.196 E

DISCUSSION

Trend Study No. 25C-7 (51A-7)

The Cedar Grove trend study is located on the east side of Parker Mountain at an elevation of 8,500 feet on a slight northeast facing slope. The range type is sagebrush-grass. The area is good antelope habitat, and is also used by elk and deer in winter. There is little thermal or escape cover in the immediate area, but a stand of junipers 1/3 mile away could provide good cover. The land was managed by the BLM in the past, but is now administered by State Lands and Forestry. Cattle were present in 1985 during study site establishment in September and in mid-June of 1991. Sheep may have grazed through the section during the spring in years past. Pellet group data from the site in 1998 estimate 2 deer, 25 elk and 4 cow days use/acre. A few antelope pellet groups were also encountered. Rabbit sign was very abundant.

The soil is very rocky, both above and below the surface. It is fairly shallow with an estimated effective rooting depth (see methods) of just 8 inches. There is a hardpan at about 7 to 8 inches in depth. This must not be a very restrictive rooting barrier over the whole site due to the presence of mountain big sagebrush mixed in with the black sagebrush. Soil texture is a loam with a slightly acid pH (6.1). Parent material is a basalt which provides 33% cover on the surface. Bare soil is exposed in the shrub interspaces as litter is found only under the vegetation. Wind may be the principle cause of erosion on the site due to the flat terrain and lack of evidence of water movement.

The key and dominant browse plants are black sagebrush and mountain big sagebrush which appear to be hybridizing. The black sagebrush is the most abundant species, numbering 7,066 plants/acre in 1991 and 4,120 by 1998. Some of the difference in density between readings is due to the larger sample used in 1998. The average mature plant currently ('98) measures 12 by 22 inches and is mostly light to moderately hedged. Mountain big sagebrush is about one-half as abundant with a density of 3,065 plants/acre in 1991 and 2,440 by 1998. It has received heavier browsing pressure than the black sage in the past. In 1991, however, 20% of the black sagebrush was heavily hedged while only 17% of the mountain big sagebrush was heavily hedged. During the 1998 reading, mountain big sagebrush was more heavily used. Fifty-nine percent of the mature plants were classified as decadent in 1985, a fairly high proportion. Since then, percent decadency has dropped to 48% in 1991 and 43% by 1998. Percent decadence of black sagebrush has declined from 37% in 1991 to 16% by 1998. Other browse species include: narrowleaf low rabbitbrush, slenderbush eriogonum, broom snakeweed, bitterbrush, snowberry, and gray horsebrush. These are found in small numbers and do not appear to be increasing.

Grasses on the site do not produce much forage, but muttongrass (*Poa fendleriana*) is very common with a quadrat frequency of 82% in 1998. Bottlebrush squirreltail and blue grama are also fairly common and had been grazed by cattle in the past. Forbs are diverse but low in numbers. None are abundant enough to be an important forage source.

1985 APPARENT TREND ASSESSMENT

Soil trend is relatively stable. Vegetative trend appears stable, but there is potential for the range condition to deteriorate unless the reproduction of big sage improves. Grazing should be closely monitored each year and terminated when livestock begin to take significant and excessive amounts of key browse.

1991 TREND ASSESSMENT

Most basic cover parameters are fairly stable, with a slight increase in bare ground and rock cover, and a decrease in vegetative cover. Soil trend here would be stable to slightly declining. The key browse, black sagebrush and Wyoming sagebrush, show increases in population density and in the proportion of heavily hedged plants. Trend for browse would be stable. Trend for herbaceous understory would be slightly upward as 10 of the 20 species indicate upward increases in abundance.

TREND ASSESSMENT

soil - stable to slightly declining

browse - stable

herbaceous understory - stable

1998 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground from 24% to 16%. Rock and pavement cover has also declined from 53% to 33% and litter cover increased slightly. Trend for browse is mixed. Black sagebrush appears to have a stable trend. Density estimates are lower compared to 1991, but some of the difference is due to the larger sample used in 1998. There were only 240 dead plants sampled in 1998 which does not completely account for the nearly 3,000 plants/acre decline in density. Utilization is lighter, vigor improved and percent decadence lower at 16%. Mountain big sagebrush appears to be declining with a 20% decrease since 1991. The number of dead plants (460) appear to support the actual decline in density. Utilization and percent decadence is similar to 1991 levels but vigor is poor on 15% of the population compared to 2% in 1991 and 27% of the decadent plants are classified as dying. Recruitment is poor and not enough to maintain the population. This is probably a marginal site for mountain big sagebrush. Overall, the browse trend is considered slightly down. Trend for the herbaceous understory is down slightly since the sum of nested frequency of perennial grasses and forbs has declined slightly. Nested frequency of blue grama and bottlebrush squirreltail have increased significantly while frequency of mutton bluegrass has remained similar.

TREND ASSESSMENT

soil - up slightly

browse - down slightly

herbaceous understory - down slightly

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
G	Agropyron smithii	-	-	1	-	-	1	.03
G	Agropyron spicatum	_a 2	_b 14	_{ab} 5	1	7	4	.05
G	Bouteloua gracilis	_b 42	_b 41	_a 14	18	20	7	.28
G	Carex spp.	_a -	_a -	_b 31	-	-	12	.18
G	Poa fendleriana	196	213	225	75	80	82	9.03
G	Sitanion hystrix	_b 129	_b 139	_a 47	63	64	20	.44
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		369	407	323	157	171	126	10.02
F	Antennaria rosea	-	-	2	-	-	1	.00
F	Androsace septentrionalis (a)	-	-	57	-	-	23	.39
F	Arabis demissa	_c 83	_b 44	_a 11	39	20	6	.03
F	Astragalus lentiginosus	_b 16	_a -	_a -	8	-	-	-
F	Astragalus spp.	4	8	15	2	5	7	.09
F	Calochortus nuttallii	-	5	-	-	2	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'85	'91	'98	'85	'91	'98	
F	Chaenactis douglasii	-	-	3	-	-	1	.00
F	Cryptantha spp.	_{ab} 10	_b 15	_a 4	7	8	2	.01
F	Cymopterus spp.	-	4	1	-	2	1	.00
F	Erigeron eatonii	_a 17	_b 39	_{ab} 33	11	18	16	.14
F	Erigeron pumilus	18	16	28	9	8	15	.25
F	Hymenoxys richardsonii	_a -	_b 15	_a -	-	6	-	-
F	Lomatium triternatum	_a -	_b 60	_a -	-	29	-	-
F	Lotus utahensis	-	-	1	-	-	1	.00
F	Lygodesmia spinosa	13	22	19	9	12	9	.36
F	Phlox austromontana	_a 4	_a 2	_b 20	2	1	9	.42
F	Phlox longifolia	_c 71	_a 13	_b 50	35	8	22	.16
F	Polygonum douglasii (a)	-	-	1	-	-	1	.00
F	Senecio multilobatus	3	1	3	1	1	3	.01
F	Trifolium spp.	_b 9	_b 9	_a -	4	5	-	.00
Total for Annual Forbs		0	0	58	0	0	24	0.39
Total for Perennial Forbs		248	253	190	127	125	93	1.50

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

BROWSE TRENDS --

Herd unit 25C, Study no: 7

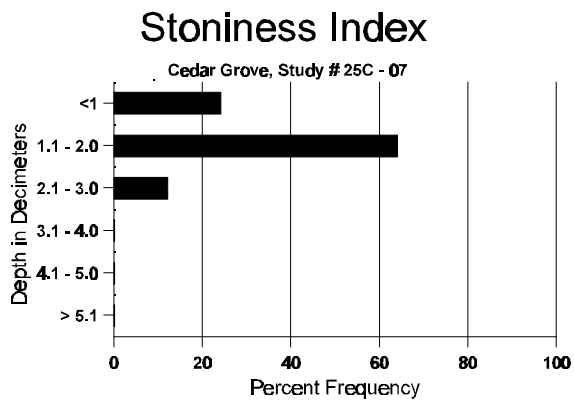
Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	81	7.40
B	Artemisia tridentata vaseyana	73	7.71
B	Artemisia tridentata wyomingensis	0	-
B	Chrysothamnus viscidiflorus stenophyllus	3	-
B	Eriogonum microthecum	8	.01
B	Gutierrezia sarothrae	8	.04
B	Opuntia spp.	0	-
-	Purshia tridentata	0	-
-	Symphoricarpos oreophilus	0	-
-	Tetradymia canescens	1	-
Total for Browse		174	15.17

BASIC COVER --
Herd unit 25C, Study no: 7

Cover Type	Nested Frequency '98	Average Cover %		
		'85	'91	'98
Vegetation	286	8.75	6.25	32.63
Rock	223	16.00	19.50	9.01
Pavement	312	28.50	24.50	24.20
Litter	365	23.75	24.00	27.92
Cryptogams	42	2.75	2.00	.39
Bare Ground	285	20.25	23.75	16.36

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 07, Study Name: Cedar Grove

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
7.9	66.2 (8.8)	6.1	48.0	29.4	22.6	2.4	16.9	195.2	.4



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 7

Type	Quadrat Frequency '98
Rabbit	31
Elk	9
Deer	6
Antelope	1

BROWSE CHARACTERISTICS --

Herd unit 25C, 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	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	91	-	2	-	-	-	-	-	-	-	2	-	-	-	133			2
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	85	15	3	-	-	-	-	-	-	-	18	-	-	-	1200			18
	91	6	8	-	5	-	-	1	-	-	19	1	-	-	1333			20
	98	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
M	85	21	30	3	-	-	-	-	-	-	51	-	3	-	3600	11	13	54
	91	15	20	7	5	-	-	-	-	-	45	2	-	-	3133	12	15	47
	98	115	18	21	8	-	-	-	-	-	161	-	1	-	3240	12	22	162
D	85	3	24	2	-	-	-	-	-	-	22	-	4	3	1933			29
	91	8	17	9	-	-	-	-	-	5	22	-	-	17	2600			39
	98	20	7	3	-	-	-	2	-	-	22	-	-	10	640			32
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	240			12
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		56%			05%			10%			+ 5%							
'91		42%			20%			16%			-42%							
'98		12%			12%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	6733	Dec:	29%			
												'91	7066		37%			
												'98	4120		16%			
Artemisia tridentata vaseyana																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	6	1	-	-	-	-	-	-	-	7	-	-	-	466			7
	98	-	2	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	4	2	2	3	-	-	-	-	-	11	-	-	-	733			11
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	4	7	2	-	-	-	-	-	-	12	1	-	-	866	18	25	13
	98	24	30	14	-	-	-	-	-	-	65	1	2	-	1360	17	26	68
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	10	6	4	2	-	-	-	-	-	21	-	-	1	1466			22
	98	26	15	10	-	-	1	-	-	-	36	-	2	14	1040			52
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	460			23
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		33%			17%			02%			-20%							
'98		37%			20%			15%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	3065		48%			
												'98	2440		43%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4		1	2				
<i>Artemisia tridentata wyomingensis</i>												
S	85	3	-	-	-	-	-	-	3	200		3
	91	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	0		0
Y	85	4	-	-	-	-	-	-	2	2	266	4
	91	-	-	-	-	-	-	-	-	-	0	0
	98	-	-	-	-	-	-	-	-	-	0	0
M	85	1	9	1	-	-	-	-	9	2	733	17 19
	91	-	-	-	-	-	-	-	-	-	0	- -
	98	-	-	-	-	-	-	-	-	-	0	- -
D	85	-	17	5	-	-	-	-	14	7	1466	
	91	-	-	-	-	-	-	-	-	-	0	0
	98	-	-	-	-	-	-	-	-	-	0	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		70%		16%		32%						
'91		00%		00%		00%						
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'85	2465	Dec:	59%		
							'91	0		0%		
							'98	0		0%		
<i>Chrysothamnus viscidiflorus stenophyllus</i>												
Y	85	3	-	-	-	-	-	-	3	-	200	3
	91	1	-	-	-	-	-	-	1	-	66	1
	98	-	-	-	-	-	-	-	-	-	0	0
M	85	-	-	-	-	-	-	-	-	-	0	- -
	91	1	-	-	-	-	-	-	1	-	66	4 4
	98	3	-	-	-	-	-	-	3	-	60	8 9
D	85	-	-	-	-	-	-	-	-	-	0	0
	91	1	-	-	-	-	-	-	1	-	66	1
	98	-	-	-	-	-	-	-	-	-	0	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'85		00%		00%		00%		- 1%				
'91		00%		00%		00%		-70%				
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'85	200	Dec:	0%		
							'91	198		33%		
							'98	60		0%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
<i>Eriogonum microthecum</i>																	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	-	-	1	-	-	-	-	-	1	-	-	-	66	4	3	1
	91	-	2	-	-	-	-	-	-	2	-	-	-	133	1	3	2
	98	6	-	-	5	-	-	-	-	11	-	-	-	220	6	8	11
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		100%		00%		+50%									
'91		100%		00%		00%		+49%									
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	66	Dec:	-				
										'91	133		-				
										'98	260		-				
<i>Gutierrezia sarothrae</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	2	-	-	-	-	-	-	-	2	-	-	-	133	6	3	2
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	11	-	-	-	-	-	-	-	11	-	-	-	220	9	8	11
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		00%		00%		+ 0%									
'91		00%		00%		00%		+40%									
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	133	Dec:	-				
										'91	133		-				
										'98	220		-				
<i>Opuntia spp.</i>																	
M	85	1	-	-	-	-	-	-	-	1	-	-	-	66	2	2	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'85		00%		00%		00%											
'91		00%		00%		00%											
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'85	66	Dec:	-				
										'91	0		-				
										'98	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>Purshia tridentata</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	30	89	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	0		-			
<i>Symphoricarpos oreophilus</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	49	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'98	0		-			
<i>Tetradymia canescens</i>																		
M	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	3	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20	4	5	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'98		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-			
												'91	0		-			
												'98	20		-			

Trend Study 25C-8-98

Study site name: South Narrows .

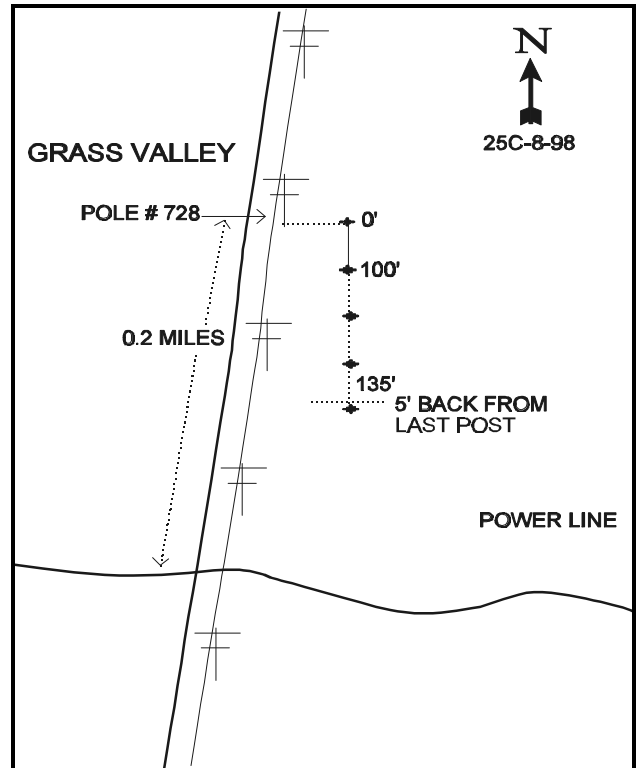
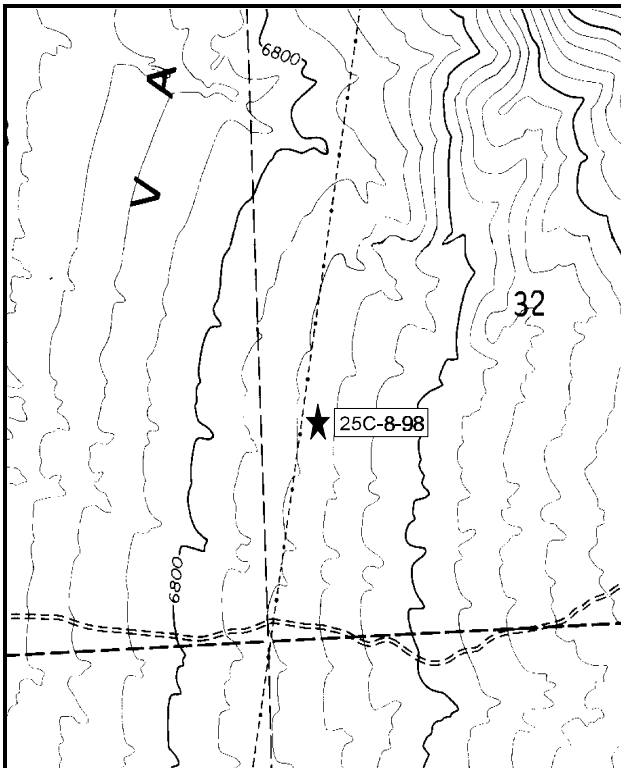
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

Proceed south of Koosharem on SR62. Turn left (east) 0.5 miles south of mile marker 24. Go northeast 0.7 miles and turn right. Go east 0.1 miles to another fork and turn right. Go 0.45 miles and turn left just across the creek (Otter Creek). Go 0.8 miles east and turn left. Drive parallel to the powerline (north) for 0.2 miles to pole #728. The frequency baseline begins 100 feet east of this powerpole. The 0-foot baseline stake is tagged #7120. All stakes are rebar.



Map Name: Parker Knoll, Utah

Diagrammatic Sketch

Township 28S, Range 1W, Section 32

UTM 4242346.610 N, 418232.148 E

DISCUSSION

Trend Study No. 25C-8 (44-8)

The South Narrows trend study is located west of Parker Mountain in Grass Valley at an elevation of 6,900 feet. The foothills slope gently west-southwest toward Otter Creek Reservoir about one-half mile away. The range type is Wyoming big sagebrush-grass in association with scattered pinyon-juniper. Mule deer and elk use the area for winter range. The level of browsing and number of pellet groups indicate a moderate level of use with 13 deer and 14 elk days use/acre in 1991. Pellet group data from 1998 estimate a higher level of deer use at 30 days use/acre, but elk use is similar to 1991 at 16. Security and thermal cover is lacking except for a few pinyon-junipers along the washes. Livestock have grazed here heavily in the past, yet current levels are estimated at only 3 cow days use/acre.

Soil is very rocky and relatively shallow with an effective rooting depth (see methods) estimated at almost 9 inches. Parent material is a basalt and the dark colored rocks and pavement are common on the surface providing 41% cover in 1998. Rock, ranging in size from small gravel to large boulders, is found throughout the soil profile. Stoniness index data show rock to be concentrated from the surface down to about 4 inches. Due to the high rock content, average soil temperature is high at nearly 70°F. Soil texture is a sandy loam with a slightly acid pH (6.3). Litter cover is clustered under the sagebrush and had been decreasing with the extended drought, down to 16% as of 1994. By 1998, percent litter cover has rebounded to 27%. There is some evidence of soil movement, although erosion is not severe on the site. Two washes run through the transect area which channel water into Otter Creek during heavy runoff events.

The key species is Wyoming big sagebrush, which provides 99% of the browse cover on the site. Density has ranged between 3,665 plants/acre in 1985 to a high of 4,932 in 1991. Currently ('98), there are an estimated 3,900 plants/acre. Utilization has been moderate to heavy over the years with the heaviest use reported in 1985. Percent decadence has remained fairly steady averaging 35% since 1991. Plants displaying poor vigor was high at 20% in 1991, but this number has declined to 14% by 1998. The number of young plants peaked in 1991 at 1,133 plants/acre, although they have dropped to only 160 by 1994. Currently, reproduction appears adequate to maintain the current population.

As with the browse, species diversity of herbaceous plants is low. Grasses and forbs have been depleted by overgrazing, but it appears that some of the grasses are starting to recover. The most common species are blue grama and needle-and-thread grass which currently provide 96% of the grass cover. Forbs will be very slow to recover, as there were none found on the site in 1985 or 1991. Three perennial and 4 annuals were found in 1994, however these combined to produce less than ½ of 1% cover.

1985 APPARENT TREND ASSESSMENT

Soil trend is stable. Vegetative trend is also stable, but could be improving under reduced livestock grazing. An increase in grass density, especially needle-and-thread and Indian ricegrass, is desirable to improve early spring forage, but the rockiness of the soil may be limiting to the site potential.

1991 TREND ASSESSMENT

Soil trend would be slightly down, regardless of the changes in the rock and pavement values which negate one another. There were substantial losses in litter cover and increases in percent bare ground. There are not many browse species on this site, but the key species, Wyoming big sagebrush, has increased its density by 26% with a slight increase in rate of decadency. This would be expected with the extended drought. The browse trend would be slightly improving. The herbaceous understory is improving slightly with respect to their quadrat frequencies. One problem on this site is that there are no forb species.

TREND ASSESSMENT

soil - slightly down

browse - slightly upward

herbaceous understory - slightly upward, but there are no forbs in the species composition

1994 TREND ASSESSMENT

The soil trend would be considered stable since the percent of rock-pavement cover has decreased and percent bare ground has also decreased from 23% to 16%. Litter cover has continued to decline, but is expected to continue with the prolonged drought continuing. The browse trend is regarded as stable even with the slight decrease in the Wyoming big sagebrush population. This is thought to mostly be an effect of the larger sample size giving a better estimate of the population. Percent decadence from 1991 has improved slightly. Trend for the herbaceous understory is up slightly. Sum of nested frequency of grasses continues to increase. Some forbs were picked up this year but they are still lacking with a cover value of less than 1%.

TREND ASSESSMENT

soil - stable, but still poor condition

browse - stable

herbaceous understory - slightly improving, but still in poor condition, especially for the forbs

1998 TREND ASSESSMENT

Trend for soil appears stable with an increase in litter cover and a slight increase in percent bare ground. Trend for the key Wyoming big sagebrush is slightly down with a lower density, percent decadence still above 30%, and the percentage of decadent plants classified as dying increasing to 44%. Reproduction has improved. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses has increased slightly while frequency of forbs has declined. Most of the drop in frequency of forbs is the result of a lack of annual forbs in 1998 compared to 1994.

TREND ASSESSMENT

soil - stable

browse - slightly down

herbaceous understory - stable, but still lacking forbs

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 8

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'04	'08
G	<i>Bouteloua gracilis</i>	284	296	289	274	92	96	92	90	12.30	9.30
G	<i>Bromus tectorum</i> (a)	-	-	_a 1	_b 14	-	-	1	6	.00	.06
G	<i>Oryzopsis hymenoides</i>	_a 6	_{ab} 16	_c 49	_{bc} 24	3	7	21	14	1.80	.36
G	<i>Sitanion hystrix</i>	43	52	58	58	21	27	28	28	.88	.36
G	<i>Sporobolus cryptandrus</i>	-	-	8	3	-	-	5	1	.10	.03
G	<i>Stipa comata</i>	_a 75	_a 95	_a 102	_b 165	35	40	41	63	2.96	3.48
Total Annual Grasses		0	0	1	14	0	0	1	6	0	0.06
Total Perennial Grasses		408	459	507	538	151	170	188	202	18.05	13.61
F	<i>Astragalus</i> spp.	-	-	6	3	-	-	3	3	.04	.04
F	<i>Descurainia pinnata</i> (a)	-	-	_b 20	_a 2	-	-	10	1	.05	.00

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'04	'08
F	Draba spp. (a)	-	-	12	8	-	-	6	3	.03	.01
F	Erigeron pumilus	-	-	10	9	-	-	5	3	.07	.06
F	Lappula occidentalis (a)	-	-	_b 62	_a 3	-	-	31	2	.15	.01
F	Lepidium spp. (a)	-	-	20	-	-	-	10	-	.05	-
F	Phlox longifolia	-	-	3	-	-	-	1	-	.00	-
Total Annual Forbs		0	0	114	13	0	0	57	6	0.28	0.06
Total Perennial Forbs		0	0	19	12	0	0	9	6	0.12	0.07

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

BROWSE TRENDS --

Herd unit 25C, Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Artemisia tridentata wyomingensis	88	84	11.14	10.00
B	Ceratoides lanata	0	1	-	-
B	Chrysothamnus nauseosus	0	1	-	-
B	Echinocereus spp.	0	6	.00	.07
B	Gutierrezia sarothrae	0	0	-	-
B	Juniperus osteosperma	0	1	.15	.03
B	Opuntia spp.	3	5	.00	.00
B	Pinus edulis	0	0	-	-
B	Tetradymia canescens	0	0	-	-
Total for Browse		91	98	11.30	10.10

BASIC COVER --

Herd unit 25C, Study no: 8

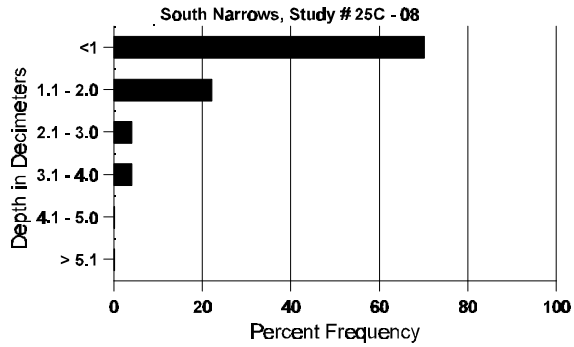
Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'85	'91	'94	'98
Vegetation	336	335	11.00	13.25	27.00	27.67
Rock	334	318	17.50	25.50	25.76	25.90
Pavement	262	286	20.75	15.25	3.57	15.20
Litter	371	376	34.50	22.50	17.28	26.57
Cryptogams	52	87	2.25	.75	.33	.92
Bare Ground	330	314	14.00	22.75	16.27	20.51

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 08, Study Name: South Narrows

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.5	69.6 (9.2)	6.3	54.0	31.4	14.6	1.5	13.5	105.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 8

Type	Quadrat Frequency	
	04	08
Rabbit	17	18
Elk	7	11
Deer	24	37
Cattle	3	1

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 8

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata wyomingensis																		
S	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	4	1	-	-	-	-	-	-	-	5	-	-	-	333		5	
	91	9	6	1	-	-	-	1	-	-	14	3	-	-	1133		17	
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	98	15	8	1	1	2	-	-	-	-	27	-	-	-	540		27	
M	85	3	30	4	-	-	-	-	-	-	36	-	1	-	2466	12 19	37	
	91	9	11	5	1	2	-	-	-	-	28	-	-	-	1866	15 21	28	
	94	82	48	2	1	-	-	-	-	-	127	-	5	1	2660	17 29	133	
	98	46	41	11	6	1	-	-	-	-	103	2	-	-	2100	18 30	105	
D	85	-	6	7	-	-	-	-	-	-	11	-	1	1	866		13	
	91	6	9	1	6	7	-	-	-	-	14	-	-	15	1933		29	
	94	49	25	2	-	-	-	-	-	-	45	-	4	27	1520		76	
	98	33	22	7	-	1	-	-	-	-	35	-	-	28	1260		63	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	880		44	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	840		42	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		67%			20%			05%			+26%							
'91		47%			09%			20%			-12%							
'94		34%			02%			17%			-10%							
'98		38%			10%			14%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	3665	Dec:	24%				
											'91	4932		39%				
											'94	4340		35%				
											'98	3900		32%				
Ceratoides lanata																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9 6	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-				
											'91	0		-				
											'94	0		-				
											'98	20		-				

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus nauseosus</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		100%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'94	0		-		
												'98	20		-		
<i>Echinocereus spp.</i>																	
S	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	4	-	-	1	-	-	-	-	-	5	-	-	-	100	1	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'94	0		-		
												'98	140		-		
<i>Gutierrezia sarothrae</i>																	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	7	11	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-		
												'91	0		-		
												'94	0		-		
												'98	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				
Juniperus osteosperma																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	20		-			
Opuntia spp.																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200	2	2	3
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	2	4	1
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	2	3	3
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	6	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%			- 1%							
'91		00%			00%			00%			-70%							
'94		00%			00%			00%			+40%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	200	Dec:	-			
												'91	199		-			
												'94	60		-			
												'98	100		-			
Pinus edulis																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	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									
Tetradymia canescens														
M	'85	8	-	-	-	-	-	-	8	8	533	9	4	8
	'91	1	2	1	-	-	-	1	-	5	333	6	4	5
	'94	-	-	-	-	-	-	-	-	0	0	-	-	0
	'98	-	-	-	-	-	-	-	-	0	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
	'85	00%		00%		00%		-38%						
	'91	40%		20%		00%								
	'94	00%		00%		00%								
	'98	00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'85	533	Dec:	-	
										'91	333		-	
										'94	0		-	
										'98	0		-	

Trend Study 25C-9-98

Study site name: Dry Wash .

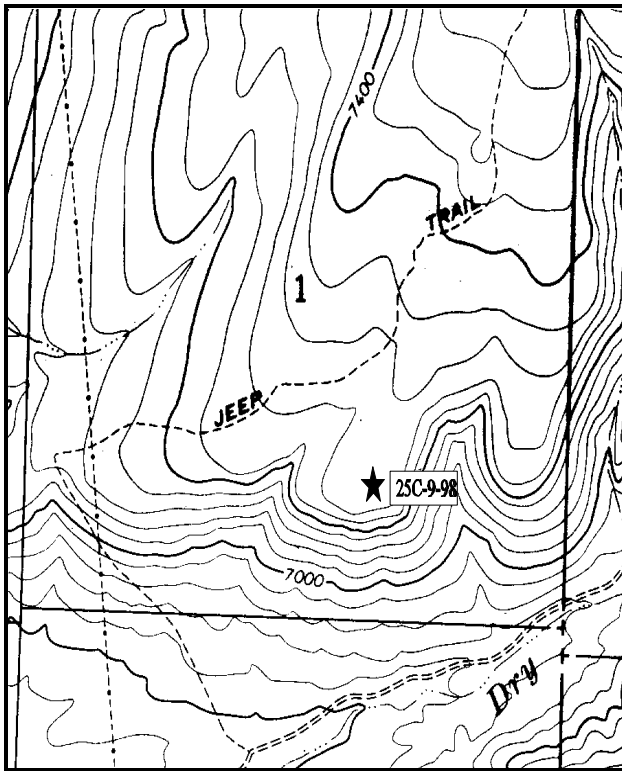
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (95ft), line 2 (11ft), line 3 (34ft), line 4 (71ft), line 5 (59ft).

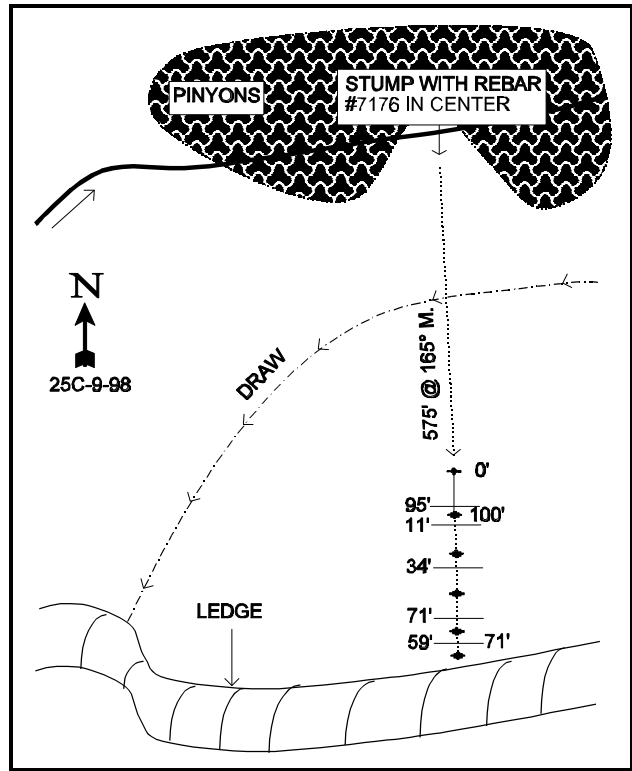
LOCATION DESCRIPTION

From the town of Antimony, go east on the dump road (off Main between the Antimony school and Antimony mercantile) 2.5 miles up Dry Wash Canyon then turn left. Go up the hill 0.625 miles to the top of the ridge and turn right. Go 0.575 miles to a small stump on the right side with tagged rebar #7176 on it. The baseline stake is 688 feet away at 165° magnetic. Measure with a tape to make it easier to find the short rebar that marks the baseline. The 0-foot baseline stake is tagged #7177. The 100-foot end of the baseline is marked by a rebar that is actually 101 feet away because of rocks.



Map Name: Angle, Utah

Township 31S, Range 2W, Section 1



Diagrammatic Sketch

UTM 4221048.114 N, 416184.701 E

DISCUSSION

Trend Study No. 25C-9 (44-9)

The Dry Wash trend study is located on a rocky knoll east of the town of Antimony with an elevation of 7,300 feet. The transect runs up a 20% north facing slope which drops off at a steep, boulder-strewn cliff. The range type is Wyoming big sagebrush-black sagebrush-grass. Nearby areas are dominated by increaser species rabbitbrush, broom snakeweed, and pinyon-juniper. Grazing pressure from livestock has been very heavy on this BLM administered land in the past. There is also considerable use from deer, with an estimated 22 deer days use/acre in 1991. Elk use was lower with only 5 elk days use/acre. Pellet group data from 1998 estimate a higher amount of big game use at 40 deer and 54 elk days use/acre. Cow use was estimated at only 4 days use/acre.

The site is very rocky and the soil appears moderately shallow with an effective rooting depth (see methods) of 12 inches. Soil texture is a sandy loam with a slightly acid pH (6.3). Parent material is a basalt and these dark colored rocks cover half of the soil surface. Rocks are also common within the profile. Due to the high amounts of rock on the surface and within the profile, average soil temperature is fairly high at 70.8°F at a depth of almost 14 inches. This condition can inhibit shrub seedling survival over the dry summer months. Erosion is slight with low amounts of bare ground. There are no active gullies on the site.

The dominant species is Wyoming big sagebrush which provides 31% of the shrub cover. There is also some black sagebrush on the site and hybridizing between the two species is taking place. It appears that 43% of the sagebrush on the site were classified as black sagebrush in 1994, but only a few mature plants were called black sagebrush in 1998. There was a problem identifying these two species in 1998. Combined density of sagebrush was estimated at 6,598 plants/acre in 1985 steadily declining to 2,660 by 1998. The number of mature plants has remained moderately stable over the years, but the number of young and decadent plants have declined. Utilization was moderate to heavy in 1985 and 1991, although more light to moderate in 1994 and 1998. The proportion of plants displaying poor vigor has remained at similar low numbers since 1985. Percent decadence has also remained similar at around 15% with the exception of a peak of 31% in 1991.

Other important browse species found on the site include winterfat and fourwing saltbush. Currently ('98), winterfat accounts for 28% of the browse cover. Individual plants are small, currently averaging only 4 inches in height. It appears that much of the annual growth is taken each year. Population density has remained fairly stable since 1985. Utilization was heavy in 1985, moderate in 1991 and 1994, and moderate to heavy in 1998. Vigor has remained good and no decadent plants have been found since 1985. Fourwing saltbush has showed continued heavy use, yet the small population shows mostly normal vigor and low decadence.

The site also supports fairly large, but stable populations of broom snakeweed and narrowleaf low rabbitbrush. Pinyon and juniper trees are found scattered on the site at an estimated density of 33 pinyon and 18 juniper trees/acre with an average trunk diameter of 3.5 inches for both species.

The herbaceous understory is not very productive. Grasses combined to produce only 6% cover in 1994 and 8% in 1998. The most common grasses are blue grama and needle-and-thread grass. Indian ricegrass is also fairly abundant. Cheatgrass, an undesirable annual, was found in small numbers in 1994. It has since increased nearly 10 fold in nested frequency by 1998. However, it currently provides only 1.2% cover, although it will likely increase unless there is significant competition from perennial grasses. Forbs are lacking and produced less than ½ of 1% cover in 1994 and 1998.

1985 APPARENT TREND ASSESSMENT

The soil trend appears stable. An increase in vegetative cover, especially growing between and around rocks is desirable, but difficult to establish unless the site is rested. The key species, Wyoming big sagebrush, has a

stable population and appears able to sustain it's current level of utilization. The winterfat is also a very important species here, but the heavy hedging and resulting poor vigor may reduce it's ability to maintain itself in the stand. A reduction in grazing and rest every third year should increase production of the winterfat and fourwing saltbush, as well as benefit the entire vegetative community.

1991 TREND ASSESSMENT

It appears that percent bare ground has decreased since 1985, but percent rock is increasing. Other soil parameters are nearly what they were before so the trend is considered stable, but still in poor condition. The Wyoming big sagebrush population has declined by 18%, fourwing saltbush has declined by 34%, winterfat has declined by 33%, all indicating a downward trend for browse. Broom snakeweed has decreased by a remarkable 94%, which is the only decrease that would be welcome on this site. Low rabbitbrush was the only browse species that increased in density since 1985 (42%). Overall trend for browse is considered down. There are 10 herbaceous understory species, and only 3 species showed any increase. The trend here is also downward.

TREND ASSESSMENT

soil - stable, but poor condition

browse - downward, density decreased for all key shrubs

herbaceous understory - downward

1994 TREND ASSESSMENT

Trend for soil is still stable, but in poor condition. Percent bare ground is consistent with what it was in 1985. Litter cover has continued to slowly decrease through time, but this is more reflective of the extended drought we are in. The browse trend is mixed with broom snakeweed having an overall declining trend from 1985 and narrowleaf low rabbitbrush having remained fairly steady since 1991. Winterfat has had an interesting up and down change in it's density since 1985. Overall, it has increased by 8% since 1985. The two key species with the highest relative vegetative cover values are Wyoming big sagebrush and black sagebrush. Black sagebrush was not identified in earlier readings, but combined with Wyoming big sagebrush, it's population is now estimated at 1,920 plants/acre which are in fairly good condition. Wyoming big sagebrush shows a decrease in it's density which can be attributed to almost 2,000 plants/acre being now classified as black sagebrush. Percent decadence has decreased down to only 12% and the percentage of plants being moderately to heavily hedged has also decreased to only 2%. With the losses, trend for browse would be considered slightly down. The herbaceous understory trend is slightly up, considering the increase in sum of nested frequency for the grasses and forbs.

TREND ASSESSMENT

soil - stable, but poor condition

browse - slightly down

herbaceous understory - up

1998 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in bare ground and pavement cover combined with the continued decline in litter cover. The browse trend appears stable for the key species, Wyoming big sagebrush/black sagebrush and winterfat, but the decline in density would suggest a slightly downward trend. Density of black sagebrush and Wyoming big sagebrush combined has declined from 4,440 plants/acre in 1994 to 2,660 by 1998. Utilization is mostly light to moderate but heavier than 1994 estimates. Percent decadence is still low at only 15%, however 63% of those decadent plants were classified as dying. Recruitment is fairly good, with enough young plants present to replace many of the decadent/dying individuals. Winterfat density has declined 26% from the extremely high number of 18,600 estimated in

1994. Utilization is heavier but vigor is good and there are no decadent plants. In addition, reproduction is good with 33% of the population consisting of young plants. Fourwing saltbush also shows heavier use compared to 1994 estimates and a slight decline in density. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has remained similar to 1994 estimates while nested frequency of forbs has declined due to a reduction in the number of annual forbs found on the site. One negative factor is the significant 10 fold increase in frequency of cheatgrass. It still only produces just over 1% cover, however a continued increase would be detrimental.

TREND ASSESSMENT

soil - down slightly

browse - slightly declining in density for key species

herbaceous understory - stable, but forbs are lacking

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 9

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'91	'94	'98	'85	'91	'94	'98	'04	'08
G	<i>Bouteloua gracilis</i>	_a 66	_a 54	_b 100	_a 53	25	26	37	23	3.13	2.19
G	<i>Bromus tectorum</i> (a)	-	-	_a 16	_b 154	-	-	8	52	.06	1.20
G	<i>Oryzopsis hymenoides</i>	116	98	109	99	54	45	50	40	1.21	1.02
G	<i>Sitanion hystrix</i>	76	74	79	95	36	35	36	43	.85	1.06
G	<i>Sporobolus cryptandrus</i>	_b 31	_a 12	_a 3	_a 5	16	8	1	3	.03	.18
G	<i>Stipa comata</i>	_b 100	_a 59	_{ab} 75	_b 97	45	29	33	40	.85	2.24
Total Annual Grasses		0	0	16	154	0	0	8	52	0.06	1.20
Total Perennial Grasses		389	297	382	503	176	143	165	201	6.15	7.92
F	<i>Arabis demissa</i>	3	-	-	-	1	-	-	-	-	-
F	<i>Astragalus</i> spp.	-	1	3	4	-	1	1	2	.03	.01
F	<i>Castilleja</i> spp.	-	-	-	1	-	-	-	1	-	.00
F	<i>Chenopodium album</i> (a)	-	58	20	-	-	29	6	-	.08	-
F	<i>Cryptantha</i> spp.	-	-	4	5	-	-	2	4	.01	.02
F	<i>Descurainia pinnata</i> (a)	-	-	82	-	-	-	35	-	.17	-
F	<i>Erigeron pumilus</i>	9	2	12	17	4	1	5	6	.05	.06
F	<i>Lappula occidentalis</i> (a)	-	-	_b 61	_a 15	-	-	23	7	.11	.03
F	<i>Salsola iberica</i> (a)	_a 3	_b 59	_a -	_a -	2	32	-	-	-	-
Total Annual Forbs		3	117	163	15	2	61	64	7	0.36	0.03
Total Perennial Forbs		12	3	19	27	5	2	8	13	0.09	0.10

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

BROWSE TRENDS --
Herd unit 25C, Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Artemisia nova	33	2	3.70	.03
B	Artemisia tridentata wyomingensis	47	57	4.55	5.21
B	Atriplex canescens	15	12	2.01	.98
B	Ceratoides lanata	53	56	2.40	4.69
B	Chrysothamnus nauseosus	0	1	-	-
B	Chrysothamnus viscidiflorus stenophyllus	24	34	1.63	2.69
B	Echinocereus spp.	0	1	-	.03
B	Gutierrezia sarothrae	33	38	.51	.97
B	Juniperus osteosperma	0	0	-	.15
B	Opuntia spp.	3	2	-	-
B	Pinus edulis	0	1	1.00	2.11
Total for Browse		208	204	15.82	16.88

CANOPY COVER --
Herd unit 25C, Study no: 9

Species	Percent Cover '08
Pinus edulis	5

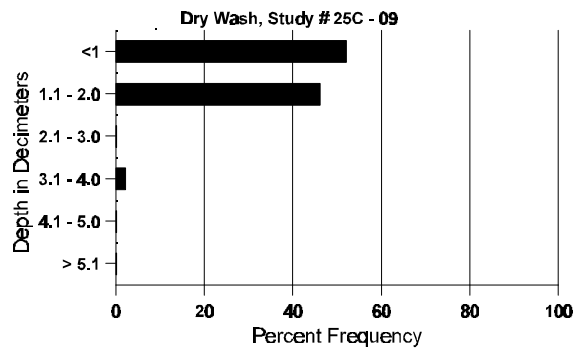
BASIC COVER --
Herd unit 25C, Study no: 9

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'85	'91	'94	'98
Vegetation	313	322	4.00	4.50	23.49	25.56
Rock	338	326	24.75	36.75	29.15	29.29
Pavement	310	296	24.75	20.75	11.21	20.95
Litter	367	366	34.50	30.50	27.61	23.70
Cryptogams	1	-	.75	0	.00	0
Bare Ground	272	273	11.25	7.50	11.68	17.37

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 09, Study Name: Dry Wash

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.9	70.8 (13.7)	7.2	48.0	29.4	22.6	3.5	9.7	179.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 9

Type	Quadrat Frequency	
	04	08
Rabbit	33	38
Horse	-	1
Elk	30	37
Deer	33	37
Cattle	-	4

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 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				
Artemisia nova																		
S	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	2	-	-	-	-	-	-	-	-	1	-	1	-	40		2	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	6	-	-	4	-	-	-	-	-	10	-	-	-	200		10	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'94	45	12	17	-	-	-	-	-	-	74	-	-	-	1480	13	23	
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	8	15	
D	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	4	2	6	-	-	-	-	-	-	2	-	-	10	240		12	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	340		17	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		15%			24%			10%			-98%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'91	0		0%			
												'94	1920		13%			
												'98	40		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total									
		1	2	3	4												
Artemisia tridentata wyomingensis																	
S	85	82	1	2	-	-	-	-	-	85	-	-	-	5666		85	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	10	-	-	-	-	-	-	-	10	-	-	-	200		10	
	98	12	-	-	-	-	-	-	-	12	-	-	-	240		12	
Y	85	28	21	6	-	-	-	-	-	53	-	2	-	3666		55	
	91	11	9	2	1	-	-	1	-	24	-	-	-	1600		24	
	94	41	3	-	-	-	-	-	-	44	-	-	-	880		44	
	98	32	1	-	2	-	-	-	-	35	-	-	-	700		35	
M	85	5	15	8	-	-	-	-	-	26	-	2	-	1866	14	18	28
	91	5	15	3	5	4	-	-	-	32	-	-	-	2133	13	20	32
	94	63	4	-	-	-	-	-	-	67	-	-	-	1340	18	31	67
	98	42	35	-	-	-	-	-	-	77	-	-	-	1540	15	23	77
D	85	1	10	5	-	-	-	-	-	12	-	3	1	1066		16	
	91	1	6	7	6	5	-	-	-	18	-	2	5	1666		25	
	94	11	1	2	1	-	-	-	-	9	-	-	6	300		15	
	98	12	6	1	-	-	-	-	-	7	-	-	12	380		19	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	420		21	
	98	-	-	-	-	-	-	-	-	-	-	-	-	440		22	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'85		46%			19%			08%			-18%						
'91		48%			15%			09%			-53%						
'94		06%			02%			05%			+ 4%						
'98		32%			.76%			09%									
Total Plants/Acre (excluding Dead & Seedlings)										'85	6598	Dec:	16%				
										'91	5399		31%				
										'94	2520		12%				
										'98	2620		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		1	2								
Atriplex canescens																
Y	'85	-	-	-	-	-	-	-	0		0					
	'91	-	-	1	-	-	-	-	66		1					
	'94	2	-	-	-	-	-	-	40		2					
	'98	2	1	-	-	-	-	-	60		3					
M	'85	-	1	1	-	-	-	-	133	13	14	2				
	'91	-	-	-	-	-	1	-	66	23	9	1				
	'94	12	5	1	-	-	-	-	360	22	28	18				
	'98	2	7	2	-	1	-	-	240	20	27	12				
D	'85	-	-	1	-	-	-	-	66			1				
	'91	-	-	-	-	-	-	-	0			0				
	'94	3	-	-	-	-	-	-	60			3				
	'98	-	2	-	-	-	-	-	40			2				
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'85		33%		67%		00%		-34%								
'91		00%		50%		00%		+71%								
'94		22%		04%		09%		-26%								
'98		65%		12%		06%										
Total Plants/Acre (excluding Dead & Seedlings)									'85	199	Dec:	33%				
									'91	132		0%				
									'94	460		13%				
									'98	340		12%				
Ceratoides lanata																
S	'85	38	14	4	-	-	-	-	52	-	3	1	3733		56	
	'91	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	'85	18	78	42	-	-	-	-	125	-	12	1	9200		138	
	'91	11	44	-	-	-	1	-	56	-	-	-	3733		56	
	'94	99	3	-	-	-	-	-	102	-	-	-	2040		102	
	'98	9	71	57	-	-	-	-	137	-	-	-	2740		137	
M	'85	1	27	89	-	-	-	-	103	-	13	1	7800	2	3	117
	'91	39	73	-	1	-	-	2	115	-	-	-	7666	8	5	115
	'94	566	154	102	2	-	-	-	824	-	-	-	16560	5	6	828
	'98	43	295	114	2	4	-	-	457	1	-	-	9160	4	5	458
D	'85	-	1	-	-	-	-	-	1	-	-	-	66			1
	'91	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'85		41%		51%		11%		-33%								
'91		68%		00%		00%		+39%								
'94		17%		11%		00%		-36%								
'98		62%		29%		00%										
Total Plants/Acre (excluding Dead & Seedlings)									'85	17066	Dec:	0%				
									'91	11399		0%				
									'94	18600		0%				
									'98	11900		0%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total						
		1	2	3	4									
Chrysothamnus nauseosus														
Y	85	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	-	3	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
	'85	00%		00%		00%								
	'91	00%		00%		00%								
	'94	00%		00%		00%								
	'98	00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'85	0	Dec:	-	
										'91	0		-	
										'94	0		-	
										'98	60		-	
Chrysothamnus viscidiflorus stenophyllus														
S	85	1	-	-	-	-	-	-	-	1	-	66		1
	91	-	-	-	-	-	-	-	-	-	-	0		0
	94	3	-	-	-	-	-	-	-	3	-	60		3
	98	-	-	-	-	-	-	-	-	-	-	0		0
Y	85	2	-	-	-	-	-	-	-	2	-	133		2
	91	5	-	-	-	-	-	-	-	5	-	333		5
	94	28	-	-	-	-	-	-	-	28	-	560		28
	98	24	-	-	-	-	-	-	-	24	-	480		24
M	85	7	1	-	-	-	-	-	-	8	-	533	8 13	8
	91	4	4	-	-	-	-	-	-	7	-	533	7 11	8
	94	29	3	3	-	-	-	-	-	35	-	700	9 16	35
	98	117	-	-	-	-	-	-	-	117	-	2340	9 13	117
D	85	1	-	-	-	-	-	-	-	1	-	66		1
	91	6	-	-	-	-	-	-	-	6	-	400		6
	94	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	0		0
X	85	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>						
	'85	09%		00%		00%		+42%						
	'91	21%		00%		05%		- 0%						
	'94	05%		05%		00%		+55%						
	'98	00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'85	732	Dec:	9%	
										'91	1266		32%	
										'94	1260		0%	
										'98	2820		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				
Echinocereus spp.																		
M	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	1	4	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	20		-			
Gutierrezia sarothrae																		
S	'85	61	-	-	-	-	-	-	-	-	60	-	1	-	4066			61
	'91	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	'85	43	-	-	-	-	-	-	-	-	41	-	2	-	2866			43
	'91	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	'94	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
	'98	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
M	'85	73	-	-	-	-	-	-	-	-	73	-	-	-	4866	7	7	73
	'91	4	-	-	-	-	-	-	-	-	4	-	-	-	266	6	5	4
	'94	52	-	-	-	-	-	-	-	-	52	-	-	-	1040	7	9	52
	'98	52	-	-	-	-	-	-	-	-	52	-	-	-	1040	9	10	52
D	'85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'98	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	'85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'85		00%			00%			02%			-94%							
'91		00%			00%			00%			+66%							
'94		00%			00%			00%			- 3%							
'98		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	7798	Dec:	1%			
												'91	466		0%			
												'94	1360		1%			
												'98	1320		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				
Juniperus osteosperma																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	4	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'85	00%			00%			00%										
	'91	00%			00%			00%										
	'94	00%			00%			00%										
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	0		-			
Opuntia spp.																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	11	3
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	11	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'85	00%			00%			00%										
	'91	00%			00%			00%										
	'94	00%			00%			00%			-33%							
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'91	0		-			
												'94	60		-			
												'98	40		-			
Pinus edulis																		
Y	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'85	00%			00%			00%			+ 0%							
	'91	00%			00%			00%										
	'94	00%			00%			00%										
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'85	133	Dec:	-			
												'91	133		-			
												'94	0		-			
												'98	20		-			

Trend Study 25C-10-98

Study site name: Pleasant Creek Exclosure-In .

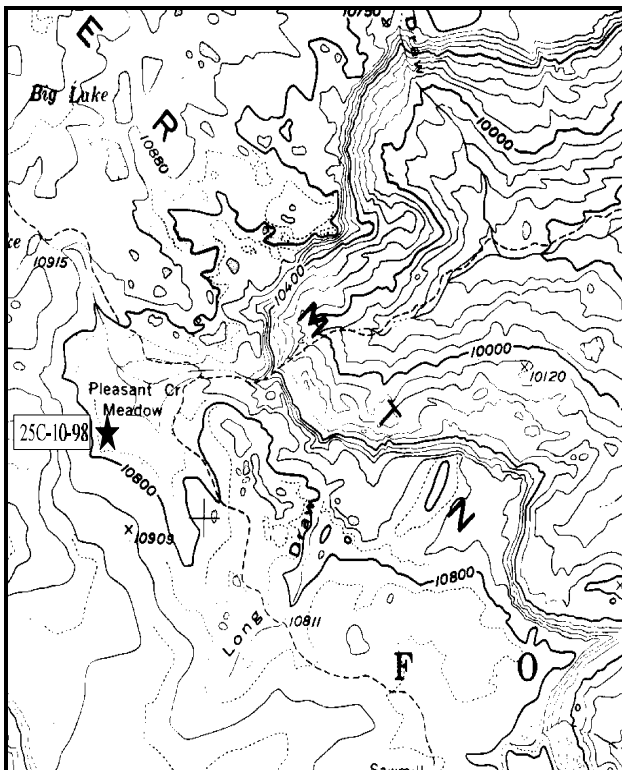
Range type: Dry Meadow .

Compass bearing: frequency baseline 222 M degrees.

Footmark (first frame placement) 5 feet. frequency belt placement; line 1 (11, 59 & 95ft), line 2 (34 & 71ft).

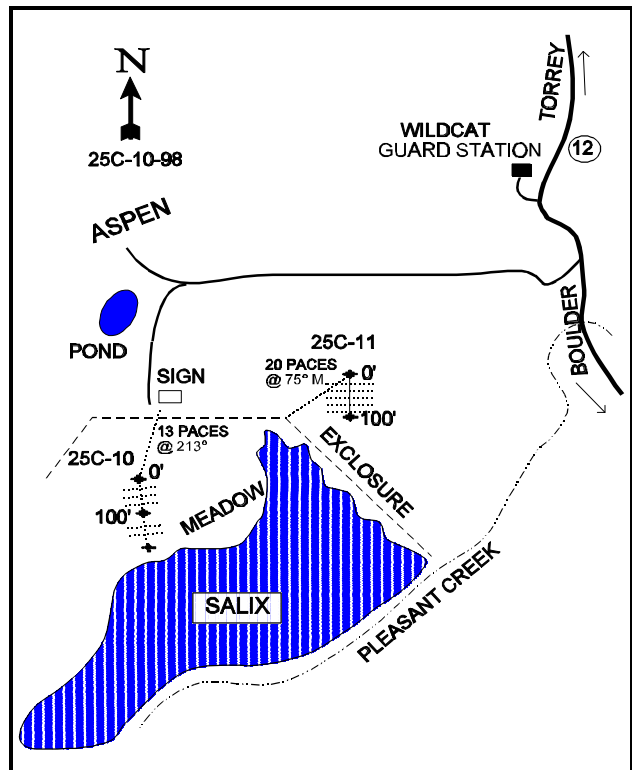
LOCATION DESCRIPTION

Heading south on Highway U-12 between Grover and Boulder, look for the USFS Wildcat Guard Station on the west side of the road. Just south of the Wildcat Guard Station and before crossing Pleasant Creek, turn off onto the Pleasant Creek Road and head west 0.75 miles to a cattleguard. This road gets very rough, and a four-wheel drive is recommended. From the cattleguard, go another 1.75 miles to a gate. After another 0.2 miles, you'll come to the Meek's Lake Fork. Go left here for 0.6 miles to where the road ends at an exclosure. (At one point, the road appears to end in a meadow, but continue on to the exclosure). From the exclosure sign, trend study #25C-10 is 13 paces a way at 215° magnetic. It is marked by browse tag (which lies within the exclosure) #9051 and runs at 222° magnetic.



Map Name: Deer Creek Lake

Township 31S , Range 5E , Section 19



Diagrammatic Sketch

UTM 4216724.312 N , 465983.022 E

DISCUSSION

Trend Study No. 25C-10 (44-10)

The Pleasant Creek Exclosure (inside) was a new study that was established in 1991 and is located within an exclosure made with a “let-down” fence. This site was initiated by the U.S. Forest Service and DWR to help determine use by elk in the area. The exclosure is located on a meadow surrounded by aspen on the north and willows on the south. It was built in 1990 around 10 acres of meadow, willow, and creek bottom along Pleasant Creek. The site is high in the aspen-conifer zone at about 9,700 feet in elevation. In the past, exclosure data has usually not been very useful for determining elk use, since they do not have the same abilities or inclination as deer at jumping fences. However, pellet group data from inside the exclosure in 1994 did show some elk use as well as cattle use. The fence is not well maintained and cows have gotten inside the exclosure. Pellet group data from 1998 estimate 9 elk and 33 cow days use/acre. Only one deer pellet group was found. Deer and elk pellet groups were hard to see in 1998 due to the dense vegetation.

The soil is moderately deep with an effective rooting depth (see methods) of almost 18 inches. It is a dark brown or black colored soil with a sandy loam texture and a moderately acid pH (6.0). The soil is fertile with high amounts of organic matter. Large rocks and boulders occur throughout the area and throughout the soil profile. Bare soil is rare, with most ground cover as herbaceous vegetation. Erosion is not a problem at this time.

The vegetation is composed of a variety of forbs and grasses. The only browse species encountered was a *Salix* spp. Kentucky bluegrass is the dominant grass, an increaser with heavy livestock grazing. It currently ('98) provides 83% of the grass cover. Slender wheatgrass, a sedge, meadow barley, and plains bluegrass are also fairly common. During the 1998 reading, forbs were more abundant and produced more cover than grasses. Composition is dominated by increasers including: pussytoes, pacific aster, silverweed, and northwest cinquefoil, dandelion, and hollyleaf clover. These species provided 98% of the forb cover in 1994 and 95% in 1998.

1991 APPARENT TREND ASSESSMENT

The soils are in good condition. The trend is stable with no change anticipated in the foreseeable future. Browse trend for this site is not critical for it is not part of the normal winter range or critical winter range. The only browse species encountered was a willow. The herbaceous understory is diverse with 38 species found. These plants appear to be moderate to heavily grazed each summer. Outside the exclosure grazing is severe. The high quadrat frequency values for Kentucky bluegrass, yarrow, and aster would indicate over grazing for a long period of time. Trend is considered stable, but the composition is not ideal. This is a new site so there is not any previous data to compare it with to determine trend.

1994 TREND ASSESSMENT

The soils are in good condition. The trend is stable with no changes being anticipated. Browse for this site are not critical and this area is not part of a normal winter range or critical winter range. The herbaceous understory is diverse. The trend for the herbaceous species is down, with significant decreases for nested frequency for both grasses and forbs. The most abundant species is Kentucky bluegrass which is the only species that showed an increase during this period. This exclosure showed a great deal of cow sign which indicated that the fence was down sometime in the recent past.

TREND ASSESSMENT

soil - stable

browse - not important on this high summer range

herbaceous understory - significant downward trend, probably closely related to the prolonged drought since 1985, but still good condition

1998 TREND ASSESSMENT

The soil trend is improved slightly since 1994 due to excellent production of herbaceous vegetation this season. Percent bare ground is only 1%. There is no significant browse component on this site and it is not important on this summer range. Trend for the herbaceous understory is up slightly. Sum of nested frequency of grasses remains similar to 1994 estimates but frequency of forbs has increased. Production is also much higher compared to 1994. Composition is still totally dominated by increasers however, with Kentucky bluegrass providing 83% of the grass cover and weedy, low growing increaser forbs make up 95% of the forb cover. Cattle are still getting into the enclosure and utilizing some of the forage.

TREND ASSESSMENT

soil - up slightly

browse - none

herbaceous understory - up slightly, but composition dominated by increasers

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'91	'94	'98	'91	'94	'98	'94	'98
G	Agropyron trachycaulum	_b 68	_a 39	_a 53	28	15	21	.29	1.64
G	Carex spp.	_c 263	_b 168	_a 89	81	58	37	4.07	2.03
G	Deschampsia caespitosa	_c 89	_b 12	_a -	38	4	-	.24	-
G	Festuca ovina	_a -	_b 24	_c 49	-	8	18	.71	.24
G	Hordeum brachyantherum	_a 2	_a 3	_b 17	1	1	8	.03	1.00
G	Juncus balticus	_b 46	_a 18	_a 6	19	9	3	.36	.09
G	Koeleria cristata	5	-	20	3	-	8	-	.21
G	Muhlenbergia montana	14	1	5	6	1	2	.03	.03
G	Phleum alpinum	_b 114	_a 5	_a 7	37	3	3	.04	.01
G	Poa arida	_a 6	_b 45	_b 64	2	14	25	.98	2.53
G	Poa pratensis	_a 296	_b 345	_b 365	93	92	97	23.09	40.04
G	Sitanion hystrix	_a -	_a 5	_b 17	-	2	8	.06	.09
G	Stipa comata	-	8	12	-	3	7	.04	.13
G	Stipa lettermani	_{ab} 21	_b 49	_a 17	11	19	9	.63	.24
Total Annual Grasses		0	0	0	0	0	0	0	0
Total Perennial Grasses		924	722	721	319	229	246	30.59	48.33
F	Achillea millefolium	_b 222	_a 156	_{ab} 173	72	56	59	2.13	9.76
F	Agoseris glauca	-	-	7	-	-	2	-	.01
F	Allium spp.	-	2	1	-	2	1	.01	.00
F	Antennaria rosea	11	2	5	4	1	2	.00	.03
F	Androsace septentrionalis (a)	_a -	_b 13	_c 81	-	5	32	.02	.72
F	Artemisia dracunculus	_c 30	_b 8	_a -	13	4	-	.02	-
F	Arabis drummondi	_b 10	_c -	_a 27	6	-	14	-	.15
F	Arenaria fendleri	9	-	-	5	-	-	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'91	'94	'98	'91	'94	'98	'94	'98
F	Aster chilensis	_b 269	_a 90	_a 66	85	33	23	.80	1.20
F	Cerastium beeringianum	9	-	-	4	-	-	-	-
F	Chenopodium album (a)	-	4	-	-	2	-	.01	-
F	Draba spp. (a)	-	_a 1	_b 41	-	1	20	.00	.12
F	Epilobium spp.	4	-	-	1	-	-	-	-
F	Equisetum variegatum	1	-	-	1	-	-	-	-
F	Erigeron flagellaris	_a 33	_b 61	_a 21	14	24	8	.32	.52
F	Erigeron spp.	_a -	_b 10	_b 34	-	3	12	.06	.84
F	Eriogonum spp.	-	-	3	-	-	1	-	.00
F	Galium spp.	10	-	-	4	-	-	-	-
F	Geum spp.	9	-	-	6	-	-	-	-
F	Lappula occidentalis (a)	-	_b 4	_a 1	-	3	1	.04	.00
F	Lomatium dissectum	-	6	-	-	2	-	.01	-
F	Lomatium spp.	-	2	3	-	1	1	.00	.00
F	Lychnis drummondii	-	-	2	-	-	1	-	.00
F	Potentilla anersina	-	140	128	-	50	48	4.26	7.74
F	Polygonum douglasii (a)	-	10	5	-	3	3	.01	.01
F	Potentilla gracilis	_b 77	_a 28	_a 19	28	12	10	1.09	.56
F	Ranunculus alismaefolius	1	-	-	1	-	-	-	-
F	Rumex salicifolius	5	-	13	2	-	6	-	.34
F	Silene spp.	-	1	-	-	1	-	.00	-
F	Taraxacum officinale	_a 332	_b 285	_a 302	97	93	91	6.85	19.22
F	Thalictrum fendleri	2	-	-	1	-	-	-	-
F	Trifolium gymnocarpon	_b 265	_a 147	_a 168	76	42	49	11.06	15.38
F	Unknown forb-perennial	8	-	-	3	-	-	-	-
F	Viola spp.	_b 17	_a -	_a 5	7	-	2	-	.01
Total Annual Forbs		0	32	128	0	14	56	0.08	0.85
Total Perennial Forbs		1324	938	977	430	324	330	26.67	55.83

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

BROWSE TRENDS --

Herd unit 25C, Study no: 10

Type	Species	Strip Frequency		Average Cover %	
		'94	'97	'94	'98
B	Populus tremuloides	0	0	-	.00
Total for Browse		0	0	0	0.0

CANOPY COVER --
Herd unit 25C, Study no: 10

Species	Percent Cover '98
Populus tremuloides	10

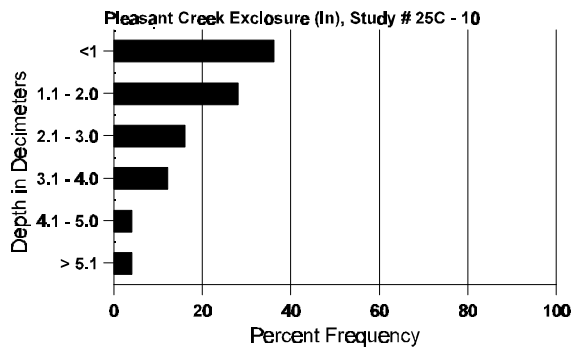
BASIC COVER --
Herd unit 25C, Study no: 10

Cover Type	Nested Frequency		Average Cover %		
	'94	'98	'91	'94	'98
Vegetation	394	395	75.75	62.59	81.70
Rock	166	80	2.25	6.29	4.46
Pavement	19	16	0	.34	.46
Litter	327	391	15.50	16.88	81.86
Cryptogams	18	34	.25	.09	.19
Bare Ground	135	57	6.25	6.08	.98

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 10, Study Name: Pleasant Creek Exclosure (In)

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.6	42.3 (17.7)	6.0	52.0	32.2	15.8	6.2	31.4	252.8	.8

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 10

Type	Quadrat Frequency	
	'94	'98
Elk	31	7
Deer	-	1
Cattle	30	18

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 10

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Populus tremuloides																	
S	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
X	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'91		00%			00%			00%			None						
'94		00%			00%			00%			None						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'91	0	Dec:	-		
												'94	0		-		
												'98	0		-		

Trend Study 25C-11-98

Study site name: Pleasant Creek Exclosure-Out .

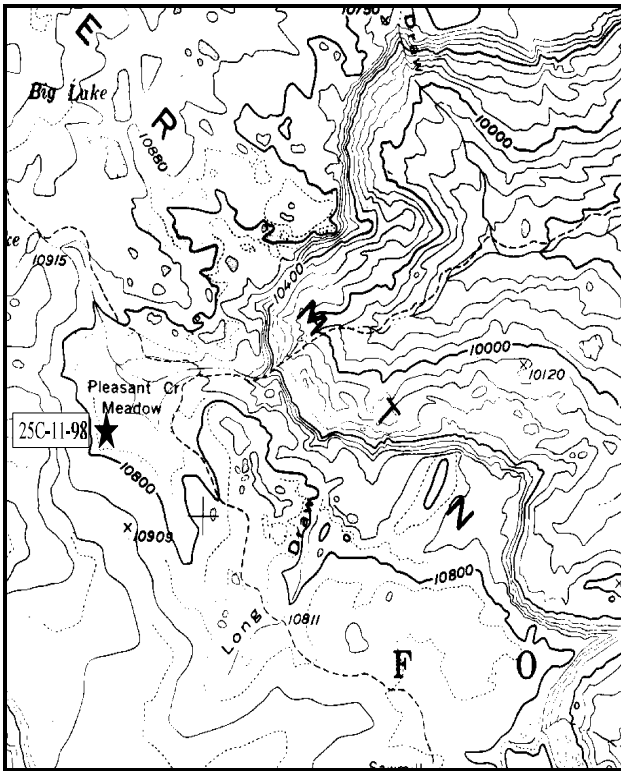
Range type: Dry meadow .

Compass bearing: frequency baseline 163 M degrees.

Footmark (first frame placement) 5 feet. frequency belt placement; line 1 (11, 34,59,71 &95ft).

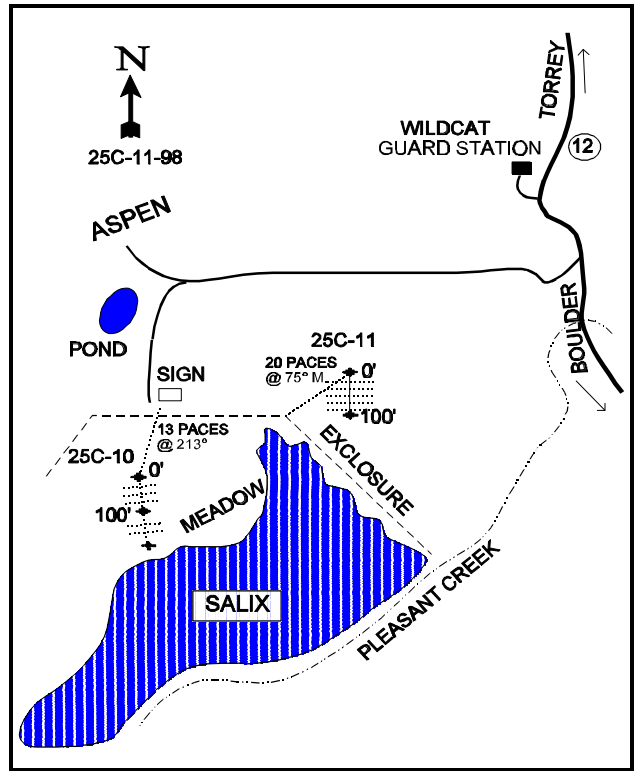
LOCATION DESCRIPTION

Trend study #25C-11-98 lies outside the exclosure to the east. From the sign, follow the fenceline east to where it makes a 45° corner to the southeast. From this corner, the 0-foot baseline stake is 23 paces away at 65° magnetic, and is marked by browse tag #9052. It also runs at 163° magnetic, and is marked by browse tag #9052.



Map Name: Deer Creek Lake

Township 31S , Range 5E , Section 19



Diagrammatic Sketch

UTM 4216746.216 N , 466075.150 E

DISCUSSION

Trend Study No. 25C-11 (44-11)

The Pleasant Creek Exclosure (outside) was a new study that was established in 1991 and is located just outside the exclosure where study #25C-10 is located. The exclosure was initiated by the U.S. Forest Service and DWR to help determine use by elk in the area. It is located on a meadow, along Pleasant Creek, surrounded by aspen on the north and willow on the south. The site is high in the aspen-conifer zone at about 9,700 feet. Pellet group quadrat frequency data from 1994 show elk at only 5% frequency and cattle at 57% frequency. All of the herbaceous vegetation was heavily utilized in 1994. A pellet group transect read on the site in 1998 estimate 9 elk and 107 cow days use/acre. Only one deer pellet group was encountered. Quadrat frequency of cow pats was almost the same as 1994 estimates, indicating a similar level of use. This area is on a deferred rotation grazing system with use in July one year and September the next.

Soils are fairly deep with an effective rooting depth (see methods) of 19 inches. It is dark brown or black in color with a sandy loam texture and a slightly acid pH (6.5). Organic matter content is relatively high at 6.5%. Large rocks and boulders occur in the area and throughout the soil profile. Bare soil is rare, with most ground cover as vegetation. Erosion should not be a problem unless overgrazed. The site was severely grazed in conjunction with extreme summer drought in 1994.

The vegetation composition is very similar to 25C-10. The only browse species encountered on the site was Wood's rose. The herbaceous component is dominated by Kentucky bluegrass which had a quadrat frequency of 98% in 1991, down to 88% in 1994, and 96% in 1998. It provided 72% of the grass cover in 1994 and 88% in 1998. Slender wheatgrass and Baltic rush are also fairly common. Forbs consist mainly of weedy increasers including: western yarrow, pacific aster, cinquefoil, dandelion, and clover. These provided 95% of the forb cover in 1994 and 1998.

1991 APPARENT TREND ASSESSMENT

Soil trend is stable, but could change with continued heavy grazing and the associated prolonged drought. Comparing the exclosure data with the outside, the outside has less vegetative cover, more rock and pavement, less litter and more bare ground. The browse and herbaceous understory would be considered stable until the next inventory. There are very high frequencies for increaser species on the outside transects.

1994 TREND ASSESSMENT

Soil trend is stable at this time. The transect stakes outside the exclosure could not be found, so the transect was located as close as possible to the old one, but still could have some effect on the data. However, the data has some notable consistent trends. The browse is not a critical part of the summer range. For the herbaceous understory, both the grasses and forbs have downward trends in their nested frequency values which again are closely related to the extended drought and heavy use. Kentucky bluegrass has very high quadrat frequency values which are consistent with a species that is an increaser with moderate to heavy grazing pressure.

TREND ASSESSMENT

soil - stable

browse - not important for this summer range

herbaceous understory - significant downward trend for both grasses and forbs, but still considered in good condition

1998 TREND ASSESSMENT

Trend for soil is up slightly due to the increase in vegetation and litter cover and a decline in percent bare ground to only 2%. The browse consist of a few Wood's rose which are unimportant on this summer range.

However, density has declined since 1994. Trend for the herbaceous understory continues to be slightly down. Sum of nested frequency of grasses and forbs has declined since 1994 although production has increased. Cover of grasses has increased from 33% to 50% and forb cover has gone from 26% to 40%. This is due to the good precipitation this area received in 1997 and 1998. Composition is still poor however, with 88% of the grass cover coming from the increaser Kentucky bluegrass. In addition, 95% of the forb cover is produced by low growing increasers including: western yarrow, pacific aster, cinquefoil, dandelion and clover.

TREND ASSESSMENT

soil - up slightly

browse - down, but unimportant on this summer range

herbaceous understory - down slightly with composition dominated by increasers

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 11

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'91	'94	'98	'91	'94	'98	'94	'98
G	Agropyron trachycaulum	c65	b58	a67	31	29	29	.32	1.89
G	Carex spp.	b202	a139	a53	70	50	23	1.70	.41
G	Festuca ovina	b66	a19	a17	27	8	8	.55	.09
G	Hordeum brachyantherum	a-	a-	b10	-	-	5	-	.19
G	Juncus balticus	ab69	b92	a50	27	33	19	1.63	1.59
G	Koeleria cristata	b50	a20	a10	20	8	5	.09	.07
G	Muhlenbergia montana	b68	a3	a-	27	2	-	.03	-
G	Phleum alpinum	6	-	2	2	-	1	-	.00
G	Poa arida	a16	b96	a19	5	29	8	3.73	.90
G	Poa pratensis	b360	a290	c373	98	88	96	23.66	43.59
G	Sitanion hystrix	a-	b10	3	-	7	1	.03	.03
G	Stipa comata	a2	a1	b19	1	1	8	.00	.40
G	Stipa lettermani	62	85	12	26	35	6	.92	.42
Total Annual Grasses		0	0	0	0	0	0	0	0
Total Perennial Grasses		966	813	635	334	290	209	32.68	49.62
F	Achillea millefolium	b159	ab124	a100	54	45	42	2.52	1.99
F	Agoseris glauca	a-	a49	a-	-	17	-	.31	-
F	Antennaria parvifolia	15	7	12	5	2	6	.15	.19
F	Androsace septentrionalis (a)	-	a3	b41	-	1	18	.00	.36
F	Artemisia dracunculus	b74	a1	a-	30	1	-	.00	-
F	Arabis drummondii	b59	a-	a-	26	-	-	-	-
F	Arenaria fendleri	3	-	-	2	-	-	-	-
F	Aster chilensis	b138	b27	a25	53	11	9	.25	.14
F	Astragalus convallarius	-	-	1	-	-	1	-	.00
F	Aster spp.	-	1	-	-	1	-	.00	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'91	'94	'98	'91	'94	'98	'94	'98
F	Chenopodium album (a)	-	2	-	-	2	-	.01	-
F	Cryptantha spp.	3	-	-	2	-	-	-	-
F	Descurainia pinnata (a)	1	-	-	1	-	-	-	-
F	Draba spp. (a)	-	4	7	-	3	4	.01	.65
F	Erigeron flagellaris	_b 102	_b 92	_a 24	36	39	10	.34	.17
F	Hymenoxys richardsonii	6	-	-	3	-	-	-	-
F	Lappula occidentalis (a)	-	1	-	-	1	-	.00	-
F	Lychnis drummondii	_a -	_a 7	_b -	-	4	-	.02	-
F	Penstemon spp.	2	-	-	1	-	-	-	-
F	Potentilla anersina	_a -	_b 110	_b 93	-	41	38	2.99	2.48
F	Polygonum douglasii (a)	-	3	6	-	1	2	.00	.01
F	Potentilla gracilis	_b 139	_a 33	_a 24	49	16	13	.52	.35
F	Ranunculus inamoenus	_b 22	_{ab} 6	_a 10	11	2	4	.01	.04
F	Taraxacum officinale	_b 340	_a 296	_a 322	96	93	98	8.21	16.46
F	Trifolium gymnocarpon	_{ab} 196	_a 181	_b 221	53	55	62	11.04	17.31
F	Unknown forb-perennial	_b 18	_a -	_a 1	7	-	1	-	.03
F	Vicia americana	4	1	-	2	1	-	.00	-
F	Viola spp.	3	-	1	1	-	1	-	.00
Total Annual Forbs		1	13	54	1	8	24	0.02	1.02
Total Perennial Forbs		1283	935	834	431	328	285	26.42	39.23

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

BROWSE TRENDS --

Herd unit 25C, Study no: 11

Type	Species	Strip Frequency		Average Cover %	
		'94	'97	'94	'98
B	Artemisia nova	-	-	.00	-
B	Rosa woodsii	4	3	.78	1.03
Total for Browse		4	3	0.78	1.03

BASIC COVER --

Herd unit 25C, Study no: 11

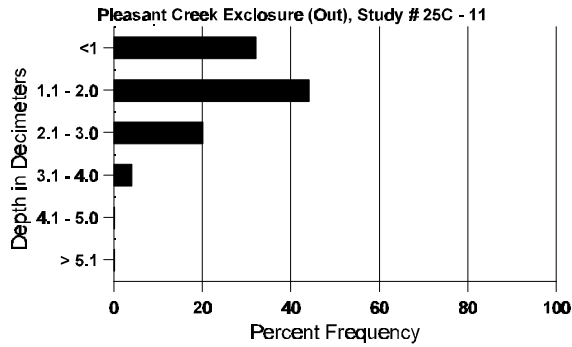
Cover Type	Nested Frequency		Average Cover %		
	'94	'98	'91	'94	'98
Vegetation	385	394	58.50	69.74	79.94
Rock	184	90	6.50	6.84	3.91
Pavement	63	48	2.50	.32	.75
Litter	312	393	24.75	16.67	82.71
Cryptogams	24	10	0	.09	.03
Bare Ground	132	63	7.75	3.95	1.92

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 11, Study Name: Pleasant Creek Exclosure (Out)

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.0	47.0 (17.7)	6.5	54.0	30.2	15.8	6.5	20.2	403.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 11

Type	Quadrat Frequency	
	'94	'98
Elk	5	6
Deer	-	2
Cattle	57	56

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 11

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				
Rosa woodsii																		
Y	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	19	-	-	-	-	-	-	-	-	19	-	-	-	380	32	29	19
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	20	19	4
D	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'91		00%			00%			00%										
'94		00%			00%			00%			-73%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'91	0	Dec:	0%			
												'94	440		14%			
												'98	120		17%			

Trend Study 25C-12-98

Study site name: Nazer Draw .

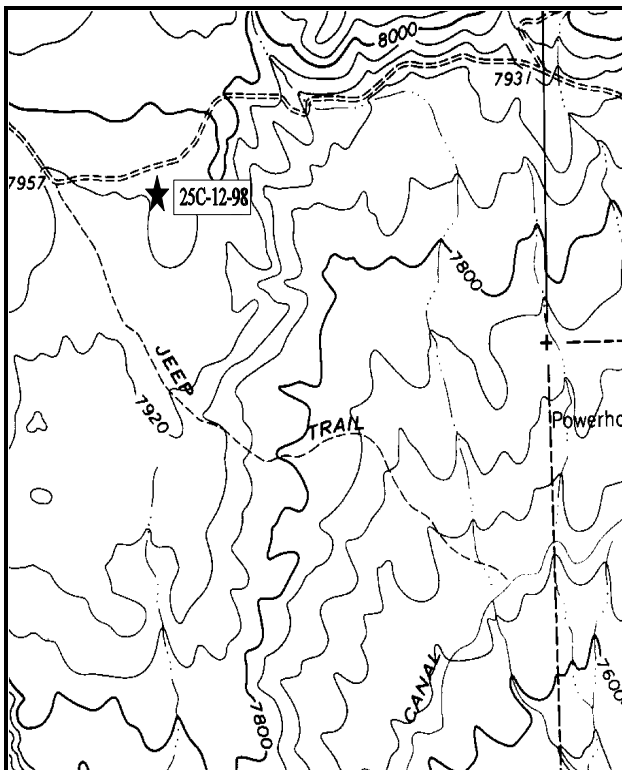
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 161 M degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

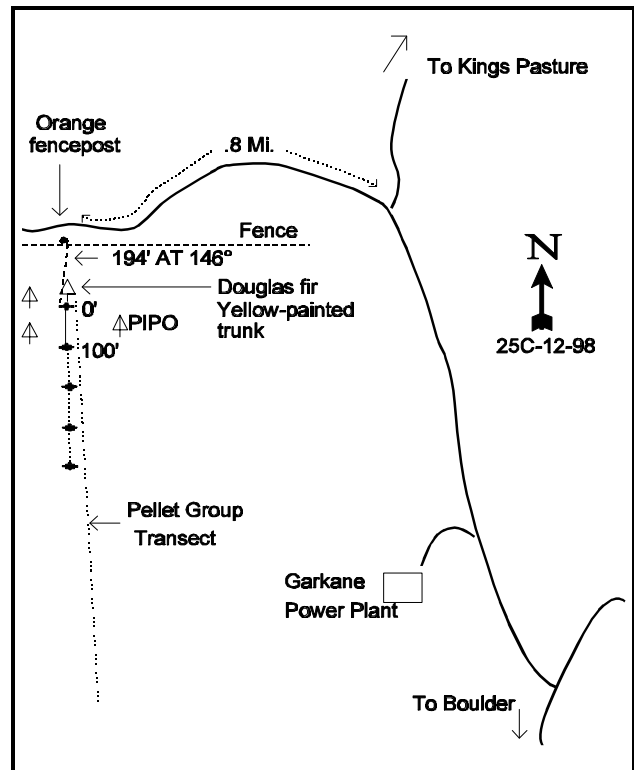
LOCATION DESCRIPTION

Travel north from Boulder on SR12 for approximately 5 miles to the Garkane Power Plant Road. Turn left (west) onto this road. Go 0.95 miles to a cattleguard. Continue 0.2 miles to a minor fork. Bear left onto a rough road and go 0.8 miles. This road is now closed so you now have to walk the 0.8 miles to the site. Stop along the fence by an orange fence post, which serves as a witness post for the range trend study and adjacent pellet group transect. The transect starts 195 feet south of the fence. The 0-foot baseline stake is a 1 1/2-foot tall fence post marked with browse tag #7131.



Map Name: Boulder Town

Township 32S, Range 4E, Section Unsurveyed



Diagrammatic Sketch

UTM 4204780.416 N, 460127.679 E

DISCUSSION

Trend Study No. 25C- 12 (44-12)

The Nazer Draw study samples an open bench with a mixture of low-growing shrubs and mountain brush with grass. The study site is part of a 1,200 acre seeding project completed in 1955. It is surrounded by ponderosa pine, scattered clumps of oak, and slopes with mountain brush. The site is used by big game mainly as winter range, with some deer use year-round. Data from the nearby pellet group transect shows moderate use at 32 days use/acre from 1990-91 to 1993-94 (Evans et al. 1995). Pellet group data taken along the baseline in 1998 estimate 27 deer, 9 elk, and 6 cow days use/acre. Cattle sign from 1998 appeared to be from last season. Rabbits also utilize the site in moderate numbers.

The almost level bench drains to the south to Boulder Creek and Nazer Draw. At the study site, the elevation is 7,950 feet. Due to the level terrain, erosion potential is minimal. There has been some soil loss in the past as evidenced by the amount of pavement and rock on the soil surface. The soil is shallow with an effective rooting depth (see methods) estimated at just over 10 inches. Texture is a sandy loam with a moderately acid pH (5.6) and a high percentage of coarse fragments in the profile. Parent material is a basalt.

A variety of browse occurs on the site including several preferred species. The most numerous shrub is black sagebrush which had a very high density of 14,599 plants/acre in 1987 and 21,866 by 1991. During the 1994 reading, there were an estimated 8,820 plants/acre, increasing to 11,120 by 1998. Due to a fairly constant decadency rate, lack of large numbers of dead sagebrush (7% in both '94 and '98), and reproductive potential that has been increasing, the change in density is most likely the result of the larger sample size used in 1994 and 1998. This larger sample gives a more representative estimate of the population (see methods section). Most plants are vigorous and have displayed mostly light to moderate use since 1987. Percent decadency has steadily declined from 34% in 1987, to 22% in 1994 and 18% by 1998.

Another key browse species is a low, spreading bitterbrush. Density is currently ('98) estimated at 540 plants/acre. The proportion of shrubs displaying heavy use has declined since 1987 when 100% of the bitterbrush were heavily utilized. During the 1991 reading, 42% of the shrubs were heavily browsed, but by 1994 only 16% displayed heavy use. Heavy use increased slightly to 26% by 1998, but most of the mature shrubs were moderately hedged. Seed production is currently poor but the percent decadency is low, declining to 4% by 1998. Bitterbrush showed excellent leader growth of 5 inches on the younger plants. More abundant on the surrounding slopes are true mountain mahogany and serviceberry. Both species have been moderately to heavily hedged. The oak clones are present around the site and were picked up with the larger sample used in 1994 and 1998. They were mistakenly not included in the shrub density strips, however point quarter data from 1994 indicate an average of 28 oak plants/acre with a mean basal diameter of less than 1 inch indicating a young population. Due to the patchy nature of the oak, point quarter data does not give a good estimate of population density. Shrub density strip data from 1998 estimate a much higher density of 1,680 oak stems/acre. Mature plants averaged just over 4 feet in height and appeared unutilized. Age class distribution indicates a stable to possibly slightly increasing population.

Other shrub species found on the site include: dwarf rabbitbrush, stickyleaf low rabbitbrush, slenderbush eriogonum, and broom snakeweed. The site also supports some pinyon and Ponderosa pine trees. These appear to be moving into the site. The ponderosa pine population is still young with point quarter data estimating approximately 33 trees/acre, while pinyon pine number about 20 trees/acre. Average basal diameter of ponderosa pine is estimated at 6 inches while pinyon averages only 3.5 inches.

Herbaceous plants are fairly abundant on the site and have good quadrat frequency values. Grasses covered 8% of the ground surface in 1994 while forbs covered 3%. Production increased by 1998 due to good precipitation in 1997 and 1998. Grass cover nearly doubled to 14%, while forb cover more than doubled to 8%. The most common species are crested wheatgrass, intermediate wheatgrass, blue grama, and bottlebrush

squirreltail. Neither wheatgrass was on the Forest Service seed list which included smooth brome, orchardgrass, timothy, alfalfa, and clover. Nearly 30 species of forbs are present on the study site. Many of the more common species like the buckwheats, penstemon, and Indian paintbrush had shown signs of utilization by deer in 1991. Currently, the most abundant forb species include: Carruth sage, redroot eriogonum, sulfur eriogonum, Utah deervetch, and owl clover.

1991 TREND ASSESSMENT

Basic cover for rock, pavement, and bare ground have all slightly increased since 1987, while percent cover for litter and vegetation have both decreased. All principal parameters indicate a slightly downward trend for the soil. The key browse species, black sagebrush, antelope bitterbrush, and serviceberry, have all increased or stayed the same since 1987. The browse trend is up. The herbaceous understory has many species, but the few species that did increase since the last inventory are in such low quadrat frequencies they would not effect the overall condition very much. The major decrease was with crested wheatgrass. Except for a small handful of forbs, most declined during the extended drought. Trend for the herbaceous understory would be slightly downward.

TREND ASSESSMENT

soil - slightly downward

browse - up

herbaceous understory - slightly downward

1994 TREND ASSESSMENT

Soil conditions are similar to those of 1991 indicating a fairly stable soil trend. However, percent bare ground is still higher than that of 1987 and litter cover has steadily decreased with drought. Soil trend would be stable to slightly declining. The browse trend appears stable with healthy populations of black sagebrush and antelope bitterbrush. The 1994 data shows some differences in population estimates for the browse species due to the larger sample taken in 1994. This new sample is a better representation of the actual populations than the samples taken in 1987 and 1991, so changes don't necessarily represent actual changes in population densities (see methods), especially if one notes the high reproductive potential for both species. Sum of nested frequencies of herbaceous vegetation have increased slightly since 1991, but they are still 23% lower than those of 1987. On the down side, the increaser blue grama is now the most abundant grass. Crested and intermediate wheatgrass declined slightly. Sum nested frequencies of forbs increased slightly. Trend for herbaceous understory is stable since 1991.

TREND ASSESSMENT

soil - stable to slightly declining

browse - stable

herbaceous understory - stable

1998 TREND ASSESSMENT

Trend for soil is up with a decline in percent bare ground and an increase in litter cover from 35% to 55%. Vegetation cover also increased due to excellent herbaceous production this year. Trend for browse is stable. Black sagebrush appears to be increasing slightly while bitterbrush density has declined. Both species display good vigor and low decadence. Bitterbrush has excellent leader growth this year. Trend for the herbaceous understory is up slightly. Sum of nested frequency of grasses increased slightly with the biggest change being the significant decline of crested wheatgrass, an increase in frequency on intermediate wheatgrass and blue grama, and a significant increase in bottlebrush squirreltail. Sum of nested frequency of forbs also increased.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - up slightly

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 12

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'04	'08
G	Agropyron cristatum	c190	b114	b110	a46	70	47	42	27	1.55	.98
G	Agropyron intermedium	24	31	18	48	8	16	7	15	.25	1.27
G	Bouteloua gracilis	ab107	a104	bc152	c183	44	38	56	64	5.54	9.67
G	Bromus inermis	10	7	4	4	3	3	1	1	.03	.15
G	Carex spp.	-	-	1	6	-	-	1	3	.00	.44
G	Oryzopsis hymenoides	-	-	2	-	-	-	1	-	.03	-
G	Sitanion hystrix	b100	b90	a15	b79	46	43	8	41	.88	1.44
G	Stipa comata	3	4	-	-	1	2	-	-	-	-
Total Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total Perennial Grasses		434	350	302	366	172	149	116	151	8.30	13.95
F	Agoseris glauca	-	-	-	3	-	-	-	1	-	.00
F	Antennaria parvifolia	6	4	-	4	2	2	-	1	-	.15
F	Arabis spp.	a-	b12	a-	a5	-	8	-	3	-	.01
F	Artemesia carruthii	a17	a8	ab22	b36	7	4	10	16	.20	.91
F	Arabis demissa	a-	b5	a-	a-	-	4	-	-	-	-
F	Astragalus newberryi	6	2	-	6	2	1	-	3	-	.06
F	Castilleja chromosa	7	-	4	18	3	-	2	7	.01	.37
F	Castilleja linariaefolia	b37	a4	a3	a14	19	3	2	8	.01	.21
F	Calochortus nuttallii	3	1	-	-	1	1	-	-	-	-
F	Comandra pallida	b19	a5	a8	ab21	13	3	3	11	.04	.49
F	Crepis acuminata	9	-	1	3	5	-	1	3	.03	.09
F	Cryptantha spp.	a5	ab13	b24	a9	4	7	13	4	.09	.09
F	Eriogonum alatum	a5	ab9	ab18	b26	3	5	9	11	.15	.35
F	Erigeron divergens	a2	a5	a3	b38	1	2	2	15	.01	.35
F	Eriogonum racemosum	87	83	83	98	45	45	40	44	.72	.96
F	Eriogonum umbellatum	68	56	55	50	30	26	22	23	.82	.88
F	Gayophytum ramosissimum (a)	-	-	b13	a-	-	-	6	-	.03	-
F	Hymenoxys acaulis	a1	a-	a3	b11	1	-	1	4	.03	.09
F	Hymenoxys cooperi	3	-	1	2	1	-	1	1	.00	.15
F	Hymenopappus filifolius	-	4	-	-	-	2	-	-	-	-
F	Lepidium densiflorum (a)	b16	a-	a3	b39	12	-	1	20	.00	.10

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
F	<i>Linum lewisii</i>	a-	a ³	a ⁵	b ⁶	-	1	2	5	.06	.05
F	<i>Lomatium</i> spp.	3	-	-	3	1	-	-	1	-	.00
F	<i>Lotus utahensis</i>	a ³²	a ²⁴	b ⁵⁷	a ³⁰	16	15	27	17	.43	.75
F	<i>Lupinus kingii</i> (a)	7	-	1	10	5	-	1	5	.00	.31
F	<i>Lychnis drummondii</i>	-	-	3	2	-	-	1	1	.00	.00
F	<i>Lygodesmia spinosa</i>	-	-	13	8	-	-	7	4	.20	.04
F	<i>Oenothera pallida</i>	16	5	15	6	6	3	6	2	.05	.03
F	<i>Orthocarpus purpureo-albus</i> (a)	a ⁷	a ⁷	a-	b ⁴⁶	5	3	-	22	-	1.12
F	<i>Penstemon comarrhenus</i>	b ⁷³	a ³⁰	a ¹³	a ⁴⁰	34	19	6	19	.08	.34
F	<i>Penstemon</i> spp.	a ⁴	a-	b ¹⁵	a-	1	-	7	-	.06	-
F	<i>Phlox longifolia</i>	b ⁵⁸	b ⁶¹	ab ⁴⁹	a ³³	29	35	24	15	.14	.15
F	<i>Polygonum douglasii</i> (a)	-	-	a-	b ⁸	-	-	-	4	-	.07
F	<i>Sphaeralcea coccinea</i>	b ¹⁰	b ¹³	b ¹⁰	a-	5	8	5	-	.19	-
F	<i>Taraxacum officinale</i>	-	-	4	-	-	-	2	-	.03	-
F	<i>Townsendia incana</i>	-	-	1	3	-	-	1	1	.00	.00
F	<i>Tragopogon dubius</i>	1	-	-	-	1	-	-	-	-	-
F	Unknown forb-perennial	-	3	-	-	-	1	-	-	-	-
Total Annual Forbs		30	7	17	103	22	3	8	51	0.03	1.60
Total Perennial Forbs		472	350	410	475	230	195	194	220	3.40	6.60

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

BROWSE TRENDS --
Herd unit 25C, Study no: 12

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Amelanchier utahensis	2	5	.30	.45
B	Artemisia nova	95	90	17.12	17.40
B	Cercocarpus montanus	1	0	-	-
B	Chrysothamnus depressus	11	5	.06	.48
B	Chrysothamnus viscidiflorus	13	16	.36	1.11
B	Echinocereus spp.	0	10	-	.03
B	Eriogonum microthecum	16	26	.13	.80
B	Gutierrezia sarothrae	2	17	.06	.42
B	Opuntia spp.	2	0	-	-
B	Pinus edulis	0	1	-	-
B	Pinus ponderosa	0	4	.18	.31
B	Purshia tridentata	35	15	7.43	5.48
B	Quercus gambelii	0	17	2.47	5.36
B	Sclerocactus	0	4	-	-
B	Tetradymia canescens	0	1	-	-
Total for Browse		177	211	28.14	31.87

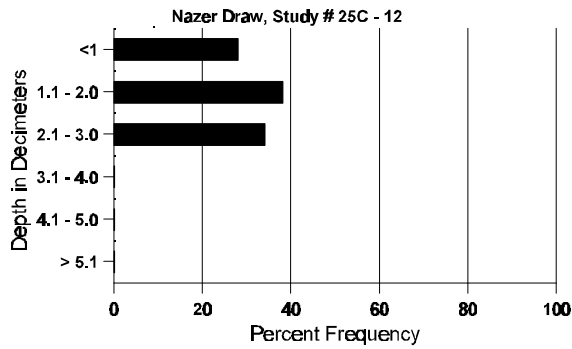
BASIC COVER --
Herd unit 25C, Study no: 12

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'87	'91	'94	'98
Vegetation	314	318	10.75	7.75	33.47	49.48
Rock	253	220	7.00	8.00	14.85	15.41
Pavement	191	210	10.75	13.00	4.99	12.05
Litter	382	383	62.25	58.50	34.90	54.52
Cryptogams	3	-	0	0	.00	0
Bare Ground	269	211	9.25	12.75	12.34	10.12

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 12, Study Name: Nazer Draw

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.4	53.4 (12.1)	5.6	60.0	21.8	18.2	2.4	10.3	112.0	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 12

Type	Quadrat Frequency	
	Ø4	Ø8
Rabbit	23	10
Elk	5	12
Deer	35	24
Cattle	-	2

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 12

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total										
		1	2	3	4													
Amelanchier utahensis																		
Y	87	-	1	1	-	-	-	-	-	1	-	1	-	133		2		
	91	-	-	1	-	-	-	-	-	1	-	-	-	66		1		
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0		
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0		
	94	-	-	1	1	-	-	-	-	2	-	-	-	40	18	20		
	98	2	1	-	-	-	-	-	-	2	1	-	-	60	22	30		
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	-	-	-	-	-	1	-	-	1	-	-	-	66		1		
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>										
'87		50%		50%		50%		- 1%										
'91		00%		100%		00%		-70%										
'94		00%		50%		00%		+60%										
'98		20%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)										'87	133	Dec:	0%					
										'91	132		50%					
										'94	40		0%					
										'98	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				
Artemisia nova																		
S	87	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	91	33	-	-	-	-	-	3	-	-	35	-	1	-	2400			36
	94	718	14	-	-	-	-	-	-	-	732	-	-	-	14640			732
	98	100	-	-	-	-	-	-	-	-	100	-	-	-	2000			100
Y	87	11	4	-	2	-	-	-	-	-	17	-	-	-	1133			17
	91	29	16	-	4	-	-	5	-	-	53	-	1	-	3600			54
	94	77	5	-	-	-	-	-	-	-	82	-	-	-	1640			82
	98	222	6	-	3	-	-	-	-	-	232	-	-	-	4640			232
M	87	85	39	3	-	-	-	-	-	-	122	2	3	-	8466	8	7	127
	91	66	79	27	8	8	-	2	-	-	187	-	1	2	12666	12	14	190
	94	208	52	-	-	-	-	-	-	-	259	-	1	-	5200	13	21	260
	98	192	28	2	-	-	-	-	-	-	222	-	-	-	4440	15	26	222
D	87	57	12	6	-	-	-	-	-	-	51	-	17	7	5000			75
	91	23	36	12	7	4	1	1	-	-	38	1	5	40	5600			84
	94	54	42	-	3	-	-	-	-	-	84	-	-	15	1980			99
	98	52	47	-	1	-	-	-	-	-	88	-	1	11	2000			100
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	640			32
	98	4	-	-	-	-	-	-	-	-	2	-	-	-	820			41
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		25%			04%			12%			+33%							
'91		44%			12%			15%			-60%							
'94		22%			00%			04%			+20%							
'98		15%			.36%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	14599	Dec:	34%				
											'91	21866		26%				
											'94	8820		22%				
											'98	11080		18%				
Cercocarpus montanus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	16	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'94	20		-				
											'98	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 depressus																		
Y	'87	2	1	-	-	-	-	-	-	-	3	-	-	-	200			3
	'91	-	-	1	-	-	1	-	-	-	2	-	-	-	133			2
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'87	3	2	2	3	-	-	-	-	-	10	-	-	-	666	4	4	10
	'91	1	1	2	2	2	2	4	-	-	14	-	-	-	933	7	11	14
	'94	11	1	-	1	-	-	-	-	-	13	-	-	-	260	4	8	13
	'98	6	-	-	3	-	-	-	-	-	9	-	-	-	180	3	8	9
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	1	-	-	-	-	1	-	-	-	2	-	-	-	133			2
	'94	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		23%			15%			00%			+28%							
'91		17%			39%			00%			-77%							
'94		14%			00%			00%			-36%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	866	Dec:	0%			
												'91	1199		11%			
												'94	280		7%			
												'98	180		0%			
Chrysothamnus viscidiflorus																		
Y	'87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	'91	-	2	1	-	1	-	-	-	-	4	-	-	-	266			4
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	'87	7	-	-	1	-	-	-	-	-	8	-	-	-	533	4	8	8
	'91	1	2	2	-	-	-	2	-	-	7	-	-	-	466	4	7	7
	'94	16	-	-	2	-	-	-	-	-	18	-	-	-	360	7	12	18
	'98	16	-	-	1	-	-	-	-	-	17	-	-	-	340	26	34	17
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	1	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			- 0%							
'91		42%			33%			00%			-55%							
'94		00%			00%			00%			+33%							
'98		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	799	Dec:	0%			
												'91	798		8%			
												'94	360		0%			
												'98	540		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				
Echinocereus spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160	3 5	8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	200		-			
Eriogonum microthecum																		
S	87	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	91	5	4	-	7	3	-	2	-	-	21	-	-	-	1400		21	
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
	98	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	87	16	7	2	2	-	-	-	-	-	24	-	3	-	1800	4 2	27	
	91	5	10	3	9	1	1	1	-	-	30	-	-	-	2000	5 5	30	
	94	22	2	-	2	-	-	-	-	-	26	-	-	-	520	4 5	26	
	98	21	1	-	4	-	-	-	-	-	26	-	-	-	520	6 7	26	
D	87	4	3	-	-	-	-	-	-	-	7	-	-	-	466		7	
	91	-	1	-	-	-	-	-	-	-	-	-	-	1	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		24%			05%			07%			+19%							
'91		37%			08%			02%			-82%							
'94		06%			00%			00%			+20%							
'98		03%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	2799	Dec:	17%			
												'91	3466		2%			
												'94	640		0%			
												'98	800		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
<i>Gutierrezia sarothrae</i>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	5	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	87	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	4	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	87	11	-	-	-	-	-	-	-	11	-	-	-	733	8	4	11
	91	5	-	-	1	-	-	-	-	6	-	-	-	400	8	6	6
	94	2	-	-	-	-	-	-	-	2	-	-	-	40	8	6	2
	98	29	-	-	-	-	-	-	-	29	-	-	-	580	9	8	29
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'87		00%		00%		00%		-46%									
'91		00%		00%		00%		-87%									
'94		00%		00%		00%		+91%									
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'87	866	Dec:	0%				
										'91	466		0%				
										'94	60		33%				
										'98	660		0%				
<i>Opuntia spp.</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	-	-	-	-	-	-	-	2	-	-	-	40	2	3	2
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'87		00%		00%		00%											
'91		00%		00%		00%											
'94		00%		00%		00%											
'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-				
										'91	0		-				
										'94	40		-				
										'98	0		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'87	00%			00%			00%									
	'91	00%			00%			00%									
	'94	00%			00%			00%									
	'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'94	0		-		
												'98	20		-		
Pinus ponderosa																	
Y	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'87	00%			00%			00%			+ 0%						
	'91	00%			00%			00%									
	'94	00%			00%			00%									
	'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%		
												'91	66		100%		
												'94	0		0%		
												'98	80		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				
Purshia tridentata																		
S	'87	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	'91	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	2	-	2	-	-	-	-	4	-	-	-	266		4	
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	'98	5	-	-	1	-	-	-	-	-	6	-	-	-	120		6	
M	'87	-	-	1	-	-	-	-	-	-	1	-	-	-	66	22	67	1
	'91	1	-	1	-	3	1	1	-	-	7	-	-	-	466	7	10	7
	'94	13	43	8	1	-	-	-	-	-	65	-	-	-	1300	12	37	65
	'98	9	5	6	-	-	-	-	-	-	20	-	-	-	400	21	52	20
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	1	-	-	-	-	-	-	1	66		1	
	'94	2	2	4	-	-	-	-	-	-	8	-	-	-	160		8	
	'98	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%			+92%							
'91		42%			42%			08%			+47%							
'94		60%			16%			00%			-64%							
'98		19%			26%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	0%				
											'91	798		8%				
											'94	1500		11%				
											'98	540		4%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Quercus gambelii													
S	87	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	0		0	
	98	22	-	-	4	-	-	-	-	26	-	-	26
Y	87	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	0		0	
	98	18	-	-	-	-	2	-	-	20	-	-	20
M	87	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	0	-	-	0
	98	52	-	-	10	-	-	-	-	62	-	-	62
D	87	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	1	-	-	1
X	87	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	180		9	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		00%		00%							
'91		00%		00%		00%							
'94		00%		00%		00%							
'98		00%		00%		01%							
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	0%			
							'91	0		0%			
							'94	0		0%			
							'98	1680		2%			
Sclerocactus													
Y	87	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	0		0	
	98	5	-	-	-	-	-	-	-	5	-	-	5
M	87	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	2	3	4	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		00%		00%							
'91		00%		00%		00%							
'94		00%		00%		00%							
'98		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	-			
							'91	0		-			
							'94	0		-			
							'98	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				
Tetradymia canescens																		
Y	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	7	
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'91	66		-			
												'94	0		-			
												'98	20		-			

Trend Study 25C-13-98

Study site name: Short Neck .

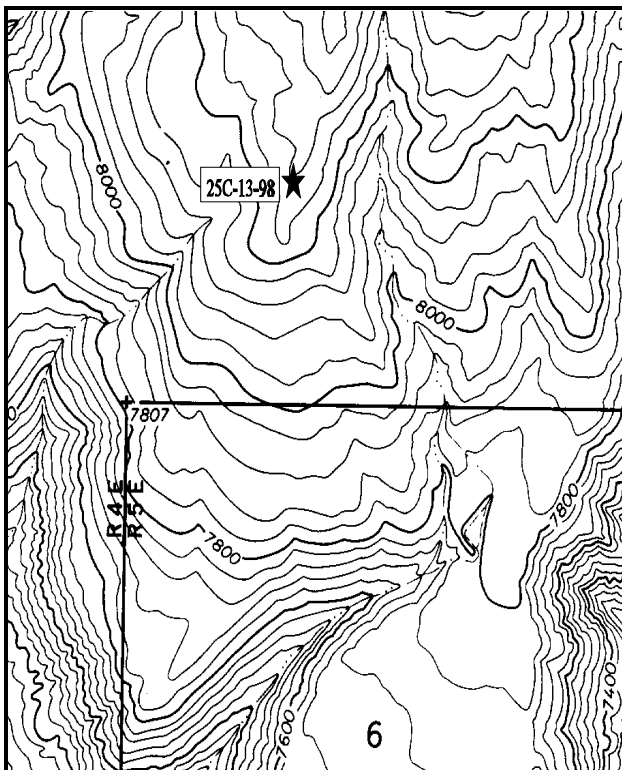
Range type: Burn-Mixed Mountain Brush .

Compass bearing: frequency baseline 180 degrees.

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

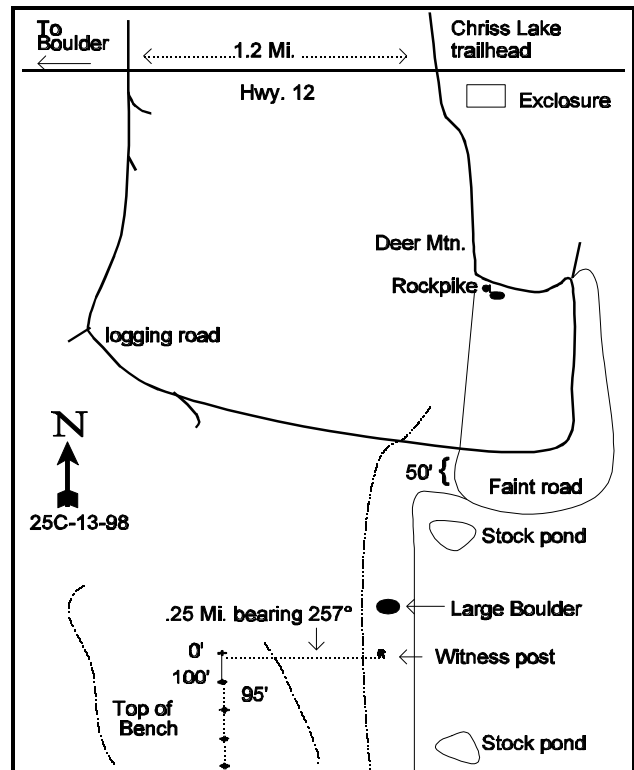
LOCATION DESCRIPTION

Go south (toward Boulder) from the Chris Lake trailhead (same place to turnoff to Deer Mountain) on SR 12 for 1.2 miles. Turn south onto a logging road. Proceed on main road 0.1 mile. Stay right. Go 0.1 mile to a fork, stay right. From here, stay on main road at all forks. Proceed 0.2 miles to a gate. Continue 0.15 miles to a fork, stay left. Go 0.4 miles to another fork, stay left. Proceed 0.85 miles and stay left. Continue 0.15 miles to a stock pond. Assuming you can drive to this stock pond, you will undoubtedly have to walk from here. Find an old faint road that goes down the ravine just west of the stock pond. Hike down this road one-half mile or so to a place where the plastic water pipeline makes a fork and is marked by an orange steel fencepost. Go west from here to the ridge top on the west side of the ravine. Then hike down the ridge about one-quarter of a mile to the study site. The 0-foot baseline stake is by a boulder that is about 3 feet high by 4 feet wide. It is marked by browse tag #7171. There is a 95 foot separation between the 100-foot baseline stake and the 200-foot baseline stake.



Map Name: Boulder Town

Township 32S , Range 5E , Section Unsurveyed



Diagrammatic Sketch

UTM 4203287.564 N, 464963.484 E

DISCUSSION

Trend Study No. 25C-13 (44-13)

The Short Neck trend study is located in an area burned by wildfire in 1971. It is now occupied by a mixed mountain brush community. The study site is located at 8,000 feet on the southeast aspect of a bench below Deer Mountain and 400 feet above Short Neck Mesa. The transect runs south across the slope, which varies from nearly level at the baseline to 10% at the last post. The area is considered winter range which is heavily used by elk, and to a lesser extent deer. Pellet group data taken on the site in 1998 estimate 52 elk, 14 deer, and 8 cow days use/acre. Cattle pats appear to be from last year. Some elk sign appeared to be only a few weeks old while the rest looked to be from last winter.

Soil on the site is a cobbly, sandy loam with a moderately acid pH (5.7). Large rocks and boulders are commonly found on the surface and throughout the soil profile. Soil depth is variable with an estimated effective rooting depth (see methods) of almost 10 inches. There is little if any erosion occurring. The rocky nature of the soil is demonstrated by the high percentage of rock and pavement cover at 37% in 1994 and 30% in 1998. Little bare soil is left exposed, currently ('98) only 1%.

The key browse species would be Gambel oak, serviceberry, and bitterbrush. These three species contributed 97% of the total browse cover in 1994 and 95% in 1998. Gambel oak alone currently ('98) makes up 62% of the browse cover. Density has varied over the years from 3,866 stems/acre in 1987 to 7,160 by 1998. Oak sampled in 1987 had not been hedged, but 25% showed a loss of vigor due to insect damage. Other clumps not sampled did show signs of browsing. The oak was not as prevalent on the original frequency baseline as opposed to the density plots used in 1987 and 1991. Oak densities increased 38% between 1987 and 1991 and appeared to be light to moderately utilized. In 1994, density of oak was estimated with the new, larger sample size at 4,000 stems/acre. Most plants were moderately hedged and in good vigor. Density increased by 1998, but this is primarily due to the increase in young plants (400 to 2,560 plants/acre). Most plants appeared only lightly utilized.

Thick patches of serviceberry were also sampled on the site. These clumps, as with the oak, are a mixture of both mature and young plants. Population density has remained relatively stable since 1987 at around 1,500 plants/acre. The serviceberry were heavily hedged in 1987, however, vigor was excellent. Use in 1991 was mostly moderate, but light to moderate in 1994 and 1998. Reproduction is limited, although the population appears healthy with a percent decadency of only 6%. Another preferred browse is bitterbrush which appears to have a stable population of 660 plants/acre as of 1998. Utilization has been moderate since 1987, with heavier use reported in 1991. Current use is more light to moderate. Vigor is good and percent decadence is low. Several other shrub species are found on the site in small numbers.

Herbaceous vegetation is limited by the thick shrub canopy which made up 67% of the total vegetative cover in 1994 and 58% by 1998. The large amount of rock cover also limits herbaceous plants to some extent. An exception is the extremely abundant herbaceous Louisiana sage. This rhizomatous plant currently ('98) provides 52% of the forb cover. Other common species encountered were: redroot eriogonum, penstemon, bastard toadflax, and longleaf phlox. Grasses are diverse with 6 species providing most of the cover. These include: blue grama, smooth brome, cheatgrass, a Carex, bottlebrush squirreltail, and needle-and-thread grass. Crested wheatgrass is found in small numbers while the intermediate wheatgrass found on the site in 1991, was not encountered in 1994 or 1998.

1991 TREND ASSESSMENT

Two of the more critical parameters for basic cover, percent bare ground and vegetative basal cover, were stable or slightly improving in 1987. However, litter cover decreased from 42% to 35%, and rock cover (rock and pavement) increased from 49% to 53%. The overall trend for soil is stable. Looking at the three key

browse species, Gambel oak, serviceberry, and antelope bitterbrush; serviceberry decreased in number by 19%, while oak and bitterbrush increased by 38% and 50% respectively. Serviceberry in 1987 made up 33% of the key browse population and in 1991 it only made up 19%. Overall, the trend for key browse would be slightly up. Looking at the grasses and forbs, sum of nested frequency is similar between 1987 and 1991 indicating a stable trend.

TREND ASSESSMENT

soil - stable

browse - slightly upward

herbaceous understory - stable

1994 TREND ASSESSMENT

Basic ground cover characteristics are similar to those of 1991 and erosion is not a problem at this time. Trend for soil is stable. The browse trend is slightly up for the moment due to healthy populations, low decadency rates, and improved vigor of the key species since 1991. Some of the population density changes are the result of the larger sample taken in 1994. On the down side, there were few seedling and young plants of the key species encountered. This will likely change with better precipitation patterns. Trend for the herbaceous understory is down dramatically. Sum of nested frequency of perennial grasses and herbs has declined from 992 to only 682 between 1991 and 1994, a 31% decrease. This change is likely the result of the dry spring periods of 1993 and 1994. Combined precipitation data from Boulder and Escalante taken from April through July indicate that these areas received only 51% of their normal precipitation in 1993 and 45% in 1994. Lack of adequate precipitation during these months severely limit's growth of herbaceous vegetation, especially forbs. A return to normal precipitation patterns will reverse this trend.

TREND ASSESSMENT

soil - stable

browse - slightly up

herbaceous understory - down due to drought

1998 TREND ASSESSMENT

Trend for soil is up due to an increase in vegetation and litter cover and a decline in rock and bare ground cover. Trend for the key browse species, serviceberry, bitterbrush, and Gambel oak is slightly up due to improved recruitment compared to 1994. Densities are similar and vigor remains good with low decadence. Trend for the herbaceous understory is up. Sum of nested frequency of perennial grasses increased slightly with a significant increase in frequency of bottlebrush squirreltail. Unfortunately, cheatgrass also showed a significant increase in nested frequency, more than doubling from 44 to 99. Cover also increased from .21% cover to 2.13% cover. Sum of nested frequency of forbs remained similar to 1994 estimates. Production of grasses has increased with cover rising from 8% in 1994 to 14% by 1998. Production of forbs has remained similar at 8%.

TREND ASSESSMENT

soil - up

browse - up slightly

herbaceous understory - up slightly for grasses, stable for forbs

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 13

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
G	<i>Agropyron cristatum</i>	5	5	10	8	2	2	4	5	.19	.10
G	<i>Agropyron intermedium</i>	_b 13	_b 11	_a -	_a -	6	5	-	-	-	.01
G	<i>Bouteloua gracilis</i>	_{ab} 61	_b 87	_a 52	_a 44	25	34	22	18	1.44	2.10
G	<i>Bromus inermis</i>	_a 22	_a 21	_b 41	_b 50	7	7	16	19	1.94	2.13
G	<i>Bromus tectorum</i> (a)	-	-	_a 44	_b 99	-	-	17	33	.21	1.58
G	<i>Carex</i> spp.	33	36	46	37	14	14	20	16	1.78	1.64
G	<i>Poa fendleriana</i>	7	23	19	16	5	10	10	7	.18	.26
G	<i>Sitanion hystrix</i>	_b 120	_b 101	_a 63	_b 122	51	51	30	53	.44	1.89
G	<i>Stipa comata</i>	_b 183	_b 154	_a 75	_a 96	65	59	26	34	1.62	4.06
Total Annual Grasses		0	0	44	99	0	0	17	33	0.21	1.58
Total Perennial Grasses		444	438	306	373	175	182	128	152	7.61	12.21
F	<i>Alyssum alyssoides</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Allium cernuum</i>	8	6	3	3	4	4	1	2	.03	.03
F	<i>Arabis</i> spp.	-	4	6	-	-	3	4	-	.02	-
F	<i>Artemisia ludoviciana</i>	_b 221	_a 192	_a 149	_a 149	80	78	59	58	3.98	4.15
F	<i>Astragalus desperatus</i>	3	6	-	-	2	2	-	-	-	-
F	<i>Aster</i> spp.	-	-	-	3	-	-	-	1	-	.03
F	<i>Astragalus</i> spp.	-	1	-	4	-	1	-	2	-	.04
F	<i>Chaenactis douglasii</i>	-	1	3	5	-	1	1	2	.15	.18
F	<i>Cirsium undulatum</i>	3	3	-	6	1	1	-	3	-	.01
F	<i>Comandra pallida</i>	27	35	31	16	13	14	13	7	1.50	.80
F	<i>Crepis acuminata</i>	2	5	8	5	1	2	5	3	.05	.09
F	Cruciferae	8	-	-	-	5	-	-	-	-	-
F	<i>Cryptantha</i> spp.	12	3	1	3	6	2	1	1	.00	.03
F	<i>Dalea searlsiae</i>	2	2	-	-	1	1	-	-	-	-
F	<i>Draba</i> spp. (a)	-	8	-	-	-	3	-	-	-	-
F	<i>Eriogonum alatum</i>	3	1	2	-	1	1	1	-	.03	-
F	<i>Eriogonum flagellaris</i>	-	-	-	-	-	-	-	-	-	.00
F	<i>Eriogonum</i> spp.	_a -	_b 8	_b 10	_a 7	-	5	5	2	.57	.01
F	<i>Eriogonum racemosum</i>	_b 196	_b 191	_a 56	_a 78	72	71	26	35	.30	.62
F	<i>Eriogonum umbellatum</i>	_a -	_{ab} 4	_b 12	_b 12	-	2	5	6	.05	.30
F	<i>Gayophytum ramosissimum</i> (a)	-	-	8	-	-	-	5	-	.40	-
F	<i>Hymenoxys acaulis</i>	2	2	1	3	1	1	1	1	.03	.03
F	<i>Hymenoxys richardsonii</i>	9	10	3	4	6	4	1	2	.03	.16
F	<i>Lappula occidentalis</i> (a)	-	-	3	5	-	-	1	2	.00	.03
F	<i>Linum lewisii</i>	16	19	15	7	10	9	6	3	.05	.01
F	<i>Lithospermum ruderale</i>	5	8	3	26	3	5	2	10	.18	.87
F	<i>Lotus utahensis</i>	3	3	-	-	2	1	-	-	-	.03

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
F	Lygodesmia spinosa	2	3	5	6	1	1	2	3	.30	.09
F	Oenothera caespitosa	-	1	-	-	-	1	-	-	-	-
F	Oenothera pallida	-	-	-	5	-	-	-	2	-	.06
F	Orthocarpus purpureo-albus (a)	-	-	4	-	-	-	2	-	.03	-
F	Penstemon comarrhenus	_b 25	_b 18	_b 29	_a 1	13	11	14	1	.32	.03
F	Phlox longifolia	_b 59	_a 23	_{ab} 33	_{ab} 42	26	13	16	25	.15	.22
F	Stellaria jamesiana	-	-	-	1	-	-	-	1	-	.00
F	Tragopogon dubius	_b 14	_a 1	_a -	_a 3	8	1	-	1	-	.06
F	Unknown forb-perennial	12	-	6	-	6	-	3	-	.06	-
F	Viguiera multiflora	-	4	-	-	-	2	-	-	-	-
Total Annual Forbs		0	8	15	5	0	3	8	2	0.43	0.03
Total Perennial Forbs		632	554	376	392	262	237	166	172	7.85	7.91

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

BROWSE TRENDS --

Herd unit 25C, Study no: 13

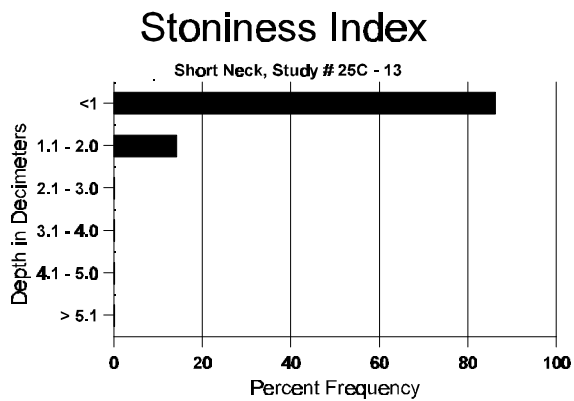
Type	Species	Strip Frequency		Average Cover %	
		'94	'98	'94	'98
B	Amelanchier utahensis	24	29	7.48	6.51
B	Artemisia nova	2	3	.04	.15
B	Artemisia tridentata wyomingensis	-	-	.03	-
B	Ceanothus martinii	0	0	-	-
B	Chrysothamnus depressus	8	3	.19	.15
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	-	.00
B	Echinocereus spp.	-	-	.00	-
B	Eriogonum microthecum	3	6	-	.03
B	Gutierrezia sarothrae	11	8	.03	.04
B	Mahonia repens	2	2	.06	.06
B	Opuntia spp.	4	6	.03	.06
B	Pinus edulis	0	1	-	.85
B	Pinus ponderosa	0	0	-	-
B	Purshia tridentata	17	21	2.30	3.29
B	Quercus gambelii	36	51	20.68	18.57
B	Symphoricarpos oreophilus	3	3	.38	.33
B	Tetradymia canescens	0	2	-	.03
Total for Browse		110	136	31.25	30.12

BASIC COVER --
Herd unit 25C, Study no: 13

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'87	'91	'94	'98
Vegetation	308	338	4.75	8.25	43.62	55.77
Rock	303	269	40.50	45.75	35.59	27.93
Pavement	92	62	8.25	6.50	1.00	2.05
Litter	377	381	42.25	35.25	47.81	54.97
Cryptogams	5	10	0	.25	.03	.08
Bare Ground	144	45	4.25	4.00	5.95	1.04

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 13, Study Name: Short Neck

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.5	62.8 (11.5)	5.7	54.0	28.2	17.8	4.5	18.4	137.6	.4



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 13

Type	Quadrat Frequency	
	'04	'08
Rabbit	12	1
Elk	13	16
Deer	6	3

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 13

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2	
Y	'87	6	3	11	-	-	-	-	-	20	-	-	-	1333		20		
	'91	1	-	-	-	1	-	-	-	2	-	-	-	133		2		
	'94	1	-	-	-	-	-	-	-	1	-	-	-	20		1		
	'98	-	3	-	10	-	-	-	-	13	-	-	-	260		13		
M	'87	-	2	10	-	-	-	-	-	12	-	-	-	800	36	17	12	
	'91	-	-	-	-	24	-	-	-	24	-	-	-	1600	34	27	24	
	'94	46	9	-	-	-	-	-	-	53	-	2	-	1100	42	40	55	
	'98	28	22	-	5	-	-	-	-	54	1	-	-	1100	42	39	55	
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	'91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	'94	-	1	-	-	-	-	-	-	1	-	-	-	20		1		
	'98	3	1	-	-	-	-	-	-	3	-	-	1	80		4		
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	'91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	'98	-	-	-	-	-	-	-	-	-	-	-	-	80		4		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		16%			66%			00%			-19%							
'91		96%			00%			00%			-34%							
'94		18%			00%			04%			+21%							
'98		36%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	2133	Dec:	0%				
											'91	1733		0%				
											'94	1140		2%				
											'98	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				
Artemisia nova																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9 22	3	
	'98	4	2	-	-	-	-	-	-	-	6	-	-	-	120	13 21	6	
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%			+63%							
'98		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	60		-			
												'98	160		-			
Ceanothus martinii																		
M	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	14 31	1	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	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 depressus											
Y	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	0	-	0
	94	1	-	1	-	-	-	-	40	14	12
	98	-	-	-	-	-	-	-	0	8	15
M	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	0	-	0
	94	5	8	-	-	-	-	-	260	14	12
	98	4	-	-	4	-	-	-	160	8	15
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%					
'91		00%		00%		00%					
'94		53%		07%		00%		-47%			
'98		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:			
						'91	0				
						'94	300				
						'98	160				
Chrysothamnus viscidiflorus viscidiflorus											
M	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	0	-	0
	98	-	-	-	-	-	-	-	0	8	6
D	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	0	-	0
	98	1	-	-	-	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%					
'91		00%		00%		00%					
'94		00%		00%		00%					
'98		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	0%		
						'91	0		0%		
						'94	0		0%		
						'98	20		100%		

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4		1	2				
Eriogonum microthecum												
Y	'87	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	1	-	-	-	20		1	
M	'87	-	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	1	-	66	9	10	1
	'94	-	7	-	-	-	-	-	140	9	11	7
	'98	11	2	-	-	-	-	-	260	7	11	13
D	'87	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	2	-	133		2	
	'94	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%						
'91		00%		00%		67%		-30%				
'94		100%		00%		00%		+50%				
'98		14%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	0%		
							'91	199		67%		
							'94	140		0%		
							'98	280		0%		
Gutierrezia sarothrae												
S	'87	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	0		0	
	'98	4	-	-	-	-	-	-	80		4	
Y	'87	1	-	-	-	-	-	-	66		1	
	'91	-	-	-	-	-	-	-	0		0	
	'94	1	-	-	-	-	-	-	20		1	
	'98	-	-	-	5	-	-	-	100		5	
M	'87	4	-	-	-	-	-	-	266	11	7	4
	'91	2	1	-	-	-	-	-	200	6	4	3
	'94	10	-	-	-	-	-	-	200	7	7	10
	'98	10	-	-	-	-	-	-	200	6	7	10
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%		-40%				
'91		33%		00%		00%		+9%				
'94		00%		00%		00%		+27%				
'98		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)							'87	332	Dec:	-		
							'91	200		-		
							'94	220		-		
							'98	300		-		

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	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	15	-	-	-	-	-	-	-	15	-	-	-	300	3	2	15
	98	15	-	-	-	-	-	-	-	15	-	-	-	300	2	3	15
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%			+ 0%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-				
										'91	0		-				
										'94	300		-				
										'98	300		-				
Opuntia spp.																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	6	-	-	-	-	-	-	-	6	-	-	-	120	2	5	6
	98	22	-	-	-	-	-	-	-	22	-	-	-	440	3	6	22
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%			+73%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-				
										'91	0		-				
										'94	120		-				
										'98	440		-				

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				
Pinus edulis																		
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	20		-			
Pinus ponderosa																		
M	'87	-	-	-	-	-	-	-	1	-	1	-	-	-	66	393	236	1
	'91	-	-	-	-	-	-	-	1	-	1	-	-	-	66	-	-	1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'91	66		-			
												'94	0		-			
												'98	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																	
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	'87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	'91	-	3	1	2	1	-	-	-	-	7	-	-	-	466		7
	'94	2	1	-	-	-	-	-	-	-	3	-	-	-	60		3
	'98	4	1	-	1	-	-	-	-	-	6	-	-	-	120		6
M	'87	1	3	-	-	-	-	-	-	-	4	-	-	-	266	16 22	4
	'91	-	1	2	-	1	-	1	-	-	5	-	-	-	333	15 35	5
	'94	8	17	-	1	-	-	-	-	-	24	-	-	2	520	29 63	26
	'98	14	5	-	2	3	-	-	-	-	24	-	-	-	480	18 39	24
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	-	-	2	-	-	-	-	-	-	2	-	-	-	133		2
	'94	-	2	-	-	-	-	-	-	-	2	-	-	-	40		2
	'98	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		43%			00%			00%			+50%						
'91		43%			36%			00%			-33%						
'94		65%			00%			06%			+ 6%						
'98		27%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	466	Dec:	0%		
												'91	932		14%		
												'94	620		6%		
												'98	660		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							
Quercus gambelii															
S	87	9	-	-	-	-	-	-	-	9	-	-	600		9
	91	6	-	-	3	-	-	17	-	26	-	-	1733		26
	94	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	6	-	-	20	-	-	18	-	44	-	-	880		44
Y	87	12	-	-	-	-	-	-	-	8	4	-	800		12
	91	14	17	-	12	8	-	11	-	59	-	3	4133		62
	94	19	1	-	-	-	-	-	-	20	-	-	400		20
	98	15	-	-	81	-	-	32	-	128	-	-	2560		128
M	87	46	-	-	-	-	-	-	-	33	-	13	3066	45 28	46
	91	-	6	1	-	3	-	-	-	9	-	1	666	48 22	10
	94	22	150	-	-	-	-	-	-	172	-	-	3440	40 32	172
	98	94	27	-	78	-	-	5	-	204	-	-	4080	45 27	204
D	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	1	14	1	-	3	-	3	-	10	2	6	1466		22
	94	-	8	-	-	-	-	-	-	8	-	-	160		8
	98	26	-	-	-	-	-	-	-	23	-	-	520		26
X	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	40		2
	98	-	-	-	-	-	-	-	-	-	-	-	380		19
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'87		00%		00%		22%		+38%							
'91		54%		02%		15%		-36%							
'94		80%		00%		00%		+44%							
'98		08%		00%		.83%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	3866	Dec:	0%		
										'91	6265		23%		
										'94	4000		4%		
										'98	7160		7%		
Symphoricarpos oreophilus															
Y	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	1	-	-	-	1	-	-	66		1
	94	-	-	-	-	-	-	-	-	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	5	-	-	-	-	-	-	-	4	-	1	100	10 25	5
	98	-	2	-	-	-	-	3	-	5	-	-	100	13 33	5
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'87		00%		00%		00%									
'91		00%		100%		00%		+45%							
'94		00%		00%		17%		-17%							
'98		40%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-		
										'91	66		-		
										'94	120		-		
										'98	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				
Tetradymia canescens																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	14	0
	'98	1	1	-	-	-	-	-	-	-	2	-	-	-	40	10	18	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		33%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	60		-			

Trend Study 25C-14-98

Study site name: New Home Bench .

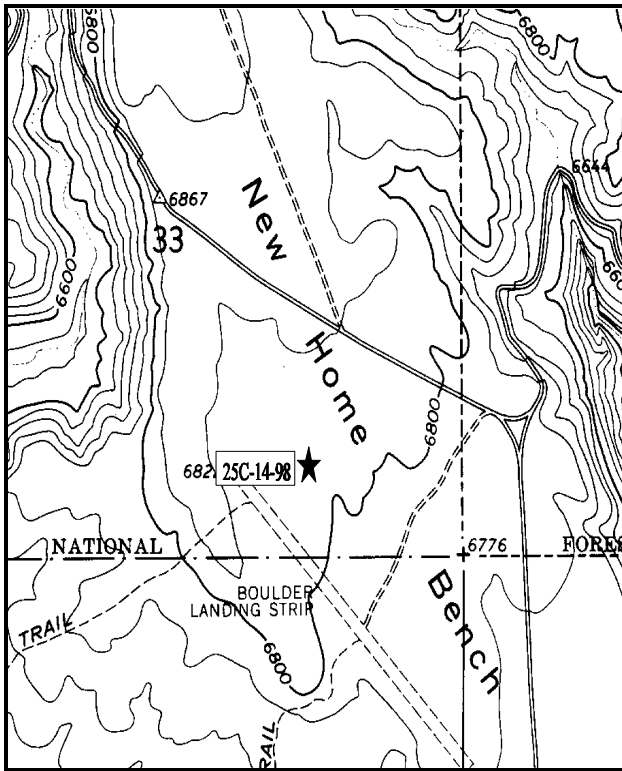
Range type: Big Sagebrush .

Compass bearing: frequency baseline 165 M degrees. Lines 2-4 346°M.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

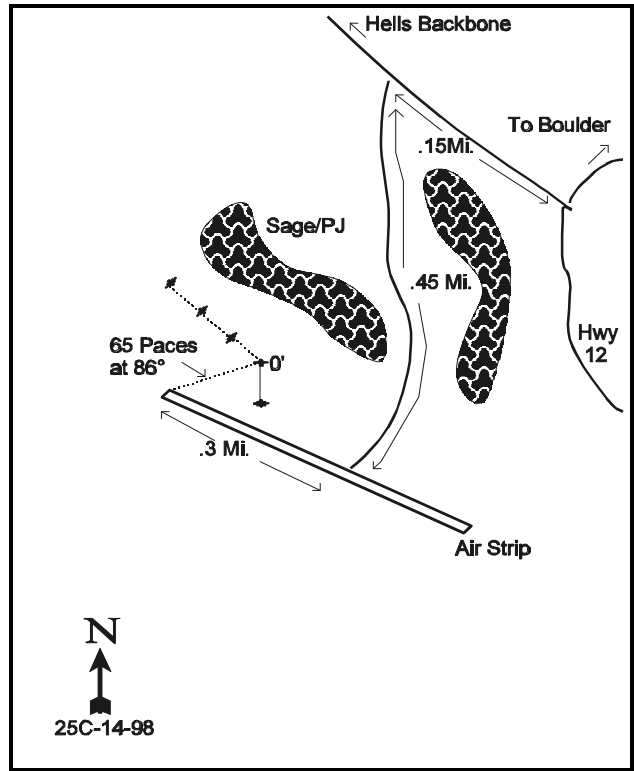
LOCATION DESCRIPTION

Take SR12 southwest out of Boulder for approximately 3 miles to the top of the bench above Dry Hollow. Turn onto the Hells Backbone-Salt Gulch Road. Travel 0.15 miles northwest to a road turning off to the left. Go 0.45 miles on this road to the Boulder airstrip. Turn right and drive down the airstrip 0.3 miles. The transect starts approximately 65 paces from the end of the airstrip, bearing 86 degrees. The 0-foot baseline stake, a 1-foot tall fence post, is marked by browse tag #7145.



Map Name: Boulder Town

Township 33S, Range 4E, Section 33



Diagrammatic Sketch

UTM 4193394.211 N, 459012.327 E

DISCUSSION

Trend Study No. 25C-14 (51B-3)

The New Home Bench study site is on the south side of Boulder Mountain, where the sagebrush range type occupies a relatively small area, and is usually found interspersed with pinyon-juniper woodland. These sage flats, such as the one on New Home Bench, are important as deer winter ranges. The large bench where the trend study is located is nearly level with a slope of 1-2% and an east to northeast aspect. Elevation is 6,800 feet. The small drainage east of the study site drains toward the south. Data from the nearby New Home Bench (6,900ft) pellet group transect indicates an average of 13 deer days use/acre between 1987-88 and 1990-91 (Jense 1992), down to an average of only 4 ddu/acre between 1991-92 and 1995-96 (Evans 1996). Pellet group data from the site in 1998 estimate a much higher use at 66 deer days use/acre. A couple of cow pats were also encountered. This area is in a summer grazing, 3 pasture rest rotation grazing system. The season of use is from mid June to mid October.

The soil is a sandy loam with a neutral pH (6.8). Effective rooting depth (see methods) is estimated at just over 13 inches with little rock on the surface or within the profile. Soil is loose and susceptible to both wind and water induced soil disturbance. The sparse vegetative, litter, and cryptogam cover provide some soil protection, but bare soil is abundant averaging 58% cover since 1987. The well developed cryptogams on this site are an important factor in soil stabilization with ground cover estimates of 10% in 1987 increasing to 12% by 1998. However, cryptogamic cover are concentrated only under sagebrush canopies. Erosion is not severe, however localized soil movement is occurring and soil pedestaling is evident around shrubs.

The dominant vegetation on the site is an old stand of Wyoming big sagebrush. First impressions indicate a stand composed only of moderately to heavily hedged mature and decadent plants. However, close examination during the 1987 reading of the density plots yielded a population split more evenly among age classes than first thought. The seedlings (biotic potential of 12%), young (24%), mature (37%), and decadent (39%) made up the 2,332 plants/acre in 1987. In 1991, the number of seedlings dropped to only 1% of the population (33 plants /acre) and young remained constant at 24%. Density increased to 4,120 plants/acre in 1998, due largely to the much larger sample used that year. This new sample better estimates shrub populations which often have aggregated and/or discontinuous distributions. The major difference between 1991 and 1998 is in the number of mature plants which increased from 300 to 2,140 plants/acre. Young and decadent sagebrush were found in similar densities compared to 1991 data. Utilization of Wyoming big sagebrush was moderate to heavy in 1987 and 1991, but more moderate in 1998. Poor vigor and percent decadence peaked in 1991 at 35% and 63% respectively. Currently, vigor is good on all but 17% of the decadent plants. Percent decadence has declined to 35%. Dead plants, first counted in 1998, are numerous at 1,240 plants/acre. It would appear that the sagebrush on this site has a relatively rapid turnover.

There are a few other browse species which also provide some forage including ephedra and a few slenderbush eriogonum. In 1987, broom snakeweed was reported to be aggressively invading the disturbed sites along the roads, but was infrequent within the sagebrush. The larger sample size used in 1998 picked up broom snakeweed on the site with an estimated density of 2,720 plants/acre. Age class distribution would indicate an expanding population. Pinyon and juniper trees also appear to be increasing on the flat. Point quarter data from 1998 estimate 28 pinyon and 26 juniper trees/acre with an average diameter of 3.4 and 3.7 inches respectively. Mature trees are in the 8 to 10 foot range.

Density and diversity of herbaceous plants is very low. Blue grama is the only common perennial grass species with a quadrat frequency of 59% in 1991, declining to 35% by 1998. Bottlebrush squirreltail and needle-and-thread are moderately abundant. The most abundant grass on the site is the annual, sixweeks fescue. It is very low growing and provides little useful forage. Forbs are depleted and nearly absent.

1991 TREND ASSESSMENT

The soil trend at this time would be considered stable to slightly declining. Basal vegetative cover did increase to 6%, and the high proportion of bare ground also increased slightly. Percent litter cover has decreased from only 28% down to 21%. Recent soil movement was detectable on the site in 1991 and washes in the area are active. There appeared to be a great deal of soil pedestaling around the sagebrush. Wyoming big sagebrush, the key browse species, increased its population by a little over only 1%, but percent decadency has gone up from 39% to 63%. Biotic potential in 1987 was at 14% and in 1991 it was only at 1%. This would indicate a slightly downward trend for key browse on this site. Grass species either declined in quadrat frequency or remained unchanged since the last reading. One species of note, Indian ricegrass, had a noteworthy increase in quadrat frequency. With the exception of scarlet globemallow, none of the forbs encountered in 1987 were still growing on the site in 1991, so the trend for herbaceous understory is down.

TREND ASSESSMENT

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

1998 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground and an increase in litter cover. Trend for Wyoming big sagebrush is up slightly. The increase in density is partly due to the larger sample used in 1998, but vigor is improved and percent decadence has declined from 63% to 35%. Reproduction is also improved since 1991. Trend for the herbaceous understory is stable and depleted. Sum of nested frequency of perennial grasses and forbs remained similar to 1991 estimates. The annual, sixweeks fescue, increased significantly in nested frequency and is now the most abundant grass on the site. Forbs are severely lacking.

TREND ASSESSMENT

- soil - up slightly
- browse - up slightly
- herbaceous understory - stable, but depleted

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 14

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
G	Bouteloua gracilis	_b 149	_b 144	_a 91	65	59	35	4.32
G	Oryzopsis hymenoides	1	13	6	1	5	4	.05
G	Sitanion hystrix	_a 19	_a 19	59	11	11	25	1.23
G	Stipa comata	_a 25	_a 13	_b 47	14	7	26	1.27
G	Vulpia octoflora (a)	-	_a 18	_b 202	-	12	64	8.65
Total Annual Grasses		0	18	202	0	12	64	8.65
Total Perennial Grasses		194	189	203	91	82	90	6.90
F	Cryptantha fulvocanescens	2	-	-	2	-	-	-
F	Descurainia pinnata (a)	-	-	5	-	-	2	.01
F	Eriogonum spp.	-	-	6	-	-	2	.06

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
F	Erigeron pumilus	-	-	2	-	-	1	.00
F	Machaeranthera canescens	4	-	-	2	-	-	-
F	Phlox longifolia	4	-	-	3	-	-	-
F	Sphaeralcea coccinea	_b 9	_b 6	_a -	5	5	-	-
F	Unknown forb-perennial	3	-	-	1	-	-	-
Total Annual Forbs		0	0	5	0	0	2	0.04
Total Perennial Forbs		22	6	8	13	5	3	0.03

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

BROWSE TRENDS --

Herd unit 25C, Study no: 14

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	85	18.72
B	Ephedra torreyana	4	-
B	Eriogonum microthecum	2	.03
B	Gutierrezia sarothrae	31	.95
B	Juniperus osteosperma	1	.38
B	Opuntia spp.	2	-
B	Pinus edulis	0	-
Total for Browse		125	20.08

BASIC COVER --

Herd unit 25C, Study no: 14

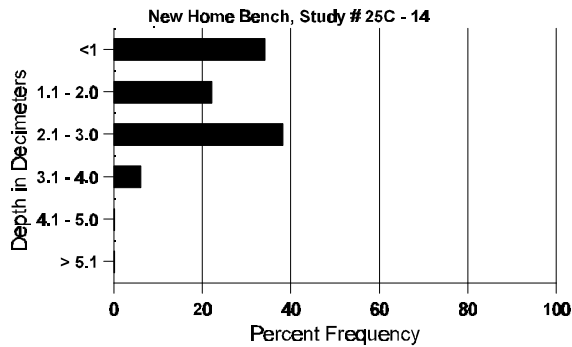
Cover Type	Nested Frequency '98	Average Cover %		
		'87	'91	'98
Vegetation	298	3.00	5.75	31.96
Rock	27	0	0	.22
Pavement	121	0	.25	2.53
Litter	383	27.50	20.50	29.28
Cryptogams	186	10.00	10.75	12.31
Bare Ground	362	59.50	62.75	51.56

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 14, Study Name: New Home Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.3	59.6 (14.3)	6.8	69.4	12.0	18.6	1.0	12.4	112.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 14

Type	Quadrat Frequency '98
Rabbit	38
Deer	38

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 14

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																		
S	87	9	1	-	-	-	-	-	-	-	10	-	-	-	333			10
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	33			1
	98	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
Y	87	9	6	2	-	-	-	-	-	-	17	-	-	-	566			17
	91	7	4	-	-	2	-	4	-	-	17	-	-	-	566			17
	98	15	6	6	-	-	-	-	-	-	27	-	-	-	540			27
M	87	3	11	12	-	-	-	-	-	-	26	-	-	-	866	29	30	26
	91	-	1	3	-	3	2	-	-	-	9	-	-	-	300	21	28	9
	98	54	45	8	-	-	-	-	-	-	107	-	-	-	2140	22	32	107
D	87	9	3	15	-	-	-	-	-	-	20	-	1	6	900			27
	91	2	10	10	1	9	12	1	-	-	20	-	3	22	1500			45
	98	36	30	6	-	-	-	-	-	-	60	-	-	12	1440			72
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1240			62
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		29%			41%			10%			+ 1%							
'91		41%			38%			35%			+43%							
'98		39%			10%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	2332	Dec:	39%			
												'91	2366		63%			
												'98	4120		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				
<i>Ephedra torreyana</i>																		
Y	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	2	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	66	9	6	1
	98	-	2	5	-	-	-	-	-	-	7	-	-	-	140	11	12	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		100%			00%			00%			+50%							
'91		100%			00%			00%			+63%							
'98		44%			56%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'91	66		-			
												'98	180		-			
<i>Eriogonum microthecum</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	40		-			
<i>Gutierrezia sarothrae</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	18	-	-	-	-	-	-	-	-	18	-	-	-	360			18
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	40	-	-	-	-	-	-	-	-	40	-	-	-	800			40
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	93	-	-	2	-	-	-	-	-	95	-	-	-	1900	8	9	95
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'91	0		0%			
												'98	2720		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			
Juniperus osteosperma																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		100%			00%			00%			-70%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	66		-		
												'98	20		-		
Opuntia spp.																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	2	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%			-40%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	133		-		
												'98	80		-		
Pinus edulis																	
S	87	-	-	-	-	-	-	1	-	-	-	1	-	-	33		1
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	33		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	1	-	1	-	-	-	33	118	98
	91	1	-	-	1	-	-	-	-	-	2	-	-	-	66	152	86
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+ 0%						
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-		
												'91	66		-		
												'98	0		-		

Trend Study 25C-15-98

Study site name: Steep Creek Bench .

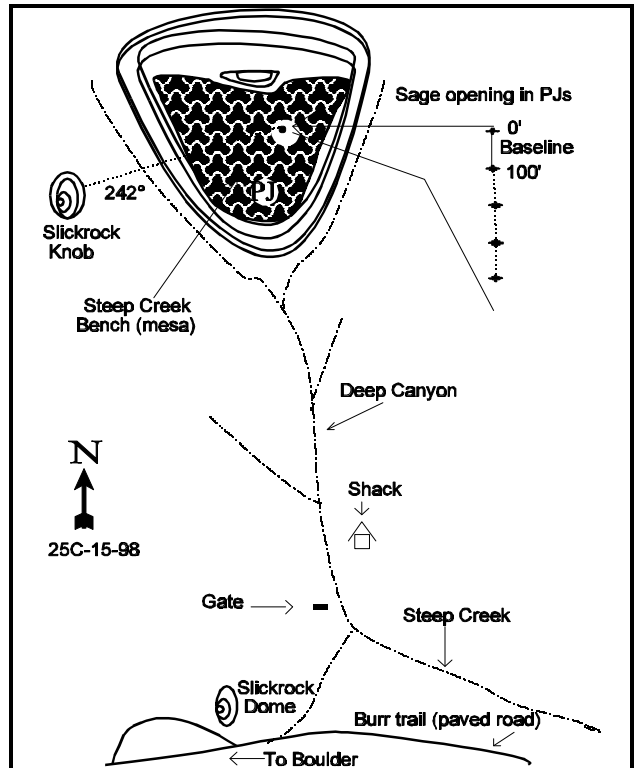
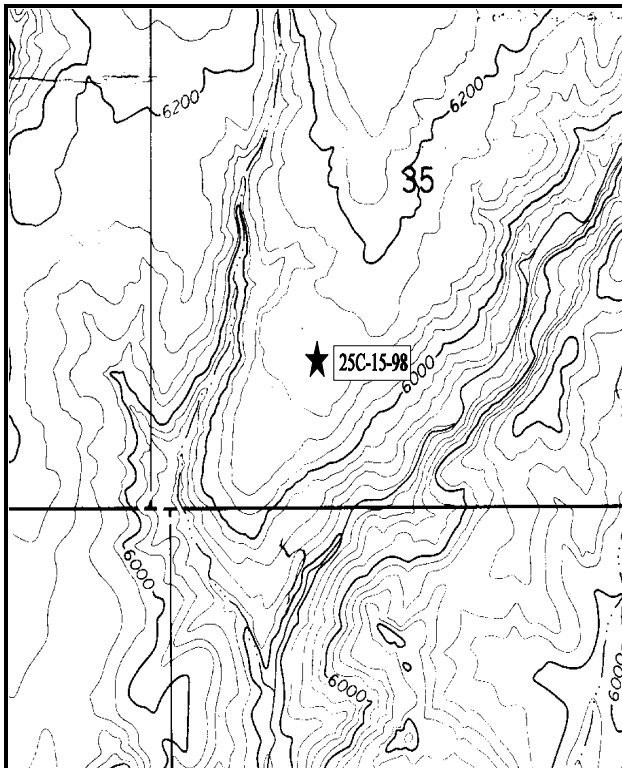
Range type: Pinyon-Juniper .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

LOCATION DESCRIPTION

From the town of Boulder, take the Burr Trail for about 6.2 miles to Deer Creek. Continue on the road for 2.0 miles to a large sandstone monolith on the left with a dirt road at its base. This is the start of the trail to Steep Creek. Follow the wash on the east side of the Slickrock Dome 1/2 - 3/4 miles north to Steep Creek, then travel up the creek bottom for approximately 1 mile to a minor fork. Pick your way up the ridge between Steep Creek and the fork to the top of the bench. Continue north through the P-J to the first major sage/grass opening. The transect is located in this opening. Bearings to visible landmarks are detailed on the accompanying map. The study markers are 1-foot tall fenceposts, and the 0-foot baseline stake is tagged #7132.



Map Name: Steep Creek Bench

Diagrammatic Sketch

Township 33S, Range 5E, Section 35

UTM 4193507.175 N, 471324.269 E

DISCUSSION

Trend Study No. 25C-15 (44-15)

Steep Creek Bench is located in the rugged, inaccessible canyon country of "The Gulch" drainage south of Boulder Mountain. Deer and elk that move south off the mountain can end up here in winter. There are a few deer that stay in this low country all year long. Low annual precipitation, slick rock, and sandy soil limit the potential vegetative types to "sparse" pinyon-juniper with scattered small open parks of sagebrush and grass. This extensive type is represented by the study on the south end of Steep Creek Bench. The terrain is basically level at the site and exposure is insignificant with an elevation of 6,100 feet. The area is used by deer and cattle. Pellet group data from 1998 estimate 27 deer and 9 cow days use/acre. Cow sign appeared to be from the previous winter. Deer antler sheds were also found in 1998. Pellet group quadrat frequency data shows similar use in 1994. Rabbit sign is also frequent.

The typical soil is a deep, loose sand with an effective rooting depth (see methods) estimated at just over 22 inches. The soil has a neutral pH (7.2). Phosphorus may be limiting to plant development at only 3 ppm, when 10 ppm is considered a minimum value. Soil organic matter is also very low at only 0.3%. Percent bare ground is abundant ranging from 65% in 1991 to in 47% in 1998. In some recurrent open spots, constantly shifting dunes are formed by the wind. Weather-scoured depressions and wind deposition cause more significant soil movement than water erosion.

Mature pinyon-juniper is the dominant overstory. The stand is open, with many stunted older trees because of poor site potential. Point quarter data taken in 1994, estimates tree density at 54 trees/acre, with pinyon being the most abundant. Point quarter data from 1998 estimate 33 pinyon and 26 juniper trees/acre. Average basal diameter of pinyon is 8.9 inches while juniper averages 22.8 inches. Pinyon and juniper combine to provide half of the browse cover on the site. The trees provide good cover, but are rarely utilized for forage.

Wyoming big sagebrush occurs within the openings. The stand is old and not very abundant producing just over 2% cover in 1994 and almost 4% in 1998. Density was estimated at 532 plants/acre in 1987, 25% of which were classified as young. The population dropped 12% as of 1991 with 466 plants/acre and 28% young. The new, much larger sample taken in 1994 estimated 780 plants/acre, all of which were mature or decadent plants. Some seedlings were encountered (100 plants/acre), giving a biotic potential of 13% which is good. Density declined 13% by 1998 to 680 plants/acre. No seedlings were encountered, but some young plants were counted. The sagebrush has been hedged heavily in the past and recovery appears to be slow on this dry site. Use was light to moderate in 1994 and 1998. Percent decadency has declined from a high of 64% in 1991, to 41% by 1994, and 38% by 1998. Poor vigor, especially for decadent plants, was very high at 38% in 1987. Vigor improved greatly by 1994, with only 8% of the population displaying poor vigor. However, that has increased to 21% by 1998. Currently ('98), 54% of the decadent sagebrush are classified as dying and young plants are not currently abundant enough to maintain the population under current conditions.

A few scraggly rubber rabbitbrush and ephedra were the only other palatable browse encountered on this end of the mesa. The most numerous woody plant is a small broom snakeweed which appears to be increasing. Population density was reported at 2,699 plants per acre in 1987, dropping by 91% to only 233 plants/acre in 1991. Numbers then rebounded in 1994 to 1,400, mostly mature snakeweed plants/acre. By 1998, density rose 62% to 3,660 plants/acre with abundant seedlings (biotic potential 10%) and young (43%) indicating an expanding population.

Herbaceous forage is limited. The most abundant grasses, sandhill muhly and blue grama, are both warm season increaser species. They are not very palatable or productive, but in high numbers, they can provide good soil protection. Other species include sand dropseed, Indian ricegrass, and bottlebrush squirreltail. All grasses combined produced only 6% cover in 1994 and 7% in 1998. Forbs are very limited. The only fairly common species is Carruth sage and a cryptantha which provided 90% of the forb cover in 1998.

1991 TREND ASSESSMENT

There is almost no rock or pavement to help protect what soils are left after the soil is eroded away by the wind and water. Vegetative basal cover is almost unchanged, from 4% to 5%. Litter cover has gone from 34% down to 24%. Percent bare ground has increased from 58% to 65%. Cryptogams have increased from 4% to 6%. This still points to a downward trend for soil. The key browse species, Wyoming big sagebrush, has decreased by 12% with percent decadency going from 31% up to 64%. The population in 1991 is now at only 466 plants/acre. The only good point for browse on this site was that broom snakeweed's population decreased by 91%. The trend for browse would still be down. The forb component of the herbaceous understory is poor. Most species only occur at very low frequencies. Carruth sage is the only forb with a very high frequency. There are five grasses that occur on the site, all are warm season increaser species except for Indian ricegrass, which is a cool season grass that has increased since the 1987 survey. This would indicate a slightly downward trend.

TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - slightly downward

1994 TREND ASSESSMENT

Basic ground cover has continued to decline slightly since 1991. Percent bare ground for 1994 is 64% and cryptogamic crusts have declined from 6% cover to 2%. The new method used this year estimates aerial cover instead of basal cover so comparisons between 1991 and 1994 on vegetation cover should not be made. However, aerial cover is quite low at 14%. Trend for soil is slightly down. Trend for browse is mixed. Percent decadency has declined for Wyoming big sagebrush, vigor has improved and no shrubs were heavily hedged. The only down side for sagebrush is the lack of seedling and young plants. Another negative factor is the apparent rebound in the broom snakeweed population. Some, but probably not all of the increase in snakeweed can be explained by the new larger sample taken in 1994. Trend for browse is, therefore, stable at this time and will likely improve with normal precipitation patterns. The herbaceous understory is in poor condition and dominated by warm season increasers, sandhill muhly and blue grama, which produce little forage. The more preferred grasses, Indian ricegrass and prairie Junegrass, both declined in nested frequency, while blue grama and sandhill muhly increased. Forbs are scarce. Sum of nested frequency of perennial grasses and forbs has declined since 1991 indicating a slightly downward trend.

TREND ASSESSMENT

soil - slightly down

browse - stable

herbaceous understory - slightly downward

1998 TREND ASSESSMENT

Trend for soil is up with a major decline in percent bare ground from 64% in 1994 to 47% by 1998. In addition, litter cover doubled and cover of cryptogamic plants increased from only 2% to 15%. The rise in cryptogamic cover may be partly due to recent rain which makes these crusts easier to see. Vegetative cover also increased from 14% to 20%. Trend for the key browse species, Wyoming big sagebrush, is down slightly. Utilization is heavier than 1994, there is a higher proportion of plants displaying poor vigor, percent decadence is similar, but reproduction is still poor. Currently, there are more decadent/dying sagebrush (140 plants/acre) than young plants to replace them (80 plants/acre). In addition, density has declined 13% since 1994 and broom snakeweed has increased 62% and appears to be increasing. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses and forbs has increased. Production of forbs increased from less than 1% cover in 1994 to 3.7% by 1998. This is most likely due to better precipitation patterns which occurred in 1997 and 1998.

TREND ASSESSMENT

soil - up, but still very poor

browse - down slightly

herbaceous understory - up slightly

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 15

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'04	'08
G	<i>Bouteloua gracilis</i>	ab45	a36	ab49	b71	18	16	20	28	.80	1.95
G	<i>Hilaria jamesii</i>	-	-	5	-	-	-	2	-	.03	-
G	<i>Muhlenbergia pungens</i>	80	116	109	101	35	43	39	39	4.89	4.05
G	<i>Munroa squarrosa</i> (a)	-	3	-	-	-	1	-	-	-	-
G	<i>Oryzopsis hymenoides</i>	ab22	b35	a18	ab32	9	17	8	14	.23	.12
G	<i>Sitanion hystrix</i>	-	-	1	2	-	-	1	2	.03	.01
G	<i>Sporobolus cryptandrus</i>	30	23	11	24	14	12	7	11	.13	.23
G	<i>Vulpia octoflora</i> (a)	-	-	a3	b32	-	-	1	14	.00	.07
Total Annual Grasses		0	3	3	32	0	1	1	14	0	0.07
Total Perennial Grasses		177	210	193	230	76	88	77	94	6.14	6.38
F	<i>Ambrosia acanthicarpa</i>	-	3	-	-	-	1	-	-	-	-
F	<i>Arabis</i> spp.	-	-	3	2	-	-	1	1	.00	.00
F	<i>Artemisia carruthii</i>	c58	a16	ab26	bc44	31	7	13	22	.74	1.16
F	<i>Astragalus</i> spp.	-	-	-	5	-	-	-	3	-	.01
F	<i>Chenopodium album</i> (a)	-	3	-	-	-	2	-	-	-	-
F	<i>Cryptantha cinerea</i>	a2	a7	a2	b32	1	5	1	13	.00	2.19
F	<i>Descurainia pinnata</i> (a)	-	-	10	5	-	-	3	3	.01	.01
F	<i>Dithyrea wislizeni</i> (a)	-	5	-	-	-	3	-	-	-	-
F	<i>Eriogonum cernuum</i> (a)	-	3	2	-	-	2	1	-	.00	-
F	<i>Erigeron</i> spp.	-	-	-	1	-	-	-	1	-	.00
F	<i>Gilia</i> spp. (a)	-	-	-	17	-	-	-	10	-	.10
F	<i>Hymenopappus filifolius</i>	5	1	-	-	4	1	-	-	-	-
F	<i>Lappula occidentalis</i> (a)	-	-	-	3	-	-	-	1	-	.00
F	<i>Oenothera latifolia</i>	a-	a-	a-	b25	-	-	-	12	-	.18
F	<i>Penstemon</i> spp.	-	-	2	4	-	-	1	2	.00	.01
F	<i>Phlox longifolia</i>	-	-	-	4	-	-	-	2	-	.01
F	<i>Stephanomeria</i> spp.	-	2	-	-	-	1	-	-	-	-
F	Unknown forb-perennial	12	-	-	-	8	-	-	-	-	-
Total Annual Forbs		0	11	12	25	0	7	4	14	0.01	0.11
Total Perennial Forbs		77	29	33	117	44	15	16	56	.76	3.61

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

BROWSE TRENDS --
Herd unit 25C, Study no: 15

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Artemisia tridentata wyomingensis	26	27	2.43	3.52
B	Chrysothamnus nauseosus	0	1	-	-
B	Chrysothamnus viscidiflorus	0	1	-	-
B	Ephedra viridis	1	0	.85	-
B	Gutierrezia sarothrae	36	47	.50	.93
B	Juniperus osteosperma	0	2	1.92	2.38
B	Opuntia spp.	5	5	.00	.15
B	Pinus edulis	0	2	2.20	2.26
Total for Browse		68	85	7.90	9.27

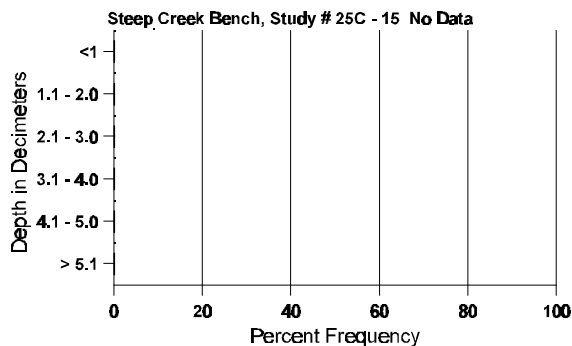
BASIC COVER --
Herd unit 25C, Study no: 15

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'87	'91	'94	'98
Vegetation	223	252	3.75	4.75	13.81	20.29
Rock	18	-	0	0	.04	0
Pavement	15	22	0	.25	.05	.13
Litter	346	381	34.00	24.25	15.37	29.97
Cryptogams	90	205	4.00	6.00	1.75	14.82
Bare Ground	376	362	58.25	64.75	63.95	46.70

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 15, Study Name: Steep Creek Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
22.4	59.0 (17.7)	7.2	89.4	4.4	6.2	.3	3.0	67.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 15

Type	Quadrat Frequency	
	'04	'08
Rabbit	33	34
Horse	-	3
Deer	12	18
Cattle	2	2

BROWSE CHARACTERISTICS --

Herd unit 25C, 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 wyomingensis</i>																		
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	3	-	-	2	-	-	-	-	-	5	-	-	-	100			5
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	'87	3	1	-	-	-	-	-	-	-	3	-	1	-	133			4
	'91	-	2	-	-	2	-	-	-	-	4	-	-	-	133			4
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	2	-	-	2	-	-	-	-	-	4	-	-	-	80			4
M	'87	2	3	2	-	-	-	-	-	-	5	-	2	-	233	30	27	7
	'91	-	1	-	-	-	-	-	-	-	1	-	-	-	33	13	8	1
	'94	21	2	-	-	-	-	-	-	-	23	-	-	-	460	20	34	23
	'98	11	6	-	-	-	-	-	-	-	17	-	-	-	340	22	34	17
D	'87	3	1	1	-	-	-	-	-	-	1	1	3	-	166			5
	'91	-	3	1	-	4	-	1	-	-	5	-	-	4	300			9
	'94	10	3	-	2	-	-	1	-	-	13	-	-	3	320			16
	'98	6	7	-	-	-	-	-	-	-	6	-	-	7	260			13
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	2	-	-	-	2	-	-	-	-	2	-	-	-	320			16
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	340			17
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		31%			19%			38%			-12%							
'91		86%			07%			29%			+40%							
'94		13%			00%			08%			-13%							
'98		38%			00%			21%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	532	Dec:	31%			
												'91	466		64%			
												'94	780		41%			
												'98	680		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	5	6	7	8	9	1	2	3	4				
Chrysothamnus nauseosus																	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	123 34	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	-			
											'91	0		-			
											'94	0		-			
											'98	20		-			
Chrysothamnus viscidiflorus																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	15 16	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'91	0		-			
											'94	0		-			
											'98	40		-			
Ephedra viridis																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	94	-	-	1	-	-	-	-	-	-	1	-	-	-	20	29 48	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			100%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'91	0		-			
											'94	20		-			
											'98	0		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total										
		1	2	3	4		1	2											
<i>Gutierrezia sarothrae</i>																			
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	91	1	-	-	-	-	-	-	-	1	-	-	-	33		1			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	98	22	-	-	-	-	-	-	-	22	-	-	-	440		22			
Y	87	18	-	-	-	-	-	-	-	15	-	-	3	600		18			
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	15	-	-	-	-	-	-	-	15	-	-	-	300		15			
	98	78	-	-	-	-	-	-	-	78	-	-	-	1560		78			
M	87	59	-	-	-	-	-	-	-	58	-	1	-	1966	5	5	59		
	91	7	-	-	-	-	-	-	-	7	-	-	-	233	8	8	7		
	94	53	-	-	-	-	-	-	-	53	-	-	-	1060	6	9	53		
	98	104	-	-	-	-	-	-	-	104	-	-	-	2080	8	11	104		
D	87	4	-	-	-	-	-	-	-	1	-	2	1	133		4			
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	1	-	-	1	-	-	-	-	2	-	-	-	40		2			
	98	1	-	-	-	-	-	-	-	-	-	-	1	20		1			
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	-	-	-	-	-	-	-	-	-	-	-	-	20		1			
	98	-	-	-	-	-	-	-	-	-	-	-	-	160		8			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'87		00%		00%		09%		-91%											
'91		00%		00%		00%		+83%											
'94		00%		00%		00%		+62%											
'98		00%		00%		.54%													
Total Plants/Acre (excluding Dead & Seedlings)										'87	2699	Dec:	5%						
										'91	233		0%						
										'94	1400		3%						
										'98	3660		1%						
<i>Juniperus osteosperma</i>																			
M	87	-	-	-	-	-	-	1	-	-	1	-	-	33	236	138	1		
	91	-	-	-	-	-	-	-	1	1	-	-	-	33	236	142	1		
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
	98	-	-	-	-	-	-	-	2	2	-	-	-	40	-	-	2		
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0			
	98	-	-	-	-	-	-	-	-	-	-	-	-	20		1			
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>											
'87		00%		00%		00%		+ 0%											
'91		00%		00%		00%													
'94		00%		00%		00%													
'98		00%		00%		00%													
Total Plants/Acre (excluding Dead & Seedlings)										'87	33	Dec:	-						
										'91	33		-						
										'94	0		-						
										'98	40		-						

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3
	91	12	-	-	-	-	-	-	-	-	12	-	-	-	400		12
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	7	-	-	-	-	-	-	-	-	7	-	-	-	233	3 6	7
	91	6	-	-	-	-	-	-	-	-	6	-	-	-	200	4 10	6
	94	18	-	-	-	-	-	-	-	-	18	-	-	-	360	3 16	18
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	4 12	4
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	1	-	-	-	-	-	-	-	-	-	1	-	33		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+47%						
'91		05%			00%			05%			-40%						
'94		00%			00%			00%			-74%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	333	Dec:	0%			
											'91	633		5%			
											'94	380		0%			
											'98	100		0%			
Pinus edulis																	
S	87	-	-	-	-	-	-	1	-	-	1	-	-	-	33		1
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	33		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	-	-	-	1	-	-	-	-	-	1	-	-	-	33	157 108	1
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	33	165 118	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	98	-	-	-	-	-	-	-	1	-	1	-	-	-	20	- -	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+ 0%						
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	-			
											'91	33		-			
											'94	0		-			
											'98	40		-			

Trend Study 25C-16-98

Study site name: Whites Flat .

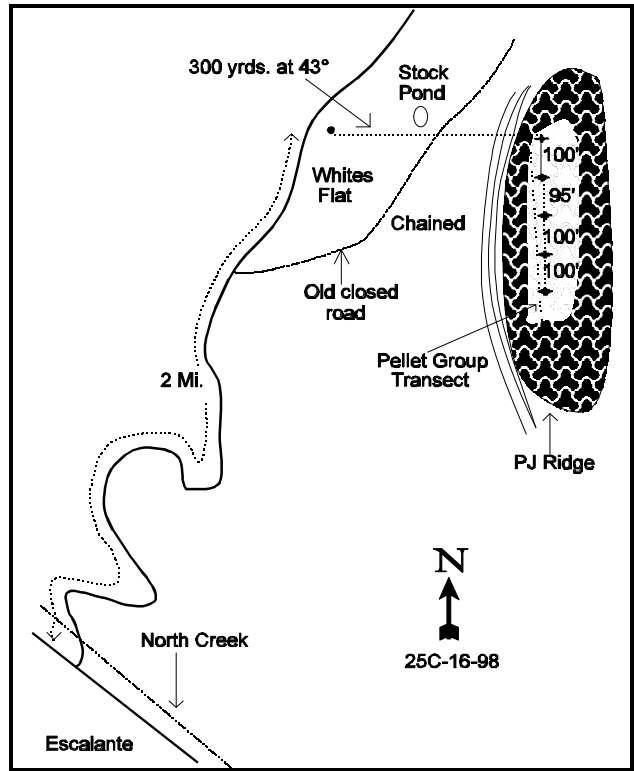
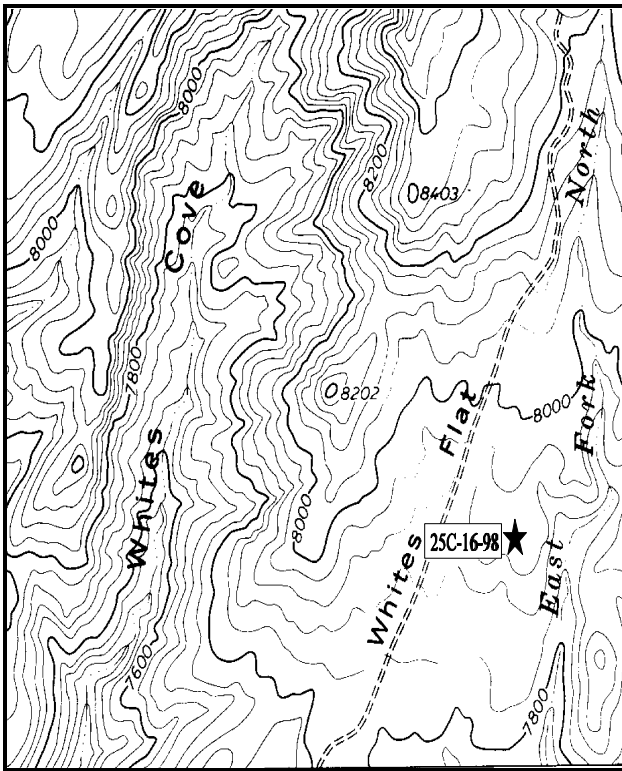
Range type: Bitterbrush .

Compass bearing: frequency baseline 159 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

LOCATION DESCRIPTION

Turn off SR 12 west of Escalante onto the North Creek Road. Follow this road 7.2 miles to North Creek Reservoir. Continue past the reservoir 2 miles to a fork. Turn right onto the Whites Flat Road. Proceed 2 miles to a witness post on the right side of the road by a pullout. The transect is located on the P-J ridge across Whites Flat at a bearing of approximately 93 degrees. Walk across the chained flat (about 1/8 mile) and onto the ridge. Look for the small yellow painted rebar marking the adjacent pellet group transect. The range trend study is marked by 2-foot tall fence posts. There is no browse tag to mark the first stake.



Map Name: Barker Reservoir

Diagrammatic Sketch

Township 34S, Range 1E, Section Unsurveyed

UTM 4192670.092 N, 433638.067 E

DISCUSSION

Trend Study No. 25C-16 (44-16)

This transect samples a well-used, high elevation deer winter range in the North Creek Basin below the rim of the Aquarius Plateau. The ridge where the transect is located is covered with pinyon-juniper, ponderosa pine, Wyoming big sagebrush, and bitterbrush. White's Flat to the west, has been chained and seeded and provides ample grass forage. Pellet group data from 1998 estimate 31 deer, 2 elk and 4 cow days use/acre. Rabbit sign was also abundant. Deer sign appeared uniformly aged from a couple of months ago. Cow sign was old and likely from last year. A deer carcass was found near the site and apparently died 3 to 4 months ago. Elk pellet groups also appeared to be a couple of months old.

Elevation at the site is 8,000 feet on a small ridge which is not much higher than the surrounding country. It is level on top and very rocky with a slight southern aspect. Soil is moderately shallow with an effective rooting depth (see methods) of 12 inches. Texture is a sandy clay loam with a moderately acid pH (6.2). Phosphorus may be limiting to plant development at 8.2 ppm, when 10 ppm is considered to be the minimum. Parent material is a basalt. Rocks are common on the surface and in the profile. Soil erosion is minimal.

Wyoming big sagebrush is the dominant key browse species along with a smaller, but important population of antelope bitterbrush. This prostrate form of bitterbrush is lightly to moderately hedged, very vigorous and productive. Density in 1987 was estimated to be 599 plants/acre, 78% of those being young plants. Biotic potential was 22% (proportion of seedlings to the population). The population increased to 799 plants/acre in 1991. The larger sample size used in 1994 estimated the population at 2,040 mature and decadent plants/acre. No seedlings or young were encountered. The larger sample size gives much better population estimates for aggregated or clumped populations. During the 1998 reading, density was estimated at 1,380 plants/acre. Due to the lack of large numbers of dead or decadent plants found in 1994, it appears that density estimates from that year may be inflated. This could have been caused by the difficulty estimating individual bitterbrush plants which have a prostrate, spreading growth form on this site. Vigor remains good, utilization light to moderate and percent decadence low. Reproduction from seed is poor but some reproduction from layering may be occurring.

Wyoming big sagebrush is abundant and provided 48% of the browse cover in 1994, down to 33% by 1998. Canopy cover of sagebrush averaged 19% in 1994 and 13% in 1998. It has a good density (considering the high conifer overstory cover) of 5,066 plants/acre in 1987, which remained quite consistent at 5,040 plants/acre by 1994. Density declined 28% to 3,640 plants/acre by 1998. The number of mature plants increased slightly but density of decadent plants declined from 2,720 to 800 plants/acre. Biotic and reproductive potentials are poor and have declined since 1987. These cycles are not unusual for shrub species which are moderately long lived. The majority of mature plants show only light to moderate hedging, with heavier use on some individuals which appear to have characteristics more like that of mountain big sagebrush.

The increaser, broom snakeweed, was common in 1987 with an estimated density of 1,199 plants/acre. That number dropped by 50%, to a population estimate of only 600 plants/acre in 1991 and 260 by 1994. Currently ('98), there are only 160 plants/acre estimated. This has been the typical pattern for broom snakeweed with the prolonged drought. Pinyon, and to a lesser extent juniper and ponderosa pine, provide quite a bit of cover on the site, but do not appear to be limiting the productivity of the more desirable shrubs. Overhead canopy cover was estimated at 3% for juniper and 15% for pinyon. Point quarter data estimated 283 pinyon and 52 juniper trees/acre in 1994. Average basal diameter of pinyon was approximately 4 inches while that of juniper was 4.4 inches. Data from 1998 estimate 267 pinyon, 62 juniper and 10 Ponderosa pine trees/acre. Average basal diameter is estimated at 5.3 inches for pinyon, 4.1 inches for juniper and 11.2 inches for Ponderosa pine. There are many young conifers, so it's numbers will likely increase in the future.

The herbaceous understory is sparse producing only 9% cover in 1994 and 8.6% in 1998. The most abundant grasses include: blue grama which provides 50% of the grass cover and bottlebrush squirreltail which makes up an additional 41%. Although grass frequency is fairly high because of the abundance blue grama, overall grass forage is limited on the site. Diversity of forbs is good, but no species are especially prevalent. Many of the forbs present in 1987 were not present in 1991 or 1994. Currently ('98), the only abundant species is silvery lupine which provides half of the forb cover.

1991 TREND ASSESSMENT

Even though vegetative basal cover declined to 4%, and bare ground rose to 7% due to the effect of the drought, this site would still be considered stable. The key browse species, Wyoming big sagebrush and antelope bitterbrush display different trends. Sagebrush appears to be declining with moderate to heavy use, poor vigor on 34% of the population, percent decadence increasing from 25% to 56%, and reduced reproduction. In addition, 59% (1,733 plants/acre) of the decadent sagebrush were classified as dying. Bitterbrush appears to have an upward trend with mostly moderate use, good vigor, low decadence and good reproduction. Density of mature plants has remained the same compared to 1987 data but the density of young plants has increased. Another positive trend indicator is that broom snakeweed's density decreased by 50%. With all of this in mind, trend for browse is considered stable. Trend for the herbaceous understory is considered down slightly due to a decline in the sum of nested frequency of both grasses and forbs. Of the 6 grasses sampled in 1987, 5 show a decline in nested frequency. Nested frequency of forbs declined substantially from 202 to only 55.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly downward

1994 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in percent bare ground and a drop in litter cover, most likely the result of the continuing drought. Although winter precipitation has been above normal in 1993 and 1994, spring and early summer precipitation was about half of normal at Boulder and Escalante in 1994. Erosion is not a problem on this site due to the gentle terrain and rocky surface. The browse trend is stable for Wyoming big sagebrush. Plants are less heavily hedged and in better vigor than those sampled in 1991. The percent decadence is still high at 54%, but only 27% (740 plants/acre) of these were classified as dying compared to the 1,733 estimated in 1991. However, no seedlings were encountered and young plants are not in sufficient numbers to maintain the current population. Trend for antelope bitterbrush has improved slightly. Shrubs are less heavily hedged, in better vigor, show a declining decadency rate, and have increased in number. Some of the difference in density may be due to the larger sample used in 1994. The lack of seedlings will likely improve with the return of normal precipitation patterns. Overall browse trend is up slightly. The herbaceous understory is sparse on this site and dominated by blue grama which is considered an increaser under grazing pressure. Nested frequencies of forbs are low, yet improved since 1991. Sum of nested frequencies of perennial grasses and forbs combined have remained similar to 1991 indicating a stable trend with a composition that is still poor. Continued increases in shrub and tree density will eventually cause more declines in the herbaceous understory.

TREND ASSESSMENT

soil - down slightly

browse - up slightly for bitterbrush, down slightly for sagebrush, stable overall

herbaceous understory - stable, but with a poor composition

1998 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground and a small increase in vegetation and litter cover. Density of both key browse species, bitterbrush and Wyoming big sagebrush, have declined since 1994 but both populations currently appear stable. Sagebrush density declined from 5,040 plants/acre to 3,640. Density of mature plants actually increased by 620 plants/acre. It appears that the decline came primarily from the decadent age class. As a result, percent decadence fell from 54% to 22%. Utilization is mostly light and vigor improved. Bitterbrush decreased 32% since 1994. Due to the lack of decadent or dead plants sampled during 1994 and 1998, the change in density appears to be caused by a problem in counting density in 1994 of the low growing, spreading bitterbrush. Utilization is heavier but vigor is good and percent decadence is very low at only 1%. Reproduction is still poor but improved from 1994. Trend for browse is stable to slightly down with a smaller but healthier population of sagebrush. Trend for the herbaceous understory is considered stable. Composition has changed slightly. Nested frequency of blue grama declined significantly while frequency of bottlebrush squirreltail increased significantly. Forbs are still limited.

TREND ASSESSMENT

soil - up slightly

browse - stable to slightly down

herbaceous understory - stable, but poor

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 16

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	04	08
G	Agropyron cristatum	-	-	-	2	-	-	-	1	.00	.01
G	Agropyron spicatum	-	-	-	5	-	-	-	3	-	.04
G	Bouteloua gracilis	_{ab} 133	_{ab} 124	_b 158	_a 115	53	48	56	45	3.65	3.10
G	Bromus tectorum (a)	-	-	-	9	-	-	-	3	-	.01
G	Carex spp.	_b 32	_b 24	_b 19	_a 2	15	14	10	1	.29	.03
G	Oryzopsis hymenoides	9	19	14	4	5	8	5	2	.08	.04
G	Poa fendleriana	35	20	26	33	16	9	11	12	1.06	.40
G	Sitanion hystrix	_c 112	_{ab} 60	_a 39	_{bc} 93	47	33	20	41	.22	2.53
G	Stipa comata	_b 37	_{ab} 15	_a 5	_a 6	15	9	2	4	.18	.02
Total Annual Grasses		0	0	0	9	0	0	0	3	0	0.01
Total Perennial Grasses		358	262	261	260	151	121	104	109	5.52	6.19
F	Alyssum alyssoides (a)	-	-	-	15	-	-	-	7	-	.06
F	Antennaria parvifolia	-	4	3	-	-	1	1	-	.15	-
F	Arabis spp.	-	3	-	8	-	2	-	3	-	.04
F	Artemesia carruthii	_b 17	_{ab} 5	_a 1	_a 2	7	3	1	1	.00	.03
F	Astragalus spp.	1	-	4	5	1	-	2	2	.01	.03
F	Castilleja chromosa	_c 26	_a -	_a -	_b 13	15	-	-	7	-	.20
F	Camelina microcarpa (a)	-	-	-	5	-	-	-	2	-	.01
F	Chaenactis douglasii	_b 25	_a 8	_a 14	_a 3	12	5	4	2	1.27	.01
F	Cruciferae	13	-	-	-	7	-	-	-	-	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	Ø4	Ø8
F	Cryptantha spp.	4	2	-	-	1	2	-	-	-	-
F	Eriogonum alatum	1	-	1	3	1	-	1	2	.00	.01
F	Erigeron flagellaris	a ⁻	a ⁻	a ⁻	b ¹¹	-	-	-	4	-	.09
F	Erigeron pumilus	b ³⁵	a ²	a ⁸	a ¹⁷	17	2	5	8	.16	.14
F	Eriogonum racemosum	b ²³	ab ²²	a ⁴	ab ¹⁴	11	8	2	6	.38	.18
F	Hymenoxys acaulis	a ⁻	a ⁻	b ¹⁰	a ⁻	-	-	4	-	.07	-
F	Hymenoxys richardsonii	-	-	1	-	-	-	1	-	.00	-
F	Lepidium spp. (a)	-	-	-	8	-	-	-	4	-	.02
F	Lotus utahensis	7	-	4	5	3	-	1	2	.15	.03
F	Lupinus argenteus	b ³⁰	a ⁻	b ¹⁸	b ²³	16	-	8	13	1.25	1.20
F	Penstemon spp.	6	-	-	-	2	-	-	-	-	-
F	Petradoria pumila	a ⁻	a ¹	a ⁻	b ¹²	-	1	-	6	-	.22
F	Phlox longifolia	5	5	-	3	2	3	-	1	-	.00
F	Sphaeralcea coccinea	5	1	7	7	3	1	5	5	.02	.10
F	Unknown forb-perennial	4	2	-	-	3	1	-	-	-	-
Total Annual Forbs		0	0	0	28	0	0	0	13	0	0.09
Total Perennial Forbs		202	55	75	126	101	29	35	62	3.50	2.31

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

BROWSE TRENDS --

Herd unit 25C, Study no: 16

Type	Species	Strip Frequency		Average Cover %	
		Ø4	Ø8	Ø4	Ø8
B	Artemisia tridentata wyomingensis	86	81	18.80	13.05
B	Chrysothamnus depressus	0	2	-	.03
B	Chrysothamnus viscidiflorus	4	3	.16	-
B	Echinocereus spp.	2	0	-	-
B	Gutierrezia sarothrae	9	4	.18	.15
B	Juniperus osteosperma	0	3	1.76	2.40
B	Opuntia spp.	7	8	.04	.84
B	Pinus edulis	0	10	9.98	11.21
B	Pinus ponderosa	0	0	-	-
B	Purshia tridentata	48	46	7.91	11.19
B	Sclerocactus	0	3	-	.00
B	Symphoricarpos oreophilus	0	0	-	-
B	Tetradymia canescens	10	8	-	.21
Total for Browse		166	168	38.86	39.09

CANOPY COVER --

Herd unit 25C, Study no: 16

Species	Percent Cover 08
Juniperus osteosperma	3
Pinus edulis	15

BASIC COVER --

Herd unit 25C, Study no: 16

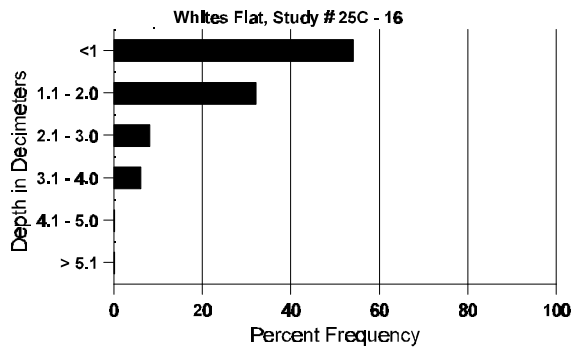
Cover Type	Nested Frequency		Average Cover %			
	04	08	'87	'91	'94	'98
Vegetation	263	263	7.25	3.75	41.23	43.01
Rock	247	249	20.00	23.25	20.37	20.27
Pavement	132	152	6.25	6.00	2.44	7.03
Litter	380	380	61.00	59.50	47.75	49.46
Cryptogams	47	34	.50	1.00	.61	.68
Bare Ground	221	192	5.00	6.50	14.48	12.28

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 16, Study Name: Whites Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.1	58.4 (12.9)	6.2	57.4	20.0	22.6	3.0	8.2	115.2	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 16

Type	Quadrat Frequency	
	04	08
Rabbit	8	22
Elk	1	-
Deer	24	19

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 16

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	6	9	3	-	-	-	-	-	-	18	-	-	-	1200			18
	91	5	-	-	2	-	-	-	-	-	7	-	-	-	466			7
	94	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
	98	2	3	-	2	-	-	-	-	-	7	-	-	-	140			7
M	87	17	11	11	-	-	-	-	-	-	39	-	-	-	2600	23	20	39
	91	11	12	4	-	1	-	-	-	-	24	4	-	-	1866	14	19	28
	94	69	33	-	2	-	-	-	-	-	104	-	-	-	2080	18	26	104
	98	112	17	-	5	1	-	-	-	-	134	-	1	-	2700	19	26	135
D	87	9	6	4	-	-	-	-	-	-	18	-	-	1	1266			19
	91	10	19	5	1	7	-	2	-	-	17	-	1	26	2933			44
	94	70	64	-	2	-	-	-	-	-	98	1	-	37	2720			136
	98	33	6	-	1	-	-	-	-	-	31	-	-	9	800			40
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1000			50
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1020			51
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		34%			24%			01%			+ 4%							
'91		49%			11%			34%			- 4%							
'94		38%			00%			15%			-28%							
'98		15%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	5066	Dec:	25%				
											'91	5265		56%				
											'94	5040		54%				
											'98	3640		22%				
<i>Chrysothamnus depressus</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	8	0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	6	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'94	0		-				
											'98	40		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus																		
Y	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'91	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	12	12	1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	5	-	-	-	-	-	-	-	-	5	-	-	-	100	9	16	5
	'98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	11	14	5
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	1	1	-	-	-	-	-	-	-	-	-	1	1	133			2
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+34%							
'91		33%			00%			67%			-40%							
'94		00%			00%			00%			-17%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	132	Dec:	0%			
												'91	199		67%			
												'94	120		17%			
												'98	100		0%			
Echinocereus spp.																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	40		-			
												'98	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>Gutierrezia sarothrae</i>								
S	87	4	-	-	-	-	-	4
	91	-	-	-	-	-	-	0
	94	-	-	-	-	-	-	0
	98	-	-	-	-	-	-	0
Y	87	7	-	-	-	-	-	7
	91	-	-	-	-	-	-	0
	94	2	-	-	-	-	-	2
	98	5	-	-	-	-	-	5
M	87	11	-	-	-	-	-	11
	91	5	-	1	-	3	-	9
	94	11	-	-	-	-	-	11
	98	3	-	-	-	-	-	3
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'87		00%	00%	00%	-50%			
'91		00%	00%	11%	-57%			
'94		00%	00%	00%	-38%			
'98		00%	00%	00%				
Total Plants/Acre (excluding Dead & Seedlings)					'87	1199	Dec:	-
					'91	600		-
					'94	260		-
					'98	160		-
<i>Juniperus osteosperma</i>								
S	87	-	-	-	-	-	-	0
	91	-	-	-	-	1	-	66
	94	-	-	-	-	-	-	0
	98	-	-	-	-	-	-	0
Y	87	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	0
	94	-	-	-	-	-	-	0
	98	2	-	-	-	-	-	2
M	87	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	0
	94	-	-	-	-	-	-	0
	98	-	-	1	-	-	-	1
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'87		00%	00%	00%				
'91		00%	00%	00%				
'94		00%	00%	00%				
'98		00%	00%	00%				
Total Plants/Acre (excluding Dead & Seedlings)					'87	0	Dec:	-
					'91	0		-
					'94	0		-
					'98	60		-

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
S	'87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	1	-	-	5	-	-	-	-	-	6	-	-	-	400		6	
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'98	1	-	-	-	-	-	2	-	-	3	-	-	-	60		3	
M	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	3	7	1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	6	-	-	-	-	-	-	-	-	6	-	-	-	120	2	4	6
	'98	5	-	-	1	-	-	1	-	-	7	-	-	-	140	3	10	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+84%							
'91		00%			00%			00%			-65%							
'94		00%			00%			00%			+30%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'91	400		-				
											'94	140		-				
											'98	200		-				
Pinus edulis																		
S	'87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	'91	2	-	-	-	-	-	2	-	-	4	-	-	-	266		4	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	4	-	-	1	-	-	-	-	-	5	-	-	-	100		5	
Y	'87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	'91	2	-	-	1	-	-	-	-	-	3	-	-	-	200		3	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	3	-	-	-	-	-	-	2	-	5	-	-	-	100	-	-	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	200	Dec:	-				
											'91	200		-				
											'94	0		-				
											'98	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				
Pinus ponderosa																		
M	'87	-	-	-	-	-	-	-	1	-	1	-	-	-	66	393	295	1
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	264	142	1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'91	66		-			
												'94	0		-			
												'98	0		-			
Purshia tridentata																		
S	'87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	'91	-	-	-	-	1	-	-	-	-	1	-	-	-	66			1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	'87	6	1	-	-	-	-	-	-	-	7	-	-	-	466			7
	'91	-	6	1	-	2	-	-	-	-	9	-	-	-	600			9
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	3	1	-	-	-	-	-	-	-	4	-	-	-	80			4
M	'87	-	-	2	-	-	-	-	-	-	2	-	-	-	133	24	33	2
	'91	-	-	-	-	2	-	-	-	-	2	-	-	-	133	20	32	2
	'94	81	17	-	1	-	-	-	-	-	99	-	-	-	1980	32	46	99
	'98	19	32	2	4	7	-	-	-	-	64	-	-	-	1280	18	40	64
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	1	-	-	-	-	-	-	-	1	66			1
	'94	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		11%			22%			00%			+25%							
'91		92%			08%			08%			+61%							
'94		17%			00%			.98%			-32%							
'98		58%			03%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	599	Dec:	0%			
												'91	799		8%			
												'94	2040		3%			
												'98	1380		1%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Sclerocactus																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	3	4	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	60		-			
Symphoricarpos oreophilus																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	18	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	61	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	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											
Tetradymia canescens																
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	1	-	1	-	-	-	66		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	2	-	-	-	-	-	-	-	2	-	-	-	133		2
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	3	-	-	-	-	-	-	-	3	-	-	-	200	10 14	3
	91	4	-	-	-	-	-	-	-	4	-	-	-	266	6 5	4
	94	8	-	-	-	-	-	-	-	8	-	-	-	160	10 12	8
	98	4	-	-	-	-	-	-	-	4	-	-	-	80	10 12	4
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	1	2	-	-	-	-	-	-	3	-	-	-	200		3
	94	3	-	-	-	-	-	-	-	3	-	-	-	60		3
	98	3	-	-	-	-	-	-	-	3	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		00%		00%		00%		+29%								
'91		29%		00%		00%		-53%								
'94		00%		00%		00%		-27%								
'98		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	333	Dec:	0%			
										'91	466		43%			
										'94	220		27%			
										'98	160		38%			

Trend Study 25C-17-98

Study site name: Varney-Griffin Chaining .

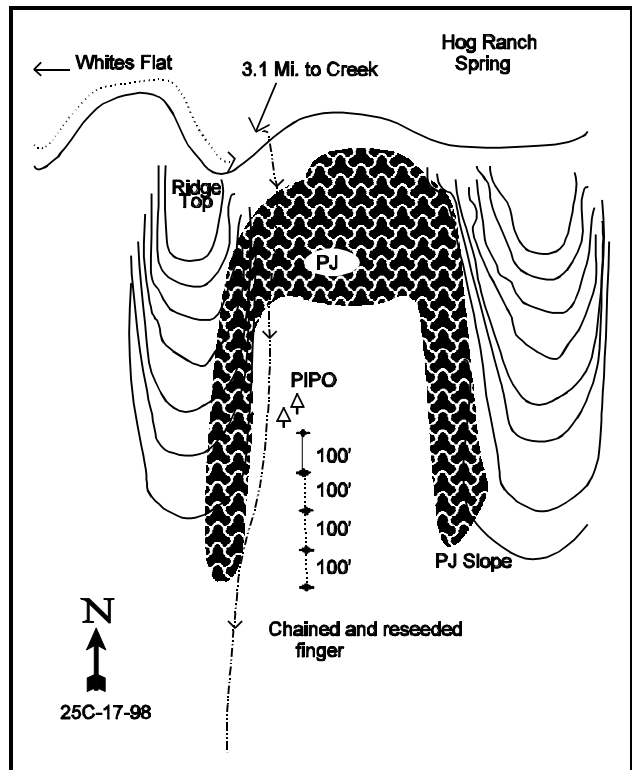
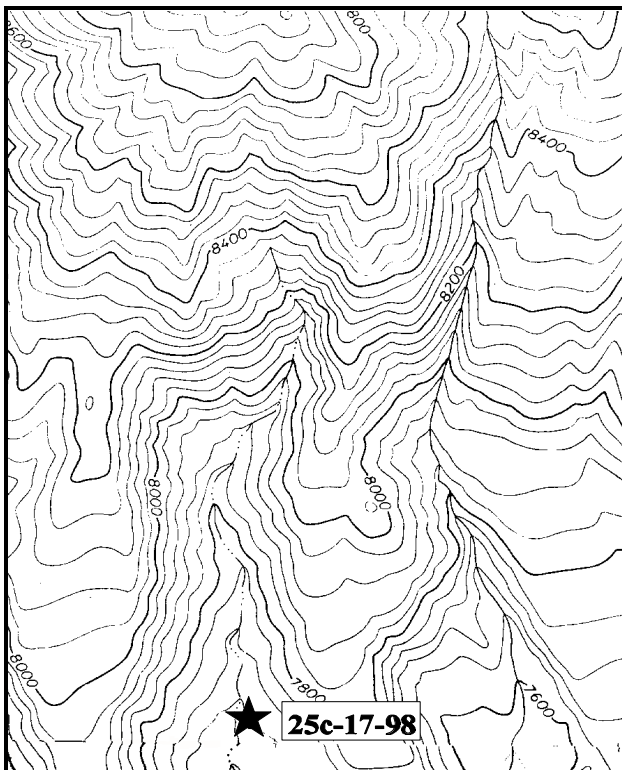
Range type: Chained-Reseeded P-J .

Compass bearing: frequency baseline 182 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From North Creek Reservoir, continue north on the main road for 2 miles to a fork. Turn right, go 2 miles to Whites Flat. Continue towards Hog Ranch Spring for 1.2 miles. Stop where the road curves across a large ridgetop. Walk along the east edge of this flat-topped ridge to where you can see the chaining in the drainage below. Hike down the side of the ridge toward the chaining. The study area is in the north end of this chained drainage. The study is marked by 1-foot tall cut fence posts.



Map Name: Wide Hollow

Diagrammatic Sketch

Township 34S , Range 1E , Section Unsurveyed

UTM 4192231.393 N, 434931.643 E

DISCUSSION

Trend Study No. 25C-17 (51B-6)

The Varney-Griffin Chaining is a 1,100 acre project completed in 1981. The chained foothills were seeded to grasses, bitterbrush, and fourwing saltbush. The transect is located in the upper end of the chaining in a narrow valley surrounded by mature pinyon-juniper and ponderosa pine. The side of the valley where the study site is located has a western aspect, draining down to a small, intermittent wash which flows south. The slope is approximately 5% with an elevation of 7,650 feet. The area did not receive much deer use in past years, but it had the potential to be excellent winter and spring range for deer and elk. By 1998, wildlife use had increased on the site. Pellet group data from 1998 estimate 26 deer, 40 elk, and 23 cow days use/acre. A few of the elk pellet groups were recent.

The soil is a moderately deep sandy loam with little rock on the surface or within the profile. Effective rooting depth (see methods) was estimated at barely 10 inches due to the compact nature of the soil which prohibited deeper soil penetrometer readings. There does not appear to be any rooting restrictions. Soil texture is a sandy loam with a slightly acid pH (6.1). Due to the high sand content, average soil temperature is high for this elevation at 72.4°F at a depth of just over 12 inches. The soil is loose and friable on the surface, permitting the establishment of a dense stand of perennial grass. There is some localized soil movement, but erosion is limited by the excellent ground cover.

Seeded grasses currently dominate the site but some browse plants are scattered throughout the chaining. Preferred species include mountain big sagebrush and bitterbrush. Density of bitterbrush is low, estimated at only 33 plants/acre in 1987 and 1991 and 40 by 1998. There were no seedling or young bitterbrush encountered during any reading. Bitterbrush displayed heavy use on all plants sampled in 1987 and 1991, although only light use was found in 1998. All plants encountered were classified as decadent in 1991, yet currently there are no decadent plants.

Only 66 plants/acre of sagebrush were estimated during the 1987 and 1991 readings, but the much larger sample used in 1998 estimated a much higher density of 820 plants/acre. These plants are lightly hedged, in good vigor and have a percent decadency of only 2%. Reproduction is good with a biotic potential of 10% and nearly 1/3 of the population classified as young plants. Seed production was also excellent in 1998.

The most numerous species is broom snakeweed which has invaded the site. Population estimates in 1987 showed a density of 2,999 plants/acre. That number decreased by 89% to only 566 plants/acre in 1991. However, the population has rebounded to 1,400 in 1998. Age class distribution indicates an expanding population. Surviving pinyon pine trees have also been released since the treatment on the site as 4 inch seedlings were quite common in 1987 (estimated density was 233/acre). There are also a few young junipers and ponderosa pines. Point quarter data from 1998 estimate a density of 54 pinyon and 22 juniper trees/acre. Average diameter of pinyon is 2.9 inches, while that of juniper is 4.9 inches. Most trees were in the 4 to 6 foot height class. Other browse occurring in the area included: Gambel oak, rubber rabbitbrush, gray horsebrush, and serviceberry.

The herbaceous understory is abundant and dominated by seeded perennial grasses which provide 88% of the grass cover. Crested wheatgrass is the most abundant, but the rhizomatous smooth brome and intermediate wheatgrass are also prominent. Blue grama, a warm season grass, is also common while other native grasses are scattered over the site. The grasses appear to be effectively competing with the browse seedlings. Seeded forbs, sweet clover and alfalfa, were observed on the site but not sampled. Eighteen forb species occurred in the frequency belts in 1987 and 1991. Twenty-six perennial and annual species were encountered in 1998. The most notable species are silvery lupine and bastard toadflax. Only light use is evident on the herbaceous plants.

1991 TREND ASSESSMENT

Basic cover characteristics for this site have not changed a great deal since 1987 with the exception of a 2 fold increase in vegetative basal cover and a decline in litter cover from 75% to 65%. Much of the loss in litter cover is probably due to the decomposition of churning litter. Collectively, pavement and rock have gone from only 1% to 3%. Percent bare ground has increased only slightly from 17% to 20%. The site is still in excellent condition and trend for soils is considered stable. There has been no change in densities for two key species, mountain big sagebrush and antelope bitterbrush. One concern for the area was the possible increase in broom snakeweed, but it's population has actually gone down by 81%, from almost 3,000 to 566 plants/acre. Trend for browse on this site is stable, but poor at this time. This site would make a good spring or fall range with the high amounts of grasses and forbs. The herbaceous understory is still in excellent condition, but only 11 out of 33 species have shown any increases in nested frequency and many of these were not in very high frequencies to begin with. Therefore, the trend is slightly downward, but it is still in excellent condition.

TREND ASSESSMENT

soil - stable

browse - stable, but still poor because of low numbers

herbaceous understory - slightly downward, an end to the extended drought would reverse this

1998 TREND ASSESSMENT

Trend for soil is up with a decline in percent bare ground from 20% to 11% and a slight increase in litter cover. Trend for browse is also up with an increase in density of the two key species, bitterbrush and mountain big sagebrush. Both species show light use, good vigor and low decadence. Sagebrush also displays improved reproduction with good numbers of seedlings and young. Trend for the herbaceous understory is mixed. Sum of nested frequency of grasses is down slightly while frequency of forbs is up slightly. The decline in nested frequency of grasses is mainly due to a significant decline in the nested frequency of blue grama, a warm season increaser, and needle-and-thread grass. Frequency of intermediate wheatgrass also declined but not significantly. Nested frequency of crested wheatgrass and smooth brome increased slightly. Forbs provide only 18% of the herbaceous vegetation cover on the site. The only forb to increase significantly was silvery lupine which is the dominant forb. With this in mind, trend for the herbaceous understory is considered stable with a change in composition for grasses.

TREND ASSESSMENT

soil - up

browse - up

herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 17

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
G	<i>Agropyron cristatum</i>	219	214	228	81	83	78	13.38
G	<i>Agropyron intermedium</i>	_b 145	_a 103	_a 69	57	45	33	1.14
G	<i>Bouteloua gracilis</i>	_b 138	_b 128	_a 39	55	52	14	.82
G	<i>Bromus inermis</i>	_a 122	_b 174	_b 188	51	67	71	6.52
G	<i>Carex</i> spp.	_a -	_a 5	_b 29	-	2	10	.46
G	<i>Elymus salina</i>	_a -	_a 7	_{ab} 4	-	4	1	.15
G	<i>Hilaria jamesii</i>	6	-	-	2	-	-	-
G	<i>Oryzopsis hymenoides</i>	11	5	3	4	2	1	.00
G	<i>Poa fendleriana</i>	_{ab} 10	_a 4	_b 23	5	2	9	.78
G	<i>Sitanion hystrix</i>	_b 9	_{ab} 2	_a 3	6	2	1	.00
G	<i>Sporobolus cryptandrus</i>	_a -	_b 12	_a 2	-	6	1	.00
G	<i>Stipa comata</i>	_{ab} 59	_b 56	_a 28	23	25	13	.43
Total Annual Grasses		0	0	0	0	0	0	0
Total Perennial Grasses		719	710	616	284	290	232	23.74
F	<i>Alyssum alyssoides</i> (a)	-	-	6	-	-	2	.01
F	<i>Androsace septentrionalis</i> (a)	-	-	8	-	-	4	.04
F	<i>Arabis</i> spp.	-	1	-	-	1	-	-
F	<i>Artemisia ludoviciana</i>	4	3	2	1	1	1	.15
F	<i>Astragalus</i> spp.	2	2	6	2	1	2	.04
F	<i>Chaenactis douglasii</i>	-	-	1	-	-	1	.00
F	<i>Comandra pallida</i>	29	22	39	10	9	13	1.08
F	<i>Cryptantha</i> spp.	10	6	7	6	2	5	.02
F	<i>Descurainia pinnata</i> (a)	6	-	1	3	-	1	.00
F	<i>Erigeron</i> spp.	_a -	_{ab} 6	_b 8	-	3	4	.04
F	<i>Eriogonum racemosum</i>	4	4	10	2	3	5	.08
F	<i>Eriogonum umbellatum</i>	6	5	5	3	3	3	.04
F	<i>Gilia</i> spp. (a)	1	-	-	1	-	-	-
F	<i>Ipomopsis aggregata</i>	-	-	5	-	-	2	.16
F	<i>Lappula occidentalis</i> (a)	-	-	1	-	-	1	.00
F	<i>Lepidium</i> spp. (a)	-	-	19	-	-	10	.05
F	<i>Lesquerella rectipes</i>	18	12	8	8	5	4	.04
F	<i>Lotus utahensis</i>	-	-	1	-	-	1	.15
F	<i>Lupinus argenteus</i>	_b 58	_a 27	_b 63	25	12	32	2.91
F	<i>Lychnis drummondii</i>	-	-	2	-	-	1	.03
F	<i>Machaeranthera canescens</i>	_b 11	_a -	_a 4	6	-	1	.00
F	<i>Medicago sativa</i>	-	-	-	-	-	-	.00
F	<i>Oenothera</i> spp.	1	3	7	1	2	3	.01
F	<i>Oenothera pallida</i>	_a 3	_{ab} 12	_b 13	1	7	6	.05

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
F	Penstemon comarrhenus	-	5	-	-	3	-	-
F	Penstemon spp.	_b 23	_a 5	_a 7	10	3	3	.04
F	Penstemon pachyphyllus	_b 8	_{ab} 1	_a -	4	1	-	-
F	Phlox longifolia	2	8	6	2	4	3	.01
F	Polygonum douglasii (a)	-	-	6	-	-	2	.01
F	Senecio multilobatus	_b 49	_a 3	_a 12	26	2	6	.08
F	Sphaeralcea coccinea	_a 8	_b 22	_a 3	3	8	2	.01
Total Annual Forbs		7	0	41	4	0	20	0.11
Total Perennial Forbs		236	147	209	110	0	98	5.01

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

BROWSE TRENDS --

Herd unit 25C, Study no: 17

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata vaseyana	31	5.81
B	Chrysothamnus viscidiflorus	8	.38
B	Gutierrezia sarothrae	30	1.21
B	Juniperus osteosperma	2	1.12
B	Pinus edulis	5	1.80
B	Pinus ponderosa	0	-
B	Purshia tridentata	2	.38
B	Quercus gambelii	4	2.51
B	Symphoricarpos oreophilus	1	.85
B	Tetradymia canescens	1	.00
Total for Browse		84	14.09

CANOPY COVER --

Herd unit 25C, Study no: 17

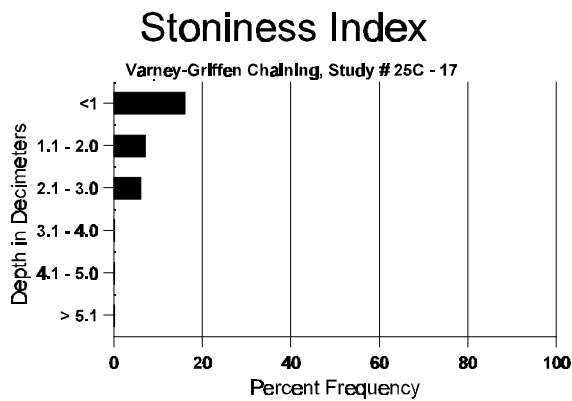
Species	Percent Cover '98
Juniperus osteosperma	.80
Quercus gambelii	1

BASIC COVER --
Herd unit 25C, Study no: 17

Cover Type	Nested Frequency '98	Average Cover %		
		'87	'91	'98
Vegetation	340	6.25	10.75	48.51
Rock	7	0	.50	.16
Pavement	134	1.25	2.25	1.11
Litter	398	74.75	65.00	68.40
Cryptogams	45	.50	1.75	.92
Bare Ground	226	17.25	19.75	10.81

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 17, Study Name: Varney-Griffin Chaining

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.8	72.4 (12.5)	6.1	73.1	12.4	14.6	1.4	12.7	134.4	.3



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 17

Type	Quadrat Frequency '98
Rabbit	52
Elk	13
Deer	9
Cattle	6

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 17

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	9	-	-	1	1	-	-	-	-	11	-	-	-	220		11	
M	87	1	1	-	-	-	-	-	-	-	2	-	-	-	66	25	21	2
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	66	29	31	2
	98	28	1	-	-	-	-	-	-	-	29	-	-	-	580	29	40	29
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		50%			00%			00%			+ 0%							
'91		00%			00%			00%			+92%							
'98		05%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%			
												'91	66		0%			
												'98	820		2%			
<i>Chrysothamnus viscidiflorus</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	33	14	9	1
	98	7	-	-	1	-	-	-	-	-	8	-	-	-	160	21	21	8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%			+82%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	33		-			
												'98	180		-			

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Gutierrezia sarothrae</i>																	
S	'87	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4
	'91	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10
	'98	26	-	-	-	-	-	-	-	-	26	-	-	-	520		26
Y	'87	19	-	-	-	-	-	-	-	-	19	-	-	-	633		19
	'91	6	1	-	-	-	-	-	-	-	5	-	2	-	233		7
	'98	33	-	-	-	-	-	-	-	-	33	-	-	-	660		33
M	'87	70	-	-	-	-	-	-	-	-	70	-	-	-	2333	9 8	70
	'91	9	-	-	-	-	-	-	-	-	8	-	1	-	300	7 8	9
	'98	37	-	-	-	-	-	-	-	-	37	-	-	-	740	12 13	37
D	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	'98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-81%						
'91		06%			00%			18%			+60%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	2999	Dec:	1%			
											'91	566		6%			
											'98	1400		0%			
<i>Juniperus osteosperma</i>																	
Y	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	'91	-	-	-	1	-	-	-	-	-	1	-	-	-	33		1
	'98	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+ 0%						
'91		00%			00%			00%			+18%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	-			
											'91	33		-			
											'98	40		-			
<i>Pinus edulis</i>																	
S	'87	8	-	-	-	-	-	-	-	-	8	-	-	-	266		8
	'91	1	-	-	-	-	-	2	-	-	3	-	-	-	100		3
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	7	-	-	-	-	-	-	-	-	4	-	3	-	233		7
	'98	3	-	-	2	-	-	-	-	-	5	-	-	-	100		5
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	- -	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			43%			-48%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'91	233		-			
											'98	120		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Pinus ponderosa																		
S	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	0		-			
Purshia tridentata																		
M	'87	-	-	1	-	-	-	-	-	-	1	-	-	-	33	12	33	1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	33	51	2
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	1	-	-	-	1	-	-	-	33		1	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%			+ 0%							
'91		00%			100%			00%			+18%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	0%			
												'91	33		100%			
												'98	40		0%			
Quercus gambelii																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	5	-	-	6	-	-	-	-	-	11	-	-	-	220	62	38	11
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	1	-	-	2	-	-	-	-	-	2	-	-	1	60		3	
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'91	0		0%			
												'98	320		19%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Symphoricarpos oreophilus</i>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	26	109	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	20		-			
<i>Tetradymia canescens</i>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	20	28	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	20		-			

Trend Study 25C-18-98

Study site name: Allen Canyon .

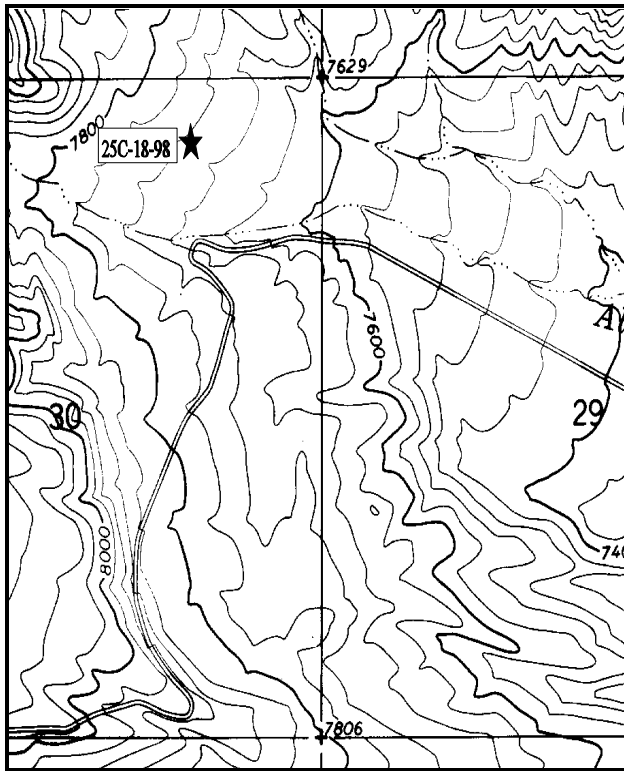
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 100 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

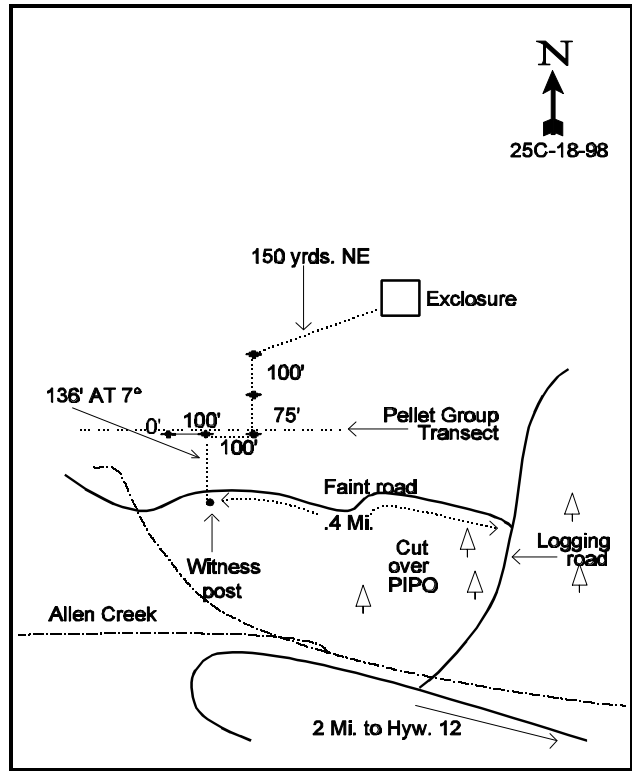
LOCATION DESCRIPTION

From mile marker #49 on SR 12 west of Escalante, continue 0.8 miles southwest to a dirt road on the right with a stop sign and sign to Allen Canyon. Turn right, go across two cattleguards. From the second cattleguard and gate, go 2.1 miles to a fork. Turn right onto this logging road and go 0.1 mile to a very faint road on the left. Follow the faint road west for 0.4 miles. There is a fence post witness post marking the study location on the left side of the road. The 100-foot end of the baseline is 136 feet north. The 0-foot end of the baseline is not marked by a browse tag.



Map Name: Upper Valley

Township 35S, Range 1E, Section 30



Diagrammatic Sketch

UTM 4177138.258 N, 427019.874 E

DISCUSSION

Trend Study No. 25C-18 (51B-7)

The Allen Canyon trend study is in an open canyon that is dominated by ponderosa pine with a mixed mountain brush range type, which is used both in summer and winter by big game. Elevation is 7,700 feet, which is at the upper limits of deer winter range and in some years is unavailable due to heavy snows. Exposure and drainage of the area is to the southeast with a slope of less than 5%. Allen Creek starts in the precipitous slopes of the east side of the Table Cliff Plateau, which is the southern tip of the Aquarius Plateau. Pellet group data from 1998 estimate 15 deer, 5 elk, and 36 cow days use/acre. Cow sign appears to be from last fall. Elk and deer pellet groups appear to be between 2 and 4 months old. Rabbits also use the site and some black bear scat was found.

Soil depth to rock is variable, but overall it appears to be moderate with an effective rooting depth estimated at 12 inches. Texture is a sandy loam with a moderately acid pH (5.6). There is little rock or pavement on the surface. Protective ground cover, in the form of litter and vegetation cover, is abundant. Nearby, large gullies continue to erode, but on the study area there is little evidence of erosion.

The study is adjacent to the Allen Canyon timber sale, a shelter-wood type harvest done in 1987. The study site consists of an open canopy of second growth, 50-foot tall Ponderosa pines. The next layer is thick with oakbrush, Utah and Rocky Mountain juniper, and snowberry. Point quarter data from 1998 estimate 26 pinyon, 10 rocky mountain juniper, and 18 Ponderosa pine trees/acre. Average diameter is estimated at 6.6 inches for pinyon, 15.2 inches for juniper and 20.3 inches for Ponderosa pine.

As browse forage, the vigorous snowberry has received the most use. Many of the mature plants showed heavy hedging in 1987 and 1991. There were an estimated 3,799 snowberry plants/ acre in 1987, increasing to 4,399 in 1991. A much larger sample taken in 1998 estimates a smaller density of 2,520 plants/acre, which provide 30% of the browse cover. Density of mature plants has remained similar between years at around 2,000 plants/acre, but young plants show a steady decline. Currently ('98), utilization is light to moderate, vigor good and percent decadence low at only 2%.

Oak is also numerous and sprouting vigorously, except for a patch of sprouts which have not been browsed. Density of oak has also declined since 1987, but this is mainly due to the reduced number of young plants sampled. Density was estimated at 9,465 plants/acre in 1987, declining to 5,865 by 1991. Currently, there are an estimated 3,249 oak stems/acre which produce a cover value of 14% that represents 44% of the total browse cover. Some of the change in density and average height and crown measurements is due to the larger sample used in 1998. Photo point comparisons show oak increasing in size to about 4 to 5 feet in height.

Bitterbrush is relatively infrequent, contributing only 2% of the browse cover. The available plants displayed moderate hedging in 1987 and 1991, but current use is mostly light. Except for the increasers, broom snakeweed and prickly pear cactus, other browse species are even less common and unutilized.

Herbaceous plants are found in the open areas between trees and shrubs. Seven species of native grass were encountered with blue grama the most common. It provides 63% of the grass cover. The only other grass species which produces more than 1% cover is annual cheatgrass. Annuals were not included in past samples, although it is now fairly abundant and produces 24% of the grass cover. Forbs are diverse, yet only silvery lupine is common and provides 84% of the forb cover. Overall, density of forbs is relatively low.

1991 TREND ASSESSMENT

Soil trend is down with percent bare ground increasing from 13% to 20% and litter cover declining from 73% to 63%. Snowberry and bitterbrush would be considered the key species for the site. Both experienced

increases since 1987 of 14% for snowberry and 40% for bitterbrush. The increaser, broom snakeweed, decreased by 33%. Percent decadency for both key species increased. Browse trend would be considered stable. Overall trend for the herbaceous understory is slightly downward because only seven out of 25 species demonstrated any improved quadrat frequency values.

TREND ASSESSMENT

- soil - stable
- browse - stable
- herbaceous understory - slightly downward

1998 TREND ASSESSMENT

Trend for soil is up slightly with a decline in percent bare ground from 20% to 12% and a slight increase in litter cover. Trend for browse is considered stable with changes in density due partly to the larger sample used in 1998 which gives more accurate estimates for browse densities. Key species, bitterbrush, snowberry, and oak show lighter use, good vigor, and low decadence. Reproduction of oak and snowberry is poor, yet adequate to maintain their populations. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has declined slightly, while frequency of perennial forbs has increased slightly. Nested frequency of the dominant forb, silvery lupine, has increased significantly from a value of only 12 to 96.

TREND ASSESSMENT

- soil - up slightly
- browse - stable
- herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 18

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
G	Agropyron intermedium	-	-	1	-	-	1	.00
G	Bouteloua gracilis	200	222	194	66	70	65	10.30
G	Bromus tectorum (a)	-	-	93	-	-	30	3.90
G	Carex spp.	5	2	1	2	2	1	.15
G	Oryzopsis hymenoides	-	8	3	-	3	2	.15
G	Poa fendleriana	a-	a7	b22	-	3	10	.59
G	Sitanion hystrix	b82	ab78	a48	39	36	23	.52
G	Sporobolus cryptandrus	8	21	11	3	10	5	.05
G	Stipa comata	b47	a10	b31	21	4	13	.58
Total Annual Grasses		0	0	93	0	0	30	3.90
Total Perennial Grasses		342	348	311	131	128	120	12.36
F	Agoseris glauca	a-	a-	b17	-	-	6	.22
F	Androsace septentrionalis (a)	-	-	4	-	-	2	.01
F	Arabis spp.	-	-	4	-	-	1	.03
F	Artemesia carruthii	14	4	12	8	2	5	.05

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
F	<i>Astragalus humistratus</i>	3	11	7	1	5	3	.06
F	<i>Chaenactis douglasii</i>	_b 14	_b 14	_a -	6	5	-	-
F	<i>Comandra pallida</i>	_b 10	_a -	_a 1	6	-	1	.03
F	<i>Collinsia parviflora</i> (a)	-	-	2	-	-	1	.00
F	Cruciferae	6	-	-	2	-	-	-
F	<i>Erigeron flagellaris</i>	_{ab} 11	_b 14	2	4	8	1	.00
F	<i>Eriogonum racemosum</i>	_a 3	_a 4	_{ab} 15	2	2	9	.25
F	<i>Eriogonum umbellatum</i>	-	-	3	-	-	1	.15
F	<i>Gilia</i> spp. (a)	-	-	9	-	-	4	.04
F	<i>Holosteum umbellatum</i> (a)	-	-	7	-	-	2	.03
F	<i>Hymenoxys acaulis</i>	5	3	-	2	1	-	-
F	<i>Lappula occidentalis</i> (a)	-	-	3	-	-	1	.00
F	<i>Lathyrus pauciflorus</i>	_b 13	_a -	_a -	5	-	-	-
F	<i>Lepidium</i> spp. (a)	-	-	11	-	-	6	.05
F	<i>Lotus utahensis</i>	-	10	2	-	6	2	.03
F	<i>Lupinus argenteus</i>	_c 133	_a 12	_b 97	58	9	41	5.60
F	<i>Oenothera caespitosa</i>	2	-	-	1	-	-	-
F	<i>Petradoria pumila</i>	-	-	4	-	-	1	.00
F	<i>Phlox longifolia</i>	_b 13	_c 33	_a -	5	15	-	-
F	<i>Polygonum douglasii</i> (a)	-	-	13	-	-	5	.05
F	<i>Sphaeralcea coccinea</i>	_b 15	_a 3	_a 5	8	2	2	.01
F	<i>Taraxacum officinale</i>	1	-	-	1	-	-	-
F	<i>Tragopogon dubius</i>	11	8	1	6	5	1	.00
F	Unknown forb-perennial	3	2	-	1	1	-	-
Total Annual Forbs		0	0	49	0	0	21	0.18
Total Perennial Forbs		257	118	170	116	61	74	6.49

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

BROWSE TRENDS --
Herd unit 25C, Study no: 18

Type	Species	Strip Frequency '98	Average Cover % '98
B	Chrysothamnus nauseosus	3	.03
B	Chrysothamnus viscidiflorus viscidiflorus	5	.00
B	Eriogonum microthecum	0	-
B	Gutierrezia sarothrae	52	2.48
B	Juniperus scopulorum	2	2.15
B	Opuntia spp.	8	.16
B	Pinus edulis	2	.76
B	Pinus ponderosa	2	1.88
B	Purshia tridentata	10	.57
B	Quercus gambelii	36	13.64
B	Rosa woodsii	4	.15
B	Symphoricarpos oreophilus	58	9.23
B	Tetradymia canescens	4	-
Total for Browse		186	31.08

CANOPY COVER --
Herd unit 25C, Study no: 18

Species	Percent Cover '98
Pinus ponderosa	3

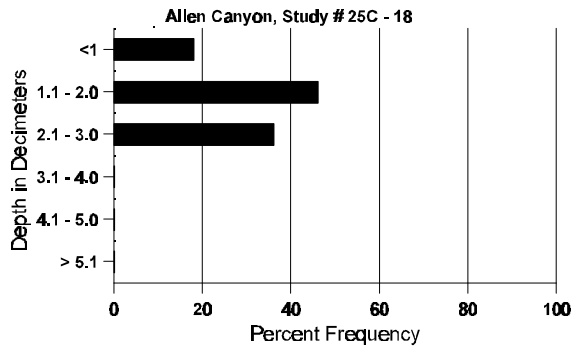
BASIC COVER --
Herd unit 25C, Study no: 18

Cover Type	Nested Frequency '98	Average Cover %		
		'87	'91	'98
Vegetation	324	8.50	7.50	48.34
Rock	58	.50	1.25	.57
Pavement	187	6.00	8.00	4.41
Litter	399	72.50	63.25	69.63
Cryptogams	4	0	0	.03
Bare Ground	206	12.50	20.00	12.05

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 18, Study Name: Allen Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.8	59.8 (13.8)	5.6	75.1	8.4	16.6	4.1	9.5	86.4	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 18

Type	Quadrat Frequency '98
Rabbit	4
Elk	6
Deer	13
Cattle	9

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 18

A G R E	Y 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 nauseosus																	
Y	'87	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	8 10	1
	'91	-	-	1	-	-	-	-	-	-	1	-	-	-	66	12 4	1
	'98	1	-	-	1	-	-	-	-	-	2	-	-	-	40	23 24	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
'87		00%			00%			00%				-86%					
'91		00%			100%			00%				- 9%					
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	466	Dec:	-		
												'91	66		-		
												'98	60		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus viscidiflorus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133	15	10	2
	91	-	-	1	-	-	-	-	-	-	1	-	-	-	66	4	3	1
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	16	13	3
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	1	-	-	-	-	-	1	66			1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			- 1%							
'91		00%			33%			33%			-29%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	199	Dec:	33%			
												'91	198		33%			
												'98	140		14%			
Eriogonum microthecum																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	14	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	0		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																		
S	'87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'98	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
Y	'87	17	-	-	-	-	-	-	-	-	17	-	-	-	1133		17	
	'91	18	-	-	1	-	-	-	-	-	19	-	-	-	1266		19	
	'98	20	-	-	-	-	-	-	-	-	20	-	-	-	400		20	
M	'87	45	-	-	-	-	-	-	-	-	45	-	-	-	3000	8 5	45	
	'91	19	-	4	-	-	-	-	-	-	23	-	-	-	1533	6 5	23	
	'98	132	1	-	2	-	-	-	-	-	135	-	-	-	2700	12 13	135	
D	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	7	-	-	-	-	-	-	-	-	2	-	-	5	140		7	
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-33%							
'91		00%			10%			00%			+14%							
'98		.61%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	4199	Dec:	2%			
												'91	2799		0%			
												'98	3240		4%			
<i>Juniperus scopulorum</i>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'98	-	-	-	-	-	-	2	-	-	2	-	-	-	40	-	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	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			
Opuntia spp.											
S	87	-	-	-	-	-	-	-	0	-	0
	91	1	-	-	-	-	4	-	333	4	5
	98	-	-	-	-	-	-	-	0	-	0
Y	87	9	-	-	-	-	-	-	600	-	9
	91	-	-	-	1	-	3	-	266	-	4
	98	3	-	-	-	-	-	-	60	-	3
M	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	2	-	-	-	133	4	6
	98	6	-	-	-	-	-	-	120	3	10
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%		-34%			
'91		00%		00%		00%		-55%			
'98		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	600	Dec:	-		
						'91	399		-		
						'98	180		-		
Pinus edulis											
Y	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	0	-	0
	98	1	-	-	1	-	-	-	40	-	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%					
'91		00%		00%		00%					
'98		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-		
						'91	0		-		
						'98	40		-		
Pinus ponderosa											
M	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	0	-	0
	98	-	-	-	-	-	2	-	40	-	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%					
'91		00%		00%		00%					
'98		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-		
						'91	0		-		
						'98	40		-		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total																																																																								
	1	2	3	4	5	6	7	8	9	1	2	3	4																																																																												
Purshia tridentata																																																																																									
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1																																																																								
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																																																																								
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																																																																								
Y	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2																																																																								
	91	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2																																																																								
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5																																																																								
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66	24 28	1																																																																								
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0																																																																								
	98	7	-	-	1	-	1	-	-	-	9	-	-	-	180	21 44	9																																																																								
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																																																																								
	91	-	2	-	-	1	-	-	-	-	3	-	-	-	200		3																																																																								
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																																																																								
<table border="0" style="width:100%"> <tr> <td>% Plants Showing</td> <td><u>Moderate Use</u></td> <td><u>Heavy Use</u></td> <td><u>Poor Vigor</u></td> <td><u>%Change</u></td> <td colspan="13"></td> </tr> <tr> <td>'87</td> <td>67%</td> <td>00%</td> <td>00%</td> <td>+40%</td> <td colspan="13"></td> </tr> <tr> <td>'91</td> <td>100%</td> <td>00%</td> <td>00%</td> <td>-16%</td> <td colspan="13"></td> </tr> <tr> <td>'98</td> <td>00%</td> <td>07%</td> <td>00%</td> <td></td> <td colspan="13"></td> </tr> </table>																		% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>														'87	67%	00%	00%	+40%														'91	100%	00%	00%	-16%														'98	00%	07%	00%														
% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>																																																																																					
'87	67%	00%	00%	+40%																																																																																					
'91	100%	00%	00%	-16%																																																																																					
'98	00%	07%	00%																																																																																						
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Total Plants/Acre (excluding Dead & Seedlings)															'87	199	Dec:	0%																																																																							
															'91	333		60%																																																																							
															'98	280		0%																																																																							
Quercus gambelii																																																																																									
S	87	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10																																																																								
	91	8	-	-	2	-	-	5	-	-	15	-	-	-	1000		15																																																																								
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0																																																																								
Y	87	73	48	-	-	-	-	-	-	-	121	-	-	-	8066		121																																																																								
	91	41	8	-	11	-	-	7	-	-	67	-	-	-	4466		67																																																																								
	98	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18																																																																								
M	87	16	-	-	-	-	-	-	-	-	16	-	-	-	1066	98 47	16																																																																								
	91	2	1	-	5	-	-	-	5	-	13	-	-	-	866	110 45	13																																																																								
	98	109	4	-	28	-	-	-	-	-	141	-	-	-	2820	41 37	141																																																																								
D	87	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5																																																																								
	91	2	-	-	5	-	-	1	-	-	8	-	-	-	533		8																																																																								
	98	-	3	-	-	-	-	-	-	-	-	-	-	3	60		3																																																																								
<table border="0" style="width:100%"> <tr> <td>% Plants Showing</td> <td><u>Moderate Use</u></td> <td><u>Heavy Use</u></td> <td><u>Poor Vigor</u></td> <td><u>%Change</u></td> <td colspan="13"></td> </tr> <tr> <td>'87</td> <td>34%</td> <td>00%</td> <td>00%</td> <td>-38%</td> <td colspan="13"></td> </tr> <tr> <td>'91</td> <td>10%</td> <td>00%</td> <td>00%</td> <td>-45%</td> <td colspan="13"></td> </tr> <tr> <td>'98</td> <td>04%</td> <td>00%</td> <td>02%</td> <td></td> <td colspan="13"></td> </tr> </table>																		% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>														'87	34%	00%	00%	-38%														'91	10%	00%	00%	-45%														'98	04%	00%	02%														
% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>																																																																																					
'87	34%	00%	00%	-38%																																																																																					
'91	10%	00%	00%	-45%																																																																																					
'98	04%	00%	02%																																																																																						
<table border="0" style="width:100%"> <tr> <td>Total Plants/Acre (excluding Dead & Seedlings)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>'87</td> <td>9465</td> <td>Dec:</td> <td>4%</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>'91</td> <td>5865</td> <td></td> <td>9%</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>'98</td> <td>3240</td> <td></td> <td>2%</td> </tr> </table>																		Total Plants/Acre (excluding Dead & Seedlings)															'87	9465	Dec:	4%																'91	5865		9%																'98	3240		2%															
Total Plants/Acre (excluding Dead & Seedlings)															'87	9465	Dec:	4%																																																																							
															'91	5865		9%																																																																							
															'98	3240		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				
Rosa woodsii																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	9	-	-	-	-	-	-	-	-	9	-	-	-	180	14 15	9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	240		-			
Symphoricarpos oreophilus																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	1	1	-	-	-	-	1	-	-	3	-	-	-	200		3	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	19	11	1	-	-	-	-	-	-	17	-	14	-	2066		31	
	91	8	4	1	5	-	-	4	-	-	22	-	-	-	1466		22	
	98	18	4	-	1	-	-	-	-	-	23	-	-	-	460		23	
M	87	8	6	9	-	-	-	-	-	-	22	-	1	-	1533	16 29	23	
	91	10	10	8	2	2	-	1	-	-	33	-	-	-	2200	20 23	33	
	98	43	32	-	25	-	-	-	-	-	100	-	-	-	2000	17 31	100	
D	87	-	1	2	-	-	-	-	-	-	3	-	-	-	200		3	
	91	-	3	5	-	3	-	-	-	-	6	-	4	1	733		11	
	98	3	-	-	-	-	-	-	-	-	-	-	-	3	60		3	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		32%			21%			26%			+14%							
'91		33%			21%			08%			-43%							
'98		29%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	3799	Dec:	5%			
												'91	4399		17%			
												'98	2520		2%			

A Y G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Tetradymia canescens																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	11	16	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	1	-	-	-	-	-	-	-	3	-	-	-	60	10	11	3
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			100%			00%			+18%							
'98		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%			
												'91	66		100%			
												'98	80		0%			

DISCUSSION

Trend Study No. 25C-19 (51B-8)

***This site was not read in 1998. There is no longer access to the site due to development along the highway. The site samples a mountain brush burn which is similar to the nearby site sampled at Short Neck 25C-13, therefore the site is being discontinued. Text from the 1991 Utah Big Game Range Trend Study Report has been included below. Please refer to the 1991 report for maps and data tables. ***

This trend study samples a small section of the 1984 burn on Rock Bench. Two hundred acres were cut and burned, then seeded with grass, sweet clover, and alfalfa. The area sampled has more browse than the larger burned section to the northeast. There is good wildlife cover in the surrounding juniper-pinyon woodland and the study area appears to receive most of the deer use primarily in the winter. Pellet group data taken during the 1991 reading indicate light deer and elk use with an estimated 23 and 12 days use/hectare respectively.

The north end of this large mesa above Boulder is basically level, with drainage to the south. The study site is on a gentle (1%) south-facing slope with an elevation of 7,600 feet.

The soil on the site is stony and shallow. It is a dark, sandy clay loam. Organic matter is building up since the fire, especially under the shrubs. Erosion is negligible. Due to the rocky nature of the site, ground cover attributed to rock and pavement is 30%, with no change in 1991. Most of the soil has good vegetative basal and litter cover. Bare ground was only 11% in 1987 and 13% in 1991%.

Apparently missing the impact of the fire, patches of mature black sagebrush and bitterbrush are vigorous and productive. Black sagebrush is the most common. Use is generally light on these low-growing plants. The bitterbrush appear to be the most preferred for many are moderately hedged, but this could be the result of being in lower densities than sagebrush. Bitterbrush density was estimated at 1,533 plants/acre in 1987 and 1,599 in 1991. Some serviceberry and Gambel oak escaped the fire, while the rest are sprouting profusely. Utilization of serviceberry was light in 1987. During the 1991 reading, 50% of these shrubs were heavily hedged. Although there are a few young pinyon pine, a nearly complete kill of conifers on the site ensures that their dominance on the site will proceed slowly.

The excellent stand of grasses established after the burn will help to slow reestablishment by woody species. The prevalent seeded species, crested wheatgrass and smooth brome, are large and vigorous, with quadrat frequencies that were 33% and now 39%, and 15% and now 19% respectively. These are good increases during this extended period of drought. Quadrat frequency of native grasses is similar, and includes blue grama, bottlebrush squirreltail and needle-and-thread. A variety of forbs were encountered, 21 species on the frequency belts, but none are especially abundant or important for forage.

1991 TREND ASSESSMENT

Rock and pavement together make up 30% of the ground cover. It did not change in 1991. The ratios changed, but the cover value stayed the same. Vegetative basal cover improved from 9% to 13%. The most notable change was the loss of litter cover, from 51% down to 45%, which allowed percent bare ground increase slightly. The overall trend for this site would be considered stable. The browse trend should be regarded as slightly improving for all three key browse species have increasing populations. Serviceberry is still low in numbers, 399 plants per acre, but it has increased by 33% since 1987. The bitterbrush population has only increased by 4%, but the young class makes up 17% of the population. Percent decadency is quite high, but should moderate itself after the extended drought has ended. The sagebrush population is a little more difficult to assess because in 1987 they called it all black sagebrush, but in 1991 an ecotype of mountain big sagebrush was selected out of the black sagebrush population. This problem is found often with Wyoming big sagebrush, mountain big sagebrush, and black sagebrush when they occupy the same site, for

there is a great deal of hybridizing between these species and many plants are somewhere between two or more of these species. For the analysis of trend, the two species were lumped together. The sagebrush population as a whole is increasing by 29% and with a decadency rate of 29%. A variety of forbs were encountered on the site, 21 species, but none are especially abundant or important for forage. The grass species are more important to this site with four of the five most abundant grass species increasing in frequency. The overall trend for the herbaceous understory would be slightly improving.

TREND ASSESSMENT

soil - stable

browse - slightly improving

herbaceous understory - slightly improving

Trend Study 25C-20-98

Study site name: Baldys .

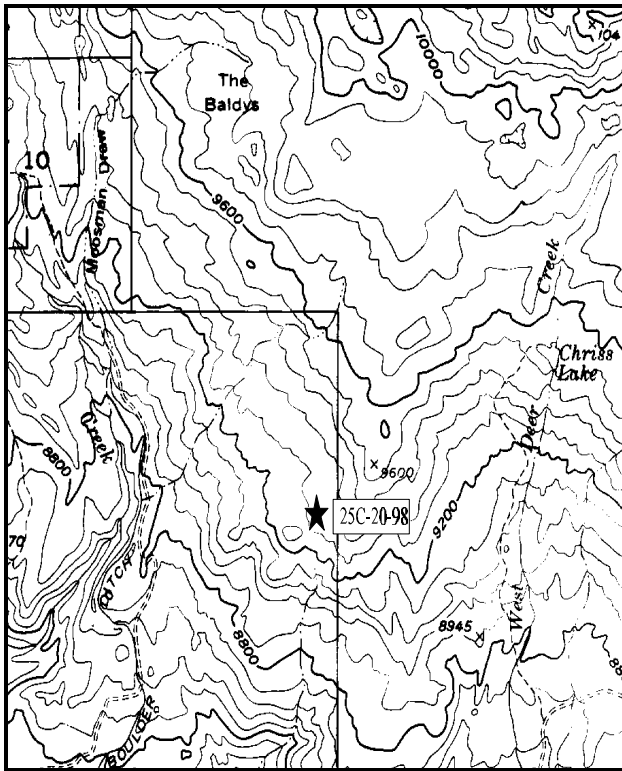
Range type: Quaking Aspen .

Compass bearing: frequency baseline 120 M degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

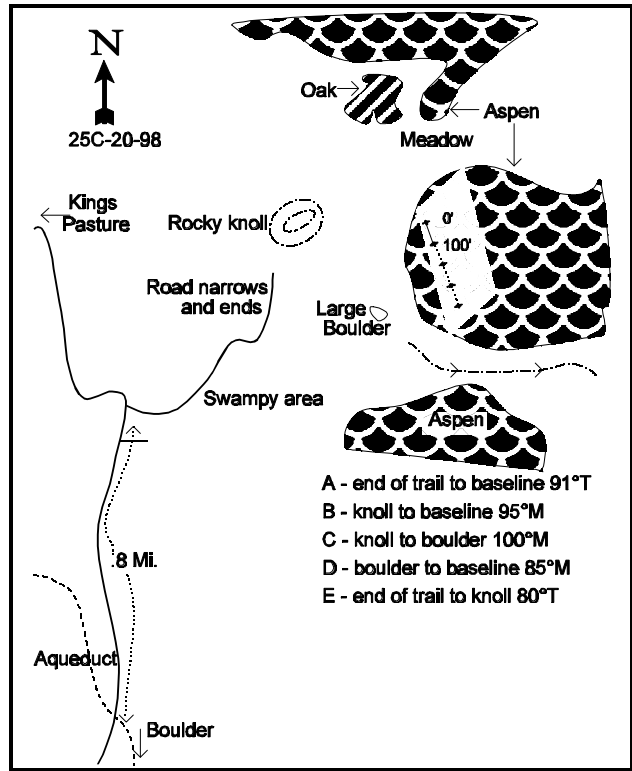
LOCATION DESCRIPTION

From SR 12 north of Boulder, turn onto the Garkane Power Plant road. Travel 1.8 miles to a fork, and go right toward Kings Pasture. Proceed 1.2 miles to a cattleguard and pipeline crossing. Continue 0.8 miles to a fork at a sharp curve in the road. Be sure to take the second fork, just 150-200 feet before the correct fork is another minor fork. Go 0.2 miles up a rocky road. Park truck at the creek, then walk across the creek and marshy area and follow the old road up the hill to the northeast. At the end of the road/trail where it tops out on the hill, take bearings to the clump of aspens where the study is located. The rocky knoll is a small knoll. The aspen stand contains a spruce along line 2 and there are no other conifers around. From the knoll to the site is approximately 600 feet It is marked by short fenceposts. The 0-foot baseline stake is tagged #7172.



Map Name: Grover, Utah (15')

Township 32S , Range 4E , Section Unsurveyed



Diagrammatic Sketch

UTM 4207785.901 N, 462387.740 E

DISCUSSION

Trend Study No. 25C-20 (44-20)

The Baldy's trend study samples a small aspen grove on deer and elk summer range in the Baldy's area below the rim of Boulder Mountain. It is separated from nearby groves of aspen by rolling meadows dominated by low rabbitbrush and grasses. Elevation at the study site is 9,600 feet with a southwest aspect on a 10 to 20% slope. The area receives considerable use by both elk and cattle and is considered a key area for elk during the summer. Pellet group frequency data indicates equal numbers of elk pellet groups and livestock pats in 1994. Pellet group data from 1998 estimate 7 deer, 32 elk, and 114 cow days use/acre. Most of the cow pats were older, but cattle are currently in the area. About 12 elk were also seen near the site during the 1998 reading. This area is in a deferred rotation grazing system with use occurring from mid June to mid October.

Soil at the site is moderately deep with an effective rooting depth (see methods) of almost 14 inches. Rocks of volcanic origin are common on soil surface, with some large rocks scattered throughout the soil profile. Parent material is a basalt. Soil texture is a sandy loam with a slightly acid pH (6.1). Soil organic matter is the highest on the unit at 6.1%. An organic matter rich "A" horizon is detectable to a depth of 6 inches. Although the terrain has a slope of about 10% to 20%, erosion is not a problem due to excellent ground cover. Historically heavy grazing is evidenced by the gullies which are common in the meadow areas, but the few observed in the aspen are no longer active.

An overstory of mature aspen characterizes the site. About half of the aspen was considered mature in 1987 and 1991. Line intercept data from 1994 and 1998 estimate an aspen canopy cover of 80% and 76% respectively. There were an estimated 866 trees/acre in 1987 and 799 in 1991. The young trees, averaging two feet in height, were moderately utilized in 1991. Aspen density data on the shrub density strips was mistakenly not collected in 1994. During the 1998 reading, aspen density was estimated at 700 plants/acre, 69% of which were classified as mature. The decadent aspen are young trees which appear to have been hedged in the past. Point quarter data from 1998 estimates 428 mature trees/acre with an average trunk diameter of 9.2 inches.

The shrub understory is dominated by snowberry which provided 82% of the shrub cover in 1998. These plants numbered about 2,399 plants/acre in 1987, increasing to 6,266 in 1991. The much larger sample used in 1994 and 1998 estimated 5,780 and 5,080 plants/acre respectively. The majority of the population is mature, although young plants remain abundant. Utilization of snowberry was moderate to heavy in 1987 and 1991, but mostly light in 1994 and 1998. Wood's rose is the second most abundant understory species with an estimated density of 1,540 plants/acre in 1998. Utilization is currently light.

The herbaceous understory is the most important component of this summer range. Tree and shrub cover have a limiting effect on grass frequency. Although grasses are diverse, only 4 species occur more than occasionally. Kentucky bluegrass, an increaser with heavy grazing, is the most abundant and it currently provides 57% of the grass cover. Mutton bluegrass, obtuse sedge, and sheep fescue are also fairly common. Diversity of forbs is also good, with at least 19 perennial species sampled each year. Composition is poor however, with low growing increasers including western yarrow, trailing fleabane, and dandelion providing 49% of the forb cover. Other undesirable increaser forbs found on the site include the poisonous orange sneezeweed and Rocky Mountain iris. Other common forbs include: thickleaf peavine, silvery lupine and American vetch.

1991 TREND ASSESSMENT

Basic cover measurements have not changed much since 1987. Vegetative basal cover was unchanged. Rock and litter cover were also almost the same as before. Percent bare ground has increased from 2% to 5%. This is still a very low percentage for bare ground, so trend for soil is considered stable. There are not many

browse species in very high frequencies on this site. Snowberry and aspen would be considered the most important. Aspen has decreased in numbers by 8%, while snowberry has increased by 62%. Percent decadency for both species is still low. Overall, trend for browse is up. The overall trend for herbaceous understory is stable. The sum of nested frequency of grasses has increased while frequency of forbs has declined slightly.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - stable

1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1991. Bare ground has declined slightly. Trend for soil is stable. Trend for browse is also stable. Aspen was mistakenly not sampled in the shrub belt inventories in 1994, so no comparisons can be made. However, snowberry and Wood's rose show stable trends. The herbaceous understory is diverse and abundant with nearly equal amounts of grasses and forbs. Composition could be better however. The increaser, Kentucky bluegrass, dominates the grass component while the most numerous forbs consist of the increasers yarrow, orange sneezeweed, silvery lupine, and dandelion. Sum of nested frequencies for grasses and forbs have declined since 1991 indicating a downward trend.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - downward and dominated by increasers

1998 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics between readings. Trend for browse is considered stable for understory shrubs, snowberry and Wood's rose. The aspen component on this site is overly mature with poor reproduction. Density of mature trees is currently stable but the proportion of young plants has steadily declined since 1987. Aspen does not provide an important forage source on this site due to the lack of available forage, but the health of the site depends on the aspen overstory. Trend for the herbaceous understory is up, although the composition is poor. Sum of nested frequency of grasses declined slightly while frequency of forbs increased dramatically. Kentucky bluegrass is still the most abundant grass and it increased significantly in nested frequency. Weedy increaser forbs including western yarrow, trailing fleabane, Orange sneezeweed, and dandelion, currently produce 59% of the forb cover. There are few of the late successional aspen community forbs present like sweetanise (*Osmorhiza occidentalis*), tall larkspur, meadowrue (*Thalictrum fendleri*) and wild carrot (*Ligusticum filicinum*). Production is up however, with grass cover increasing from 8% in 1994 to 14% by 1998. Forb cover increased from 8% to 26%.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - up, but poor composition

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 20

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
G	<i>Agropyron trachycaulum</i>	13	7	17	8	7	6	9	5	.09	.19
G	<i>Bouteloua gracilis</i>	-	-	1	-	-	-	1	-	.00	-
G	<i>Bromus anomalus</i>	ab8	b18	ab9	a3	4	10	4	1	.33	.00
G	<i>Bromus carinatus</i>	a-	b9	a-	a-	-	4	-	-	-	.03
G	<i>Carex obtusata</i>	a66	b126	ab87	a76	23	47	33	37	.78	1.42
G	<i>Dactylis glomerata</i>	b16	a-	a1	a-	7	-	1	-	.00	-
G	<i>Festuca ovina</i>	b101	b86	a31	a45	42	40	15	19	.27	1.31
G	<i>Festuca thurberi</i>	-	-	2	-	-	-	2	-	.03	-
G	<i>Juncus balticus</i>	bc38	c47	b34	a-	20	24	12	-	.56	-
G	<i>Koeleria cristata</i>	-	-	4	-	-	-	1	-	.00	-
G	<i>Muhlenbergia richardsonis</i>	a-	b10	a-	b13	-	5	-	4	-	.48
G	<i>Poa fendleriana</i>	a32	a1	b87	b80	14	1	33	28	2.87	2.12
G	<i>Poa pratensis</i>	a134	b193	a121	a143	54	71	42	47	1.90	7.86
G	<i>Sitanion hystrix</i>	a12	b40	b45	a6	8	19	21	5	.61	.12
G	<i>Stipa columbiana</i>	a-	a-	a-	b16	-	-	-	6	-	.13
G	<i>Stipa comata</i>	1	1	-	-	1	1	-	-	-	-
G	<i>Stipa lettermani</i>	ab59	ab24	b40	a14	24	12	18	5	.55	.12
Total Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total Perennial Grasses		480	562	479	404	204	240	192	157	8.05	13.81
F	<i>Achillea millefolium</i>	b154	b140	a66	a126	60	56	27	49	1.16	3.59
F	<i>Agoseris glauca</i>	-	-	-	4	-	-	-	1	-	.03
F	<i>Allium cernuum</i>	c62	b28	a10	a14	29	16	5	5	.10	.10
F	<i>Antennaria parvifolia</i>	13	14	17	30	5	7	7	10	.11	.58
F	<i>Androsace septentrionalis (a)</i>	-	-	3	9	-	-	2	3	.01	.16
F	<i>Artemisia dracunculus</i>	-	-	-	5	-	-	-	2	-	.01
F	<i>Arabis drummondii</i>	a3	b24	a-	a-	2	12	-	-	-	-
F	<i>Artemisia ludoviciana</i>	2	-	-	-	2	-	-	-	-	-
F	<i>Aster chilensis</i>	ab-	c23	b4	b19	-	9	2	8	.03	.06
F	<i>Astragalus convallarius</i>	-	-	-	5	-	-	-	2	-	.18
F	<i>Chenopodium album (a)</i>	-	-	a4	b12	-	-	3	4	.01	.07
F	<i>Cirsium vulgare</i>	5	-	3	3	2	-	1	1	.06	.03
F	<i>Collomia linearis (a)</i>	-	-	-	2	-	-	-	1	-	.00
F	<i>Cymopterus lemmonii</i>	bc33	c40	ab12	a1	16	18	8	1	.09	.01
F	<i>Descurainia spp. (a)</i>	-	-	-	5	-	-	-	2	-	.03
F	<i>Erigeron flagellaris</i>	25	12	24	27	13	6	11	11	.20	1.06
F	<i>Erigeron spp.</i>	b18	ab4	a-	a3	7	2	-	1	-	.00
F	<i>Eriogonum racemosum</i>	-	3	-	-	-	1	-	-	-	-
F	<i>Gentiana amarella heterosepala</i>	-	2	-	-	-	1	-	-	-	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	04	08
F	Geranium richardsonii	36	26	34	29	21	16	16	14	.49	.28
F	Helenium hoopesii	34	33	32	41	19	19	16	17	.81	2.51
F	Iris missouriensis	21	17	8	24	7	8	3	11	.21	.42
F	Lathyrus lanszwertii	a-	a-	b ₂₀	c ₅₈	-	-	8	19	1.14	3.83
F	Lomatium spp.	-	-	-	4	-	-	-	2	-	.15
F	Lupinus argenteus	a ₇	ab ₁₂	bc ₂₅	c ₃₉	5	6	16	23	1.26	2.32
F	Lychnis drummondii	-	-	-	2	-	-	-	1	-	.00
F	Osmorhiza occidentalis	-	-	-	7	-	-	-	3	-	.01
F	Penstemon spp.	a ₁	a-	b ₁₀	a-	1	-	6	-	.03	-
F	Phacelia spp.	-	2	-	-	-	1	-	-	-	-
F	Phlox austromontana	a-	ab ₃	c ₃₄	b ₁₅	-	1	16	8	.76	.60
F	Potentilla anersina	-	-	5	1	-	-	2	1	.03	.03
F	Polygonum douglasii (a)	-	-	8	13	-	-	4	5	.02	.16
F	Potentilla gracilis	a-	ab ₁	b ₁₂	ab ₄	-	1	5	1	.48	.06
F	Senecio multilobatus	b ₈	a-	b ₁₁	b ₁₂	4	-	6	4	.05	.07
F	Taraxacum officinale	b ₂₂₄	b ₂₂₁	a ₁₂₁	b ₁₉₉	81	81	45	71	.97	8.17
F	Trifolium repens	1	-	-	-	1	-	-	-	-	-
F	Unknown forb-perennial	4	-	-	-	2	-	-	-	-	-
F	Vicia americana	a ₆₈	ab ₇₃	a ₄₂	b ₉₇	28	32	18	41	.24	1.62
F	Viola spp.	-	3	-	4	-	1	-	2	-	.03
Total Annual Forbs		0	0	15	41	0	0	9	15	0.04	0.42
Total Perennial Forbs		719	681	490	773	305	294	218	309	8.28	25.86

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

BROWSE TRENDS --

Herd unit 25C, Study no: 20

Type	Species	Strip Frequency		Average Cover %	
		04	08	04	08
B	Amelanchier alnifolia	8	0	.44	-
B	Chrysothamnus nauseosus	0	0	-	-
B	Populus tremuloides	0	29	.53	1.82
B	Ribes inerme	1	0	.00	-
B	Rosa woodsii	19	29	.37	1.15
B	Symphoricarpos oreophilus	61	75	9.61	13.44
Total for Browse		89	133	10.96	16.42

CANOPY COVER --

Herd unit 25C, Study no: 20

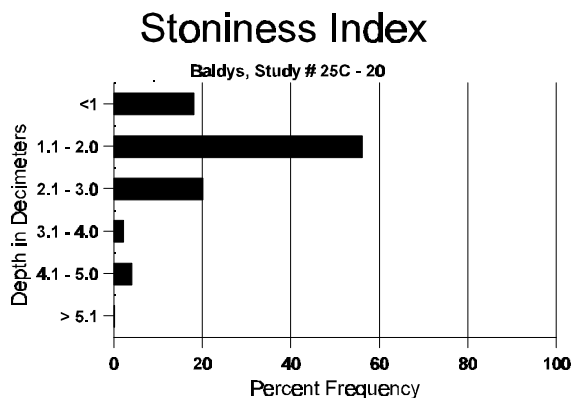
Species	Percent Cover 08
Populus tremuloides	76

BASIC COVER --
Herd unit 25C, Study no: 20

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'87	'91	'94	'98
Vegetation	258	352	4.00	3.50	23.52	49.69
Rock	118	90	8.25	6.25	7.95	5.89
Pavement	17	45	0	0	.45	1.04
Litter	317	400	85.75	85.25	79.11	81.25
Cryptogams	-	6	0	.25	0	.03
Bare Ground	64	75	2.00	4.75	3.36	4.92

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 20, Study Name: Baldys

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.5	43.2 (14.5)	6.1	62.7	16.7	20.6	6.1	28.4	329.6	.6



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 20

Type	Quadrat Frequency	
	'04	'08
Rabbit	1	-
Elk	3	12
Deer	1	5
Cattle	3	5

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 20

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier alnifolia																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	4	15	-	-	-	-	2	-	-	21	-	-	-	420	10	6	21
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		71%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	420		-			
												'98	0		-			
Chrysothamnus nauseosus																		
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	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				
Populus tremuloides																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
Y	87	1	3	2	-	-	-	-	-	-	6	-	-	-	400		6	
	91	-	5	-	-	-	-	-	-	-	3	-	1	1	333		5	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	6	3	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	87	-	-	-	-	-	-	-	6	-	6	-	-	-	400	341	144	6
	91	-	-	-	-	-	-	2	5	-	7	-	-	-	466	355	124	7
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	24	-	24	-	-	-	480	-	-	24
D	87	-	-	1	-	-	-	-	-	-	-	-	1	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	2	-	-	-	-	-	-	-	-	-	-	2	40		2	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		23%			23%			08%			- 8%							
'91		42%			00%			17%										
'94		00%			00%			00%										
'98		14%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	866	Dec:	8%				
											'91	799		0%				
											'94	0		0%				
											'98	700		6%				
Ribes inerme																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	30	39	1
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	35	55	1
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	19	63	3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%			- 9%							
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'91	66		-				
											'94	60		-				
											'98	0		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Rosa woodsii																		
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'98	12	-	-	-	-	-	-	-	-	12	-	-	-	240		12	
Y	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	'94	20	-	-	-	-	-	-	-	-	20	-	-	-	400		20	
	'98	27	1	-	-	-	-	-	-	-	28	-	-	-	560		28	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	'94	46	-	-	-	-	-	-	-	-	46	-	-	-	920	14	46	
	'98	47	-	-	-	-	-	-	-	-	47	-	-	-	940	20	47	
D	'87	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			50%			00%			-50%							
'91		00%			00%			00%			+95%							
'94		00%			00%			00%			+13%							
'98		01%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	132	Dec:	50%			
												'91	66		0%			
												'94	1340		1%			
												'98	1540		3%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4							
Symphoricarpos oreophilus												
S	87	1	-	-	-	-	-	-	1	66		1
	91	1	-	-	-	-	-	-	1	66		1
	94	1	-	-	-	-	-	-	1	20		1
	98	4	-	-	2	-	-	-	6	120		6
Y	87	4	4	3	-	-	-	-	11	733		11
	91	23	5	-	1	-	-	-	28	1933		29
	94	20	-	-	-	-	-	-	20	400		20
	98	57	5	-	-	-	-	-	62	1240		62
M	87	1	18	6	-	-	-	-	25	1666	18 27	25
	91	25	18	6	3	1	-	-	52	3533	16 24	53
	94	261	8	-	-	-	-	-	269	5380	16 24	269
	98	190	-	1	-	-	-	-	191	3820	20 29	191
D	87	-	-	-	-	-	-	-	-	0		0
	91	5	3	1	3	-	-	-	10	800		12
	94	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	1	20		1
X	87	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		61%		25%		00%		+62%				
'91		29%		07%		04%		- 8%				
'94		03%		00%		00%		-12%				
'98		02%		.39%		00%						
Total Plants/Acre (excluding Dead & Seedlings)									'87	2399	Dec:	0%
									'91	6266		13%
									'94	5780		0%
									'98	5080		0%

Trend Study 25C-21-98

Study site name: Griffin .

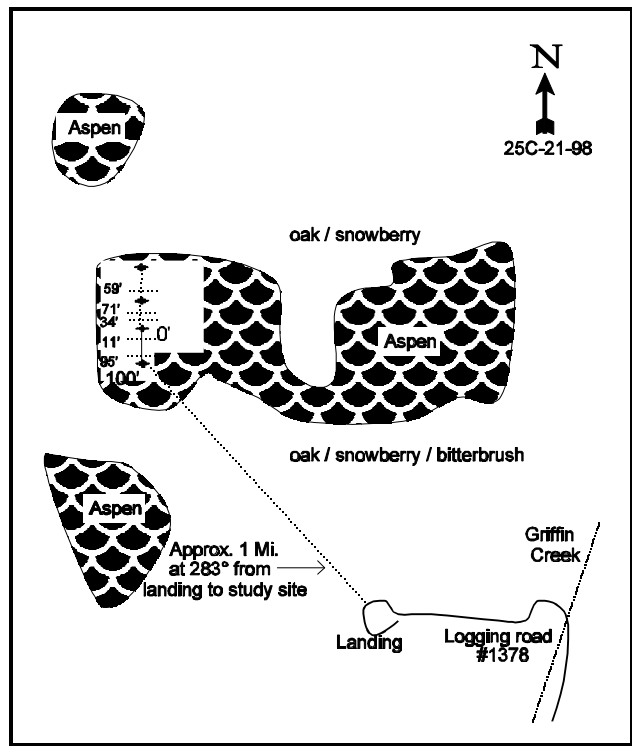
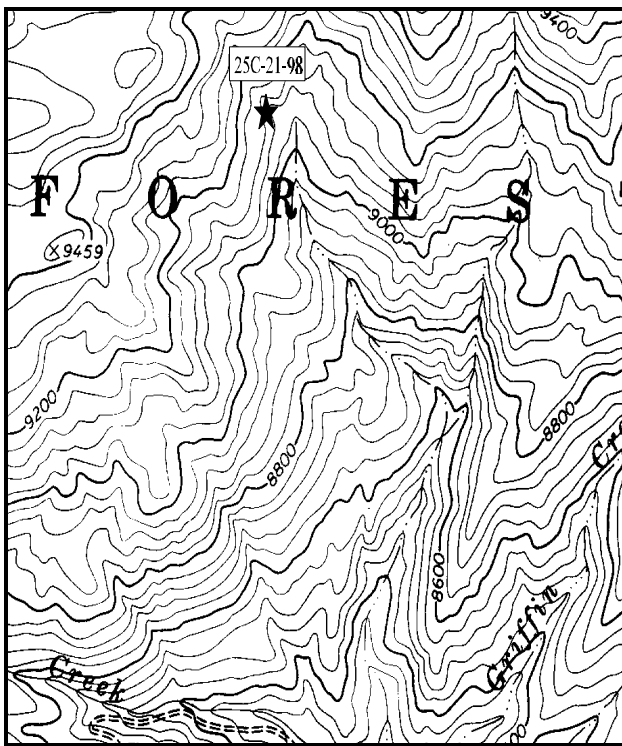
Range type: Quaking Aspen .

Compass bearing: frequency baseline 180 degrees.

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

LOCATION DESCRIPTION

Drive up the North Creek Road (west of Escalante off SR12) past the reservoir to a major fork. Bear left toward Barker Reservoir and go 2.8 miles. Take the right fork, a dead end logging road #1378. Drive to the end of the road, about 2.3 miles. From here the study is approximately 1/2 mile to the northwest (283°M) in an aspen grove. Walk northwest to the creek, and then hike up the creek to a very large rock about 40-feet wide by 20-feet tall. This is the only rock this big in the area and the creek runs right by it. This rock is about 300 yards from the road. When you find the rock leave the creek and hike southwest up the hill to a small, level bench with bitterbrush and oak on it (about 100 yards). This bench is about the same elevation as when you parked the truck. From this small bench, find the drainage gully and walk up the bottom of it through one small patch of quaking aspen. Keep walking up this drainage to the second patch of aspen which is very big and has a lone Rocky Mountain juniper growing just before it. The transect is just inside this large aspen patch about 100 feet. All stakes are short metal fence posts and the 0-foot stake is marked by browse tag #7169.



Map Name: Barker Reservoir

Diagrammatic Sketch

Township 33S , Range 1E , Section Unsurveyed

UTM 4198258.004 N , 430002.946 E

DISCUSSION

Trend Study No. 25C-21 (44-21)

Griffin, the second trend study in the aspen type, is located in the upper part of the North Creek drainage. The hillside where the transect is located is approximately one-half mile from the nearest road. It is on a moderate to steep slope, down to the intermittent drainage in the bottom. Aspect is generally southeast with an elevation of 9,200 feet. The area is thought to be used mostly by deer and to a lesser degree by elk during the summer. Pellet group quadrat frequency data from 1994 shows that elk used the area more than deer. Data from 1998 found no sign of elk and estimated only 2 deer days use/acre. Cattle were in the area on the date of study establishment in 1987 and in 1998. Twelve cow days use/acre was estimated in 1998. This area is on a 3 pasture deferred rotation grazing allotment with use occurring from June 6 to September 30.

Typical of high elevation aspen sites, the soil is deep, dark colored, and rich in organic matter. Effective rooting depth (see methods) is estimated at just over 16 inches. Texture is a sandy clay loam with a pH of 5.5 which is strongly to moderately acidic. The soil has a high percentage of organic matter incorporated in the surface horizon and litter cover is nearly continuous. There are scattered large rocks and boulders on the surface. Erosion is minimal.

This site would be characterized as a mature aspen stand. Mature trees average 80-100 feet in height with a large number of fallen trees. The aspen at this site nearly have a continuous canopy cover which could limit understory development and productivity. Shrub size and herbaceous production is much higher near the edge of the aspen. Density plots in 1987 estimated the population to be 1,932 trees/acre with 55% as young trees. The population in 1991 was down to 1,133 trees/acre with 35% of those young. The young and available trees displayed moderate to heavy hedging in 1987 and only light hedging in 1991. Aspen was mistakenly not counted in the shrub density strips in 1994, but point quarter data estimated the population at 331 trees/acre with an average basal diameter of 8.7 inches. Density of aspen increased to 3,520 plants/acre by 1998 due to an increase in young trees. This is partly due to the much larger sample used in 1998 which better estimates shrub and tree densities. The larger sample also included aspen near the edge of the clone which had a higher density of young trees. Several mature trees appear to have been blown down along the north edge of the aspen clone. Utilization in 1998 was mostly light, although some young available plants displayed moderate to heavy use.

Snowberry is numerous in the understory, totaling 6,200 plants/acre in 1987, then 9,799 in 1991, and 8,580 by 1994. Density was lower at 6,280 plants/acre by 1998. Mature plants are relatively small averaging only 12 inches in height in 1998. Utilization was moderate in 1987, but light in other years. Other woody species include: small numbers of Wood's rose, Oregon grape, wax current, white fir, and Gambel oak.

Herbaceous vegetation is the important forage resource on this range type, however the thick aspen canopy limit's growth of the understory. Obtuse sedge is the most abundant species, as it currently provides 53% of the grass cover. Other fairly abundant grasses include Kentucky bluegrass and mutton bluegrass. Production of grasses is low with only 10% cover produced in 1994 and 11% in 1998. Forbs are rare. All species combined produced only 2% cover in 1994 and 3% in 1998. The only fairly abundant species include: thistle, silvery lupine, and American vetch.

1991 TREND ASSESSMENT

Vegetational basal cover was low before, but is even lower now at only 1%. Litter cover is now up to 98%, while percent bare ground is down to only 1%. Soil trend however, is stable for this site due to the abundance of protective ground cover. The most utilized browse species are limited to aspen and snowberry. The aspen population has decreased by 41%, down to 1,133 plants/acre. The young age class has declined from 55% down to 21% of the population. Snowberry have actually increased by 37% to a population of 9,799

plants/acre. The young age class have also gone down from 61% to 42%. Overall, the trend is stable, but trend for aspen should be watched carefully. The grasses are much more common than the forbs. The sum of nested frequency for grasses is up slightly while frequency of forbs has remained stable. Trend would be slightly improving.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly improving

1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1991. Total protective ground cover is excellent at 98% with erosion not being a problem on this site. Trend for soil is stable. The key browse species on the site include aspen and snowberry. Since aspen was mistakenly not included in the shrub density strips in 1994, no comparisons can be made with data from 1991. However, point quarter data estimated 331 trees/acre which is likely a more accurate figure. All the trees sampled with the point quarter were mature trees and the aspen canopy is nearly continuous. Snowberry has an estimated density of 8,580 plants/acre. However, only 22% of the population consists of young plants and no seedlings were encountered. Wood's rose is still declining in numbers and no seedlings or young were found in 1994. The trend for browse is slightly down at this time. The herbaceous understory of this site is dominated by increaser grasses and forbs similar to the Baldy's study (25C-20). Sum of nested frequency for grasses and forbs are about half that of study #20, but they have increased since 1991, indicating a slightly upward trend. However, the composition is still poor. Thinning of the aspen would stimulate better understory growth on this site.

TREND ASSESSMENT

soil - stable

browse - down slightly for snowberry and Wood's rose

herbaceous understory - slightly improved

1998 TREND ASSESSMENT

Trend for soil continues to be stable with abundant protective ground cover. Trend for browse is stable. Density of snowberry has declined 27%, but due to the lack of decadent and dead plants this change is most likely due to the difficulty differentiating individual plants of this sprouting shrub. Density of aspen increased due to the larger sample used in 1998 which gives a better estimate of shrubs and trees. The new sample also sampled some aspen near the clone edge which had a higher density of young trees. Aspen currently has excellent reproduction, mostly light utilization, good vigor, and low decadence. However, the thick stand is suppressing the herbaceous understory production. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses and forbs has remained similar to 1994 estimates. Composition is still poor.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable, but composition poor

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 21

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
G	Agropyron trachycaulum	a-	ab ⁵	a ¹¹	ab ⁴	-	3	4	2	.49	.01
G	Bromus carinatus	4	3	2	10	1	1	1	3	.03	.22
G	Carex obtusata	ab ²³⁹	b ²⁵⁸	a ²¹⁰	a ¹⁹⁵	87	92	78	77	4.45	5.32
G	Poa fendleriana	31	42	38	58	13	20	15	24	.49	1.25
G	Poa pratensis	a ⁸¹	ab ¹⁰⁰	b ¹²⁰	a ⁷⁸	32	39	50	30	3.11	2.20
G	Sitanion hystrix	a ²⁷	a ¹⁹	ab ⁴⁶	b ⁶⁷	14	11	19	31	.78	.90
G	Stipa columbiana	1	-	3	3	1	-	3	1	.09	.00
G	Stipa lettermani	a-	b ¹⁰	b ¹²	ab ⁶	-	4	6	3	.06	.04
Total Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total Perennial Grasses		383	437	442	421	148	170	176	171	9.50	9.97
F	Agoseris glauca	-	-	-	1	-	-	-	1	-	.03
F	Antennaria parvifolia	-	6	3	-	-	3	2	-	.18	-
F	Chenopodium album (a)	-	-	6	7	-	-	4	3	.02	.01
F	Cirsium wheeleri	a ³	a ²	b ²⁵	b ³²	2	1	11	15	.18	.52
F	Corallorhiza spp.	-	1	-	-	-	1	-	-	-	-
F	Descurainia pinnata (a)	a-	ab ¹	ab ³	b ¹⁷	-	1	2	6	.01	.13
F	Epilobium paniculatum (a)	-	-	-	3	-	-	-	1	-	.00
F	Erigeron eatonii	-	-	-	1	-	-	-	1	-	.03
F	Lupinus argenteus	a-	a ¹	b ³¹	b ³⁵	-	1	12	16	1.03	1.57
F	Lychnis drummondii	-	-	-	-	-	-	-	-	.00	-
F	Osmorhiza occidentalis	4	4	5	9	2	2	4	4	.04	.19
F	Penstemon spp.	3	-	6	-	1	-	2	-	.01	-
F	Polygonum douglasii (a)	-	-	4	15	-	-	2	7	.01	.06
F	Senecio spp.	-	-	-	3	-	-	-	1	-	.01
F	Taraxacum officinale	b ⁸	ab ³	b ⁶	a-	4	1	4	-	.02	-
F	Tragopogon dubius	-	-	-	3	-	-	-	1	-	.00
F	Unknown forb-perennial	-	1	-	-	-	1	-	-	-	-
F	Vicia americana	a-	a-	b ²⁹	b ²⁰	-	-	10	7	.34	.69
Total Annual Forbs		0	1	13	42	0	1	8	17	0.04	0.20
Total Perennial Forbs		18	18	105	104	9	10	45	46	1.82	3.07

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

BROWSE TRENDS --

Herd unit 25C, Study no: 21

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Abies concolor	0	0	-	-
B	Amelanchier alnifolia	0	0	-	-
B	Chrysothamnus nauseosus	1	0	-	-
B	Mahonia repens	8	3	.18	.03
B	Pinus ponderosa	0	0	-	-
B	Populus tremuloides	0	66	4.43	4.46
B	Pseudotsuga menziesii	0	1	.03	.41
B	Quercus gambelii	0	0	-	-
B	Ribes spp.	1	2	-	.00
B	Rosa woodsii	1	3	-	.00
B	Symphoricarpos oreophilus	90	86	4.84	6.97
Total for Browse		101	161	9.50	11.89

CANOPY COVER --

Herd unit 25C, Study no: 21

Species	Percent Cover '08
Populus tremuloides	63

BASIC COVER --

Herd unit 25C, Study no: 21

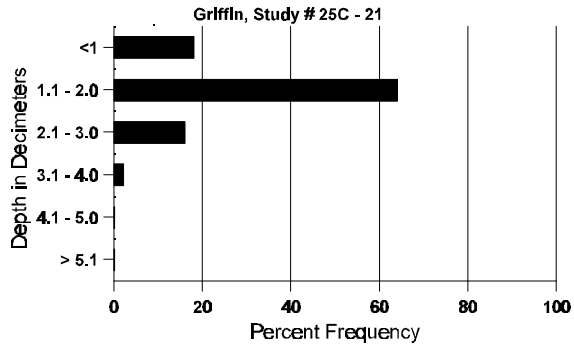
Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'87	'91	'94	'98
Vegetation	310	311	2.00	1.25	17.65	32.32
Rock	18	46	.25	.25	.51	5.83
Pavement	-	7	0	0	0	.18
Litter	398	395	94.50	98.00	77.08	85.17
Cryptogams	2	5	0	0	.00	.03
Bare Ground	21	44	3.25	.50	1.52	1.69

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 21, Study Name: Griffin

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.2	56.5 (16.1)	5.5	56.0	21.4	22.6	4.4	40.7	345.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 21

Type	Quadrat Frequency	
	04	08
Elk	5	-
Deer	1	2
Cattle	1	-

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 21

A G R E	Y 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					
Abies concolor																			
	'87	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>							
		'87			00%			00%				00%							
		'91			00%			00%				00%							
		'94			00%			00%				00%							
		'98			00%			00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-				
												'91	0		-				
												'94	0		-				
												'98	0		-				

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Amelanchier alnifolia</i>																		
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'87	00%			00%			00%										
	'91	00%			00%			00%										
	'94	00%			00%			00%										
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	200	Dec:	-			
												'91	0		-			
												'94	0		-			
												'98	0		-			
<i>Chrysothamnus nauseosus</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	7	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'87	00%			00%			00%										
	'91	00%			00%			00%										
	'94	00%			00%			00%										
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'94	20		-			
												'98	0		-			
<i>Mahonia repens</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	12	-	-	-	-	-	-	-	-	7	-	5	-	800			12
	91	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	7	5	1
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	200	4	7	3
	94	39	-	-	-	-	-	-	-	-	39	-	-	-	780	3	5	39
	98	9	-	-	-	-	-	-	-	-	9	-	-	-	180	7	11	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'87	00%			00%			38%			-15%							
	'91	00%			00%			00%			+ 8%							
	'94	00%			00%			00%			-68%							
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	866	Dec:	-			
												'91	733		-			
												'94	800		-			
												'98	260		-			

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				
Pinus ponderosa																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'94	0		-		
												'98	0		-		
Populus tremuloides																	
S	87	9	2	-	-	-	-	-	-	-	11	-	-	-	733		11
	91	10	1	1	-	-	-	-	-	-	12	-	-	-	800		12
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	83	-	-	2	-	-	-	-	-	85	-	-	-	1700		85
Y	87	5	7	4	-	-	-	-	-	-	16	-	-	-	1066		16
	91	5	-	-	-	-	-	1	-	-	3	3	-	-	400		6
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	124	6	11	-	-	-	-	-	-	141	-	-	-	2820		141
M	87	-	-	-	-	-	-	-	13	-	13	-	-	-	866	393 100	13
	91	-	-	-	-	-	-	-	11	-	11	-	-	-	733	393 143	11
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	98	4	-	-	-	-	-	-	30	-	34	-	-	-	680	- -	34
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	300		15
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		24%			14%			00%			-41%						
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		03%			06%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	1932	Dec:	0%		
												'91	1133		0%		
												'94	0		0%		
												'98	3520		1%		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
Pseudotsuga menziesii																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	-	-	-	-	-	-	-	-	-	60			3
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	1	-	-	-	-	-	-	-	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	-	-	20			1
<u>% Plants Showing</u>		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		100%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	66		-		
												'94	0		-		
												'98	20		-		
Quercus gambelii																	
S	87	-	1	-	-	-	-	-	-	-	-	-	-	66			1
	91	1	-	-	-	-	-	-	-	-	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
<u>% Plants Showing</u>		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'94	0		-		
												'98	0		-		
Ribes spp.																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	-	-	-	-	-	-	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	-	-	-	20	5	6	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
<u>% Plants Showing</u>		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%			+67%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'94	20		-		
												'98	60		-		

A 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				
Rosa woodsii																	
S	'87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
Y	'87	14	1	-	-	-	-	-	-	14	1	-	-	1000		15	
	'91	4	-	-	-	-	-	1	-	5	-	-	-	333		5	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	7	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	1	1	-	-	-	-	-	-	2	-	-	-	133	22	6	2
	'94	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	'98	2	4	-	-	-	-	-	-	2	4	-	-	120	9	9	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		07%			00%			00%			-53%						
'91		14%			00%			00%			-96%						
'94		00%			00%			00%			+92%						
'98		31%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	1000	Dec:	-			
											'91	466		-			
											'94	20		-			
											'98	260		-			
Symphoricarpos oreophilus																	
S	'87	4	-	-	-	-	-	-	-	4	-	-	-	266		4	
	'91	-	-	-	-	-	-	1	-	1	-	-	-	66		1	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	24	-	-	-	-	-	-	-	24	-	-	-	480		24	
Y	'87	34	22	1	-	-	-	-	-	57	-	-	-	3800		57	
	'91	60	1	-	-	-	-	1	-	62	-	-	-	4133		62	
	'94	93	-	-	-	-	-	-	-	93	-	-	-	1860		93	
	'98	106	1	-	3	-	-	-	-	110	-	-	-	2200		110	
M	'87	19	17	-	-	-	-	-	-	36	-	-	-	2400	14	14	36
	'91	77	2	-	3	-	-	1	-	83	-	-	-	5533	11	10	83
	'94	332	4	-	-	-	-	-	-	336	-	-	-	6720	10	14	336
	'98	198	6	-	-	-	-	-	-	204	-	-	-	4080	12	17	204
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	2	-	-	-	-	-	-	-	1	1	-	-	133		2	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		42%			01%			00%			+37%						
'91		02%			00%			00%			-12%						
'94		.93%			00%			00%			-27%						
'98		02%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	6200	Dec:	0%			
											'91	9799		1%			
											'94	8580		0%			
											'98	6280		0%			

Trend Study 25C-22-98

Study site name: Salt Gulch .

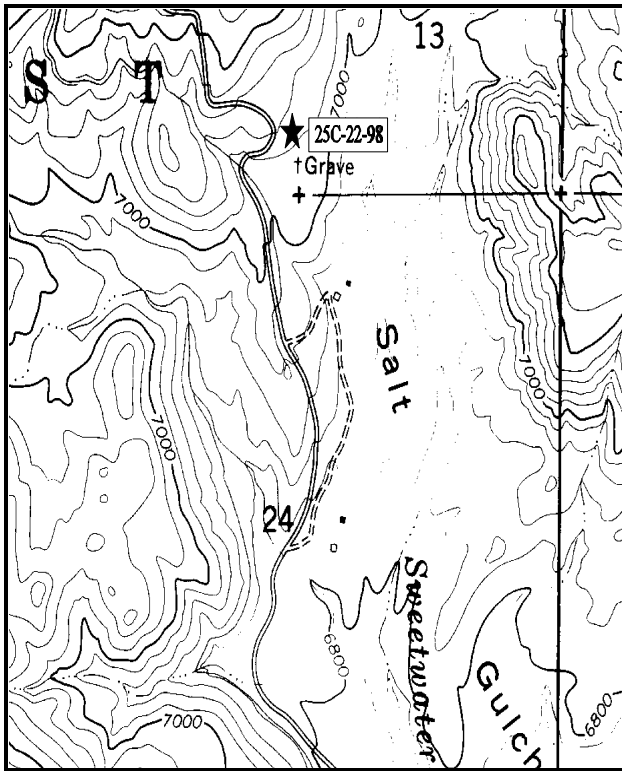
Range type: Pinyon-Juniper .

Compass bearing: frequency baseline 165 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

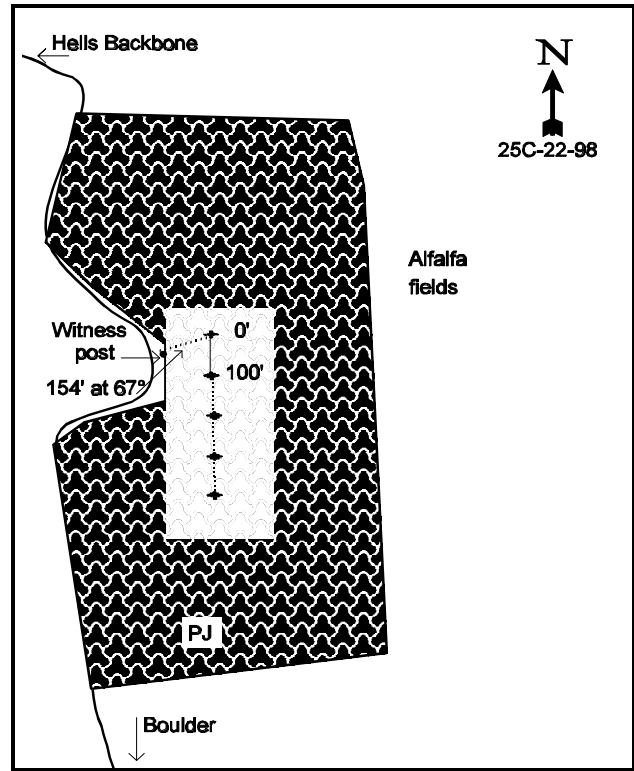
LOCATION DESCRIPTION

Take SR 12 southwest out of Boulder to the Salt Gulch - Hells Backbone Road. Turn here and proceed 4.6 miles to the Salt Gulch Ranch on the left. Continue on the main road 1.3 miles to where the road makes a bend to the left. A witness post is located 15 feet off the right side of the road. The transect starts 154 feet away, bearing 67 degrees. The 0-foot baseline stake is marked by a red browse tag #7137. The 2-foot fenceposts marking the rest of the study are found at 100 foot intervals going south.



Map Name: Roger Peak

Township 33S, Range 3E, Section 13



Diagrammatic Sketch

UTM 4198202.508 N, 454015.265 E

DISCUSSION

Trend Study No. 25C-22 (44-22)

The Salt Gulch study is located on a slope above the hay fields in Salt Gulch. This study samples an old pinyon-juniper type which is being considered by the Forest Service for treatment, either chaining or burning, to improve the range for deer, specifically winter-spring use. This type provides good thermal cover, but forage in the understory is very limited. Judging by the frequency of deer pellet groups, deer use is moderate at 17 deer days use/acre in 1991. Pellet group quadrat frequency data from 1994 show a relatively high quadrat frequency of deer and rabbit pellet groups. A pellet group transect read on the site in 1998 estimated 25 deer days use/acre.

The sparse vegetation, rocky nature of the soil and fairly steep, southeast facing slopes all serve to limit choices and potential for success for any treatments in this area. Topography varies, but at the study site the slope is 6-8% with an eastern aspect and an elevation of 7,050 feet. The soil is relatively shallow with an estimated effective rooting depth (see methods) of nearly 13 inches. Texture is a sandy loam with a neutral pH (7.2). Parent material is of igneous origin. Rocks are common in the profile and on the surface where they currently ('98) provide 29% cover. There are several active gullies in the area caused by high intensity summer storms.

Large, mature Utah juniper and pinyon pine dominate the site with a canopy cover estimated at 22% in 1998. Juniper-pinyon cover at more than 20% would normally decrease understory production by at least 50%. Point quarter data from 1994 estimated pinyon density at 52 trees/acre and juniper density at 209 trees/acre. Forty-three percent of the pinyon were young with average diameters of less than one inch. Most of the junipers consisted of large mature trees, but young trees made up about 30% of the population. Overall, average basal diameter of pinyon was 3.6 inches, while that of juniper is approximately 10.2 inches. Point quarter data from 1998 estimate 70 trees/acre for pinyon and 93 for juniper. Average basal diameter is estimated at 7.7 inches for pinyon and 10.6 inches for juniper. Only 15% of the pinyon and 10% of the juniper trees sampled had basal diameters less than 3 inches.

Cliffrose is the only key browse species in the area, but it is relatively uncommon and was not sampled during any reading. There are some small plants which occur throughout the area that are heavily hedged. The taller cliffrose (up to 12 feet tall) are all highlined. The only browse sampled on the transects was broom snakeweed and cactus. The most numerous species was broom snakeweed with a density of 8,199 plants/acre reported in 1987. A majority of the population was mature, but numbers of this short lived species are known to fluctuate widely with drought as evidenced by the 92% drop in density by 1991 (665 plants/acre). During the 1994 reading with the larger sample size, there were an estimated 4,240 plants/acre. Density increased to 4,420 plants/acre by 1998. Current age class distribution indicate an expanding population with 45% of the population consisting of young plants. Seedlings were also abundant in 1998 with a biotic potential of 22%.

For an old pinyon-juniper site, diversity is good in the understory, but overall abundance of the various herbaceous plants is very low. Grasses and forbs combined to produce only just over 4% cover in 1994 and in 1998. Only 3 perennial grasses have been found on the site during each reading since 1987. These typical native species include blue grama, Indian ricegrass, and bottlebrush squirreltail. Nineteen species of forbs have been identified over the years, but most are very small plants. Searls prairie-clover, greenstem paperflower, penstemon, and Cooper hymenoxys provide some forage. All forbs combined produced less than ½ of 1% cover in 1994 and .61% cover in 1998.

1991 TREND ASSESSMENT

Basic cover characteristics have changed since last sampling date. Percent basal cover has gone from only 3% down to 1%. Rock-pavement cover has increased (34% to 41%), while percent litter has gone down (46%

to 40%). Percent bare ground has not changed much (17% to 18%). These changes have resulted in a downward trend. For browse, there are no useful forage species. Broom snakeweed is the only numerous shrub that occurred within the density plots. It's density has fallen by 92%. Browse trend would still have to be down because of the lack of useable browse species. The herbaceous understory is not fairing well, since both grasses and forbs have declining sum of nested frequency values. Trend for herbaceous understory is down.

TREND ASSESSMENT

soil - down

browse - down, very poor composition

herbaceous understory - down

1994 TREND ASSESSMENT

With continuing drought, ground cover characteristics are still declining on this site and will likely continue as long as juniper and pinyon dominate the area. Percent bare ground has increased from 18% in 1991 to 23%. Litter has also declined. Trend for soil is down. There is still no useful browse species sampled on the site so browse trend is down due to a rebound in the population of broom snakeweed. The herbaceous understory is also in a state of decline. Sum nested frequency of grasses rose slightly due to a significant increase in the low growing increaser, blue grama. Nested frequency of forbs declined 67% and combined nested frequencies of grasses and forbs declined slightly. Trend for herbaceous understory is slightly down.

TREND ASSESSMENT

soil - down

browse - no useful browse present

herbaceous understory - slightly down with very low abundance for all species except for blue grama

1998 TREND ASSESSMENT

Tend for soil is stable with similar ground cover characteristics compared to 1994 estimates. Vegetative cover increased from 12% to 18% but nested frequency of grasses and forbs declined slightly. Trend for browse would have to be considered down slightly. There are no useful species present and density of broom snakeweed has increased slightly since 1994 along with improved reproduction. Trend for the herbaceous understory is down slightly and in poor condition. All herbaceous plants combined produced only 4.5% cover.

TREND ASSESSMENT

soil - stable

browse - down slightly with no useful species present

herbaceous understory - down slightly

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 22

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
G	<i>Aristida longiseta</i>	-	-	3	-	-	-	1	-	.00	-
G	<i>Bouteloua gracilis</i>	82	74	94	81	35	31	37	28	2.65	2.71
G	<i>Bromus tectorum</i> (a)	-	-	-	4	-	-	-	1	-	.03
G	<i>Carex</i> spp.	6	2	-	-	3	2	-	-	-	-
G	<i>Hilaria jamesii</i>	-	3	8	-	-	1	3	-	.18	-
G	<i>Oryzopsis hymenoides</i>	58	49	58	29	27	25	26	15	.78	.64
G	<i>Poa fendleriana</i>	4	-	-	-	2	-	-	-	-	.06
G	<i>Sitanion hystrix</i>	_{ab} 29	_a 16	_a 16	_b 44	17	8	9	20	.14	.47
G	<i>Sporobolus cryptandrus</i>	-	-	-	4	-	-	-	1	.00	.00
G	<i>Stipa comata</i>	2	-	7	-	1	-	3	-	.04	-
Total Annual Grasses		0	0	0	4	0	0	0	1	0	0.03
Total Perennial Grasses		181	144	186	158	85	67	79	64	3.83	3.89
F	<i>Artemisia dracunculus</i>	-	4	-	-	-	2	-	-	-	-
F	<i>Arabis holboellii</i>	2	-	2	-	1	-	1	-	.00	-
F	<i>Astragalus</i> spp.	-	2	6	-	-	1	3	-	.01	-
F	<i>Chaenactis douglasii</i>	1	-	4	-	1	-	2	-	.01	-
F	<i>Chenopodium</i> spp. (a)	-	-	-	2	-	-	-	1	-	.00
F	<i>Cryptantha fulvocanescens</i>	27	17	8	10	12	8	4	4	.09	.04
F	<i>Dalea searlsiae</i>	11	4	3	11	6	3	2	6	.01	.25
F	<i>Descurainia pinnata</i> (a)	-	-	6	5	-	-	3	2	.01	.03
F	<i>Gilia hutchinifolia</i> (a)	-	-	4	-	-	-	3	-	.01	-
F	<i>Hymenoxys acaulis</i>	_b 9	_b 9	_{ab} 4	_a -	6	6	2	-	.06	-
F	<i>Hymenoxys cooperi</i>	_b 17	_a 5	_a -	_a 1	10	3	-	1	-	.00
F	<i>Ipomopsis aggregata</i>	-	2	-	-	-	1	-	-	-	-
F	<i>Lesquerella ludoviciana</i>	_c 63	_{bc} 59	_{ab} 30	_a 24	29	25	15	12	.11	.25
F	<i>Lithospermum incisum</i>	-	-	3	-	-	-	1	-	.03	-
F	<i>Orthocarpus purpureo-albus</i> (a)	7	-	-	-	5	-	-	-	-	-
F	<i>Penstemon strictus</i>	1	1	3	4	1	1	1	2	.00	.01
F	<i>Psilostrophe sparsiflora</i>	_b 11	_{ab} 9	_b 10	_a -	6	3	5	-	.19	-
F	<i>Salsola iberica</i> (a)	_a -	_b 6	_a -	_a -	-	5	-	-	-	-
F	<i>Streptanthus cordatus</i>	-	4	-	3	-	1	-	1	-	.00
F	<i>Townsendia incana</i>	6	6	-	-	2	3	-	-	-	-
Total Annual Forbs		7	6	10	7	5	5	6	3	0.02	0.03
Total Perennial Forbs		148	122	73	53	74	57	36	26	0.54	0.58

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

BROWSE TRENDS --
Herd unit 25C, Study no: 22

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Echinocereus spp.	-	-	-	.15
B	Gutierrezia sarothrae	61	61	.43	1.55
B	Juniperus osteosperma	0	8	4.78	8.32
B	Opuntia spp.	3	2	-	.03
B	Pinus edulis	0	2	.71	2.04
Total for Browse		64	73	5.92	12.10

CANOPY COVER --
Herd unit 25C, Study no: 22

Species	Percent Cover '08
Juniperus osteosperma	18
Pinus edulis	4

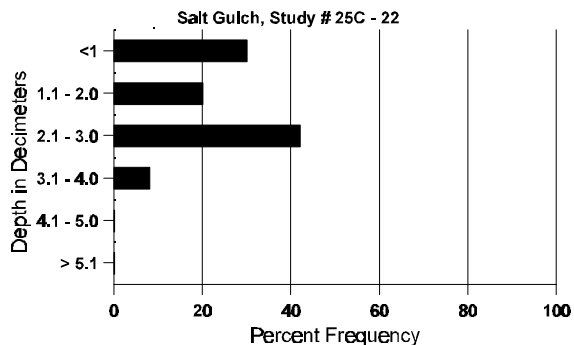
BASIC COVER --
Herd unit 25C, Study no: 22

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'87	'91	'94	'98
Vegetation	215	213	3.25	1.25	11.62	18.08
Rock	324	312	27.00	28.75	27.08	29.30
Pavement	273	238	6.50	11.75	7.07	9.39
Litter	376	381	46.25	40.00	30.94	31.72
Cryptogams	9	9	0	.25	.06	.09
Bare Ground	307	308	17.00	18.00	22.53	21.07

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 22, Study Name: Salt Gulch

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.6	61.8 (14.5)	7.2	58.0	23.4	18.6	2.6	9.0	67.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 22

Type	Quadrat Frequency	
	'04	'08
Rabbit	38	20
Elk	-	4
Deer	34	24

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 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				
<i>Gutierrezia sarothrae</i>																		
S	'87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	'91	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	'94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	'98	62	-	-	-	-	-	-	-	-	62	-	-	-	1240			62
Y	'87	26	-	-	-	-	-	-	-	-	26	-	-	-	1733			26
	'91	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	'94	72	-	-	-	-	-	-	-	-	72	-	-	-	1440			72
	'98	99	-	-	-	-	-	-	-	-	99	-	-	-	1980			99
M	'87	97	-	-	-	-	-	-	-	-	97	-	-	-	6466	8	8	97
	'91	5	-	-	-	-	-	-	-	-	5	-	-	-	333	4	4	5
	'94	137	-	-	-	-	-	-	-	-	137	-	-	-	2740	6	5	137
	'98	121	-	-	-	-	-	-	-	-	118	3	-	-	2420	11	11	121
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	'91	1	-	-	-	-	-	-	-	-	-	-	1	66			1	
	'94	3	-	-	-	-	-	-	-	-	2	-	-	60			3	
	'98	1	-	-	-	-	-	-	-	-	-	-	1	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-92%							
'91		00%			00%			10%			+84%							
'94		00%			00%			.47%			+ 4%							
'98		00%			00%			.45%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	8199	Dec:	0%			
												'91	665		10%			
												'94	4240		1%			
												'98	4420		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				
Juniperus osteosperma																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	87	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	91	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	1	-	-	-	-	-	2	-	-	3	-	-	-	200	171	118	3
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	2	-	-	-	1	-	5	-	-	-	100	-	-	5
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	1	-	-	1	-	-	2	-	-	-	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	1	-	1	-	-	-	20		1	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			25%			-25%							
'91		00%			00%			33%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	266	Dec:	0%				
											'91	199		67%				
											'94	0		0%				
											'98	180		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	5	6	7	8	9	1	2	3	4				
Opuntia spp.																	
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	87	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	2	-	-	1	-	-	2	-	5	-	-	-	333		5	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	2	-	-	-	-	-	-	-	2	-	-	-	133	7 13	2	
	91	3	-	-	-	-	-	-	-	3	-	-	-	200	8 11	3	
	94	3	-	-	-	-	-	-	-	3	-	-	-	60	4 14	3	
	98	2	-	-	-	-	-	-	-	2	-	-	-	40	4 14	2	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	2	-	-	-	-	-	-	-	1	-	-	1	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+70%						
'91		00%			00%			10%			-91%						
'94		00%			00%			00%			+25%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	199	Dec:	0%			
											'91	666		20%			
											'94	60		0%			
											'98	80		0%			
Pinus edulis																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	1	-	-	-	-	1	-	-	-	66		1	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	1	-	-	-	66	138 63	1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	1	-	-	-	-	-	1	-	2	-	-	-	40	- -	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+ 0%						
'91		00%			00%			00%									
'94		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-			
											'91	66		-			
											'94	0		-			
											'98	40		-			

Trend Study 25C-23-98

Study site name: Coal Bench .

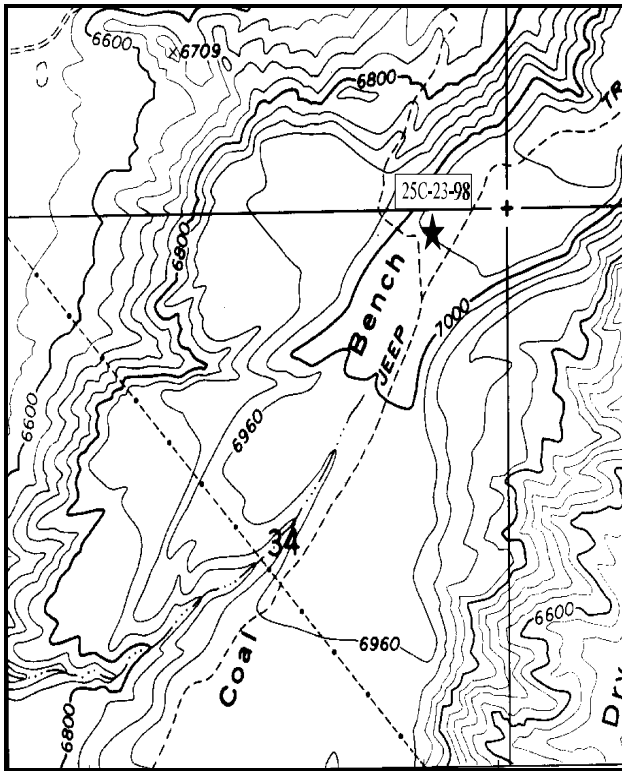
Range type: Chained, Seeded Pinyon-Juniper.

Compass bearing: frequency baseline 208 degrees M.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

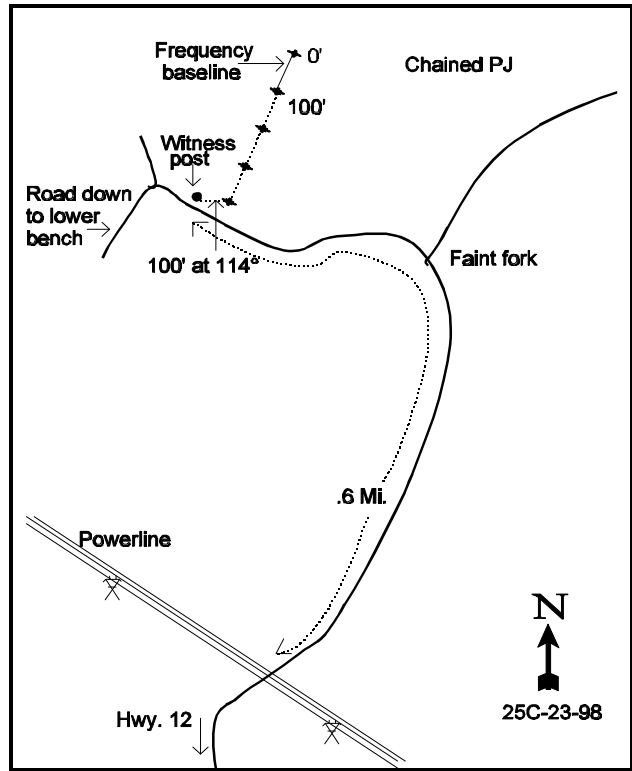
LOCATION DESCRIPTION

Take SR 12 west of Escalante towards Henrieville. Go 0.5 mile past mile marker 33, then turn right (north) onto a dirt road which leads toward Coal Bench. Go to a fork (take left fork to cross the wash) and continue to a gate. From the gate travel 2 miles to a fence at the top of the bench. Continue 0.6 miles to a fork, keep right. Continue 1 mile to a fence, then pass under the powerlines. Go 1 mile to a larger set of powerlines. Continue 0.6 miles to where the road bends and drops down onto a lower bench. There is a witness post (4 foot tall green fencepost) on the right side of the road. From the witness post, walk 100 feet southeast to the 400-foot stake. The 0-foot baseline stake, 400 feet northeast, is marked with a browse tag, #7139.



Map Name: Pine Lake

Township 36S , Range 2W , Section 34



Diagrammatic Sketch

UTM 4165865.350 N, 413177.040 E

DISCUSSION

Trend Study No. 25C-23 (51B-13)

The Coal Bench trend study is on the large Coal Bench mesa, below the Table Cliffs on a southwest point of the Aquarius Plateau. Most of the suitable acreage (3,500 acres) on Coal Bench has been chained and/or plowed and seeded. Treatments were completed in 1966. The transect is located on the narrow, northern end of upper Coal Bench at an elevation of 7,000 feet. The terrain is nearly level to gently sloping on a mostly south aspect. Deer use the area as a major spring and fall migration route from the Dixie National Forest to winter ranges further south. In mild winters, some deer stay in the area. Pellet group data taken during the 1991 reading estimate 14 deer days use/acre. Data from 1998 estimate 7 deer and 4 cow days use/acre. One elk pellet group was also found. Deer pellet groups were concentrated around cliffrose plants. Cow sign appeared old and possibly from last year. Rabbit sign was abundant. This area is within a 3 pasture rest rotation grazing system with use occurring in the spring or summer.

The soil is relatively deep with an estimated effective rooting depth (see methods) of almost 15 inches. At that depth, a hard pan layer was encountered which was impenetrable to the soil penetrometer. Soil texture is a sandy clay loam with a neutral pH (7.0). The soil was formed in alluvium from sandstone and shale. Phosphorus may be limiting to plant growth at just 4 ppm, when 10 ppm is considered to be the minimum value for normal plant development. Some areas have evidence of continued soil movement with rills, exposed plant roots, soil pedestaling and localized concentrations of pavement on the surface. However, erosion is not severe due to the gentle terrain.

Twenty years after the chaining, young (5-8 foot tall) pinyon and juniper trees are common on the site. Density did not appear great enough to effect understory plants in 1991. During the spring or early summer of 1998, prior to the 1998 reading, most of the pinyon and juniper trees were cut down with chainsaws. Point quarter data estimate 14 pinyon and 24 juniper trees/acre still on the site. Of these, 1/3 of the juniper trees sampled were cut, but still living because they were not cut close enough to the ground. Pinyon had an estimated average basal diameter of only 1 inch while uncut surviving juniper averaged 2.7 inches in diameter. Shrub density strip data estimates a total of 260 trees/acre were removed by the treatment. There are still quite a few seedling (20 plants/acre) and young (80 plants/acre) pinyon left on the site however.

Black sagebrush was identified as the most common browse species which currently ('98) makes up 81% of the browse cover. Density was estimated at 933 plants/acre in 1987 increasing to 4,599 by 1991. The much larger sample used in 1998 estimated 2,840 plants/acre. It appears that most of the change in density was caused by the decline in young plants. Mature plants actually increased from 1,233 to 1,660 plants/acre. Reproduction is currently good with a biotic potential of 25% and 37% of the population consisting of young plants. Utilization has been mostly light to moderate with a few plants displaying heavy use. Use was heavier in 1991 when 64% of the shrubs displayed moderate use. Vigor is good and percent decadence has remained low, currently at only 4%.

Other preferred browse species consist of small numbers of curlleaf mountain mahogany and Stansbury cliffrose. Curlleaf was first picked up in 1998 with the larger sample. These plants are small and only lightly utilized. Cliffrose number an estimated 60 plants/acre. Many of these are 6 to 7 feet tall and mostly unutilized. Other browse found on the site include a few Wyoming big sagebrush, rubber rabbitbrush, bitterbrush, and broom snakeweed.

The understory dominates the site by providing 78% of the vegetation cover. Crested wheatgrass is the only abundant herbaceous species however. It produces 99% of the grass cover and 94% of the total herbaceous cover. Heavy litter buildup is associated with these mature plants. The bunchgrass provides excellent soil protection where it occurs, but there is a lot of exposed soil between the plants. Native grasses are uncommon with only one species, western wheatgrass, found in 1998. Forbs are rare. Only the large-leaved cryptantha is found more than occasionally.

1991 TREND ASSESSMENT

There have been large changes in basic cover with only two characteristics that were positive. Vegetative basal cover increased (4% to 6%) and percent rock-pavement decreased (11% to 7%). The negative changes were litter cover declining (54% to 46%) and percent bare ground increasing (31% to 42%). These changes all indicate a downward trend for soils. Most of the more important browse species are in very low numbers, 66 plants/acre or less. The one key species that occurs in high numbers now is black sagebrush with a density of 4,599 plants/acre, up from 933 plants/acre in 1987. Trend for browse is up for Coal Bench. The only common herbaceous species is crested wheatgrass and Cryptantha. The overall trend is slightly downward for the sum of nested frequency for both grasses and forbs is down.

TREND ASSESSMENT

soil - down

browse - up

herbaceous understory - slightly downward

1998 TREND ASSESSMENT

Trend for soil is up with a major decline in percent bare ground (42% to 27%). Litter cover also increased slightly. Trend for browse is considered stable. Density of the key species, black sagebrush, declined 38% due to a reduced number of young plants (3,233 to 1,060 plants/acre). There is still more than enough young plants to maintain the population at current levels. In addition, biotic potential (# of seedlings) has increased from 1% to 25% since 1991. Utilization is mostly light, vigor good and percent decadence low at only 4%. Other preferred species, curlleaf mountain mahogany and cliffrose, have low but stable densities. Trend for the herbaceous understory is stable. Sum of nested frequency of crested wheatgrass has remained similar to 1991 while frequency of forbs increased slightly. Composition is poor with crested wheatgrass providing 94% of the herbaceous cover.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - stable, but poor composition

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 23

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
G	Agropyron cristatum	_b 277	_a 250	_a 249	95	90	84	16.34
G	Agropyron smithii	-	-	3	-	-	1	.01
G	Aristida longiseta	-	3	-	-	1	-	-
G	Oryzopsis hymenoides	3	5	-	1	2	-	-
G	Sitanion hystrix	1	-	-	1	-	-	-
G	Unknown grass - perennial	3	-	-	1	-	-	-
Total Annual Grasses		0	0	0	0	0	0	0
Total Perennial Grasses		284	258	252	98	93	85	16.35
F	Arabis spp.	-	1	-	-	1	-	-
F	Arabis demissa	-	3	-	-	2	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
F	Astragalus spp.	3	-	2	1	-	2	.03
F	Cruciferae	1	-	-	1	-	-	-
F	Cryptantha spp.	_{ab} 40	_a 32	_b 57	19	15	27	1.06
F	Gilia spp. (a)	-	-	-	-	-	-	.00
F	Ipomopsis aggregata	2	-	8	1	-	4	.02
F	Lesquerella intermedia	2	-	-	1	-	-	-
F	Lithospermum ruderale	6	-	-	3	-	-	-
F	Penstemon spp.	-	2	-	-	1	-	-
F	Phlox austromontana	2	3	3	1	1	2	.01
F	Townsendia incana	2	1	-	2	1	-	-
Total Annual Forbs		0	0	0	0	0	0	0
Total Perennial Forbs		58	42	70	29	21	35	1.12

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

BROWSE TRENDS --

Herd unit 25C, Study no: 23

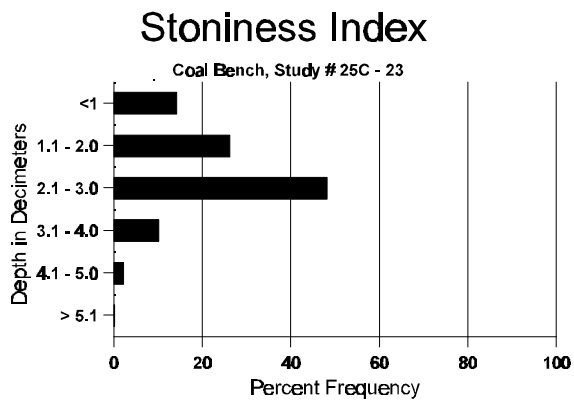
Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	44	4.08
B	Artemisia tridentata wyomingensis	0	-
B	Cercocarpus ledifolius	2	.38
B	Chrysothamnus nauseosus	1	.00
B	Cowania mexicana stansburiana	3	.53
B	Gutierrezia sarothrae	1	-
B	Juniperus osteosperma	1	-
B	Opuntia spp.	1	-
B	Pinus edulis	3	.03
B	Purshia tridentata	0	-
B	Sclerocactus	1	-
Total for Browse		57	5.03

BASIC COVER --
Herd unit 25C, Study no: 23

Cover Type	Nested Frequency '98	Average Cover %		
		'87	'91	'98
Vegetation	280	4.25	5.50	24.64
Rock	43	.50	1.50	.23
Pavement	237	10.00	4.75	6.96
Litter	390	53.75	45.75	48.13
Cryptogams	32	.50	1.00	.87
Bare Ground	290	31.00	41.50	26.76

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 23, Study Name: Coal Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.9	73.0 (15.9)	7.0	54.0	19.4	26.6	4.6	4.0	76.8	.5



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 23

Type	Quadrat Frequency '98
Rabbit	42
Deer	20
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 23

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia nova</i>																		
S	87	94	-	-	-	-	-	-	-	-	89	-	5	-	3133		94	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	45	-	-	5	-	-	-	-	-	50	-	-	-	1000		50	
Y	87	7	2	-	-	-	-	-	-	-	9	-	-	-	300		9	
	91	31	64	2	-	-	-	-	-	-	96	1	-	-	3233		97	
	98	50	-	3	-	-	-	-	-	-	53	-	-	-	1060		53	
M	87	11	6	2	-	-	-	-	-	-	18	-	1	-	633	10 14	19	
	91	13	21	1	2	-	-	-	-	-	37	-	-	-	1233	8 10	37	
	98	52	24	6	1	-	-	-	-	-	78	5	-	-	1660	11 17	83	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	4	-	-	-	-	-	-	-	4	-	-	-	133		4	
	98	5	1	-	-	-	-	-	-	-	6	-	-	-	120		6	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		29%			07%			04%			+80%							
'91		64%			02%			00%			-38%							
'98		18%			06%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	933	Dec:	0%				
											'91	4599		3%				
											'98	2840		4%				
<i>Artemisia tridentata wyomingensis</i>																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	26 16	1	
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	33	20 27	1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		100%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	-				
											'91	33		-				
											'98	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																									
Cercocarpus ledifolius																																						
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0																					
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0																					
	98	3	-	-	-	-	-	-	-	-	-	-	-	60	5	8	3																					
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0																					
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0																					
	98	2	-	-	-	-	-	-	-	-	-	-	-	40			2																					
<table border="0" style="width:100%"> <tr> <td>% Plants Showing</td> <td><u>Moderate Use</u></td> <td><u>Heavy Use</u></td> <td><u>Poor Vigor</u></td> <td><u>%Change</u></td> </tr> <tr> <td>'87</td> <td>00%</td> <td>00%</td> <td>00%</td> <td></td> </tr> <tr> <td>'91</td> <td>00%</td> <td>00%</td> <td>00%</td> <td></td> </tr> <tr> <td>'98</td> <td>00%</td> <td>00%</td> <td>00%</td> <td></td> </tr> </table>																		% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>	'87	00%	00%	00%		'91	00%	00%	00%		'98	00%	00%	00%		
% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>																																		
'87	00%	00%	00%																																			
'91	00%	00%	00%																																			
'98	00%	00%	00%																																			
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Total Plants/Acre (excluding Dead & Seedlings)			'87	0	Dec:	0%																																
			'91	0		0%																																
			'98	100		40%																																
Chrysothamnus nauseosus																																						
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0																					
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0																					
	98	-	1	-	-	-	-	-	-	-	-	-	-	20	34	41	1																					
D	87	-	1	-	-	-	-	-	-	-	-	-	-	33			1																					
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0																					
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0																					
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% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>																																		
'87	100%	00%	00%																																			
'91	00%	00%	00%																																			
'98	100%	00%	00%																																			
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Total Plants/Acre (excluding Dead & Seedlings)			'87	33	Dec:	100%																																
			'91	0		0%																																
			'98	20		0%																																
Cowania mexicana stansburiana																																						
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0																					
	91	1	-	-	-	-	-	-	-	-	-	-	-	33			1																					
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0																					
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0																					
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0																					
	98	2	-	-	-	-	-	-	-	-	-	-	-	40			2																					
M	87	-	1	-	-	1	-	-	-	-	-	-	-	66	84	96	2																					
	91	1	-	-	-	-	-	-	-	-	-	-	-	33	93	107	1																					
	98	1	-	-	-	-	-	-	-	-	-	-	-	20	74	73	1																					
<table border="0" style="width:100%"> <tr> <td>% Plants Showing</td> <td><u>Moderate Use</u></td> <td><u>Heavy Use</u></td> <td><u>Poor Vigor</u></td> <td><u>%Change</u></td> </tr> <tr> <td>'87</td> <td>100%</td> <td>00%</td> <td>00%</td> <td>-50%</td> </tr> <tr> <td>'91</td> <td>00%</td> <td>00%</td> <td>00%</td> <td>+45%</td> </tr> <tr> <td>'98</td> <td>00%</td> <td>00%</td> <td>00%</td> <td></td> </tr> </table>																		% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>	'87	100%	00%	00%	-50%	'91	00%	00%	00%	+45%	'98	00%	00%	00%		
% Plants Showing	<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>																																		
'87	100%	00%	00%	-50%																																		
'91	00%	00%	00%	+45%																																		
'98	00%	00%	00%																																			
<table border="0" style="width:100%"> <tr> <td>Total Plants/Acre (excluding Dead & Seedlings)</td> <td></td> <td></td> <td>'87</td> <td>66</td> <td>Dec:</td> <td>-</td> </tr> <tr> <td></td> <td></td> <td></td> <td>'91</td> <td>33</td> <td></td> <td>-</td> </tr> <tr> <td></td> <td></td> <td></td> <td>'98</td> <td>60</td> <td></td> <td>-</td> </tr> </table>																		Total Plants/Acre (excluding Dead & Seedlings)			'87	66	Dec:	-				'91	33		-				'98	60		-
Total Plants/Acre (excluding Dead & Seedlings)			'87	66	Dec:	-																																
			'91	33		-																																
			'98	60		-																																

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Gutierrezia sarothrae																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'98	20		-		
Juniperus osteosperma																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'98	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				
Opuntia spp.																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33	4	8	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	13	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%			-60%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%				
											'91	99		33%				
											'98	40		0%				
Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	-				
											'91	0		-				
											'98	80		-				
Purshia tridentata																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	17	24	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'98	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			
Sclerocactus																	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
	'87	00%			00%			00%									
	'91	00%			00%			00%									
	'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'98	20		-		

Trend Study 25C-24-98

Study site name: Black Ridge .

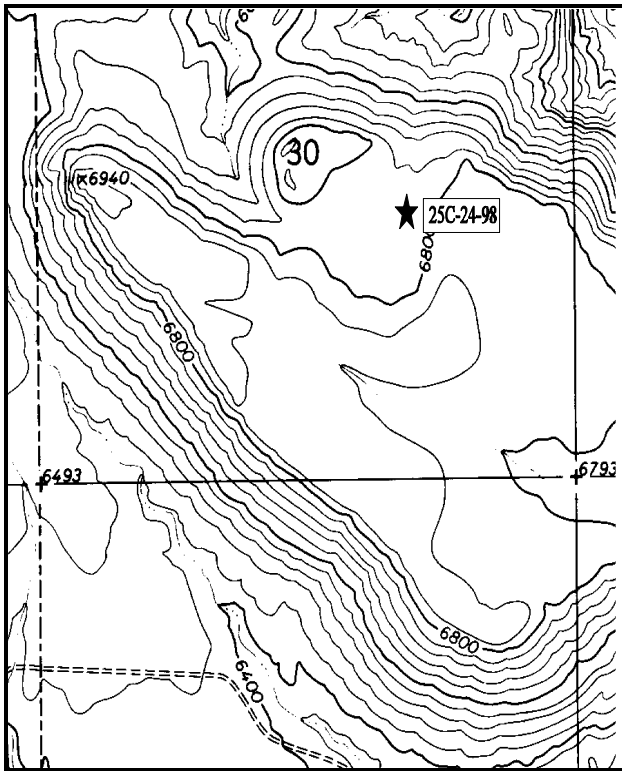
Range type: Big Sagebrush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

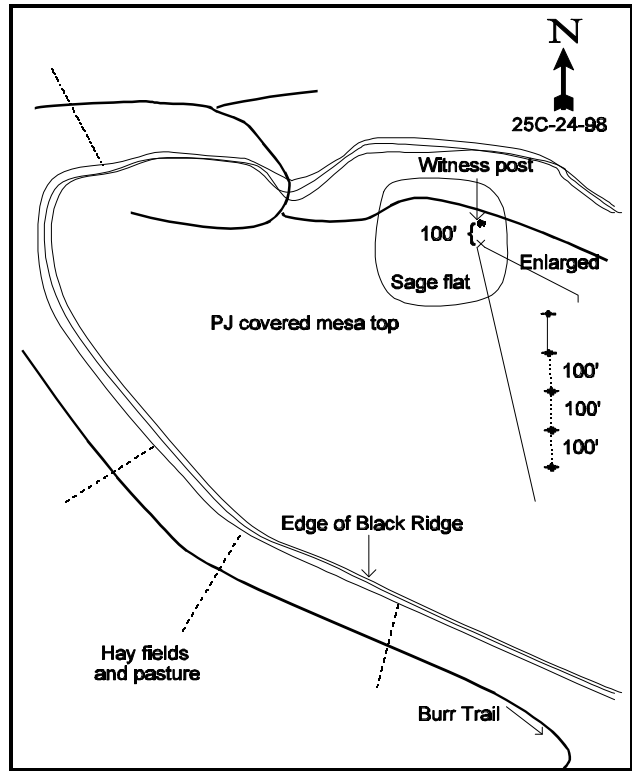
LOCATION DESCRIPTION

From the Anasazi State Park in Boulder, continue south on SR 12 for 0.1 miles then turn left (east) on a city street. Drive east for 0.7 miles to a fork. Stay left and continue 1.3 miles up Black Ridge Mesa and a witness post (full high) on the right, near the east edge of a sagebrush opening in the P-J. Make sure to stay on the main road avoiding various smaller forks. The short fenceposts marking the transect run south at 100 foot intervals. There are other routes to reach the one road leading to the top of the mesa. All, including the one described, involve crossing private land.



Map Name: Boulder Town

Township 33S, Range 5E, Section 30



Diagrammatic Sketch

UTM 4195350.045 N, 465541.966 E

DISCUSSION

Trend Study No. 25C-24 (51B-14)

The Black Ridge study site is an example of important low-elevation deer and elk winter range on a mesa top near the town of Boulder. This particular mesa is small, about 240 acres. Most of the mesa is covered with pinyon and juniper, except for a 10 acre sagebrush flat where the study was located. The mesa is privately owned and surrounded by alfalfa fields and pastures at its base. It has been used for livestock grazing in the past. During the 1998 reading, it was discovered that the mesa is being developed for houses. The road to the top has been improved and electricity and water lines have been installed. Building has not yet begun. It is not known how the sagebrush flat will be impacted, but it is apparent that big game will be affected. Frequent pellet groups and antler drops found during past readings verify the area's importance to mule deer. Pellet group data taken during the 1991 reading indicate heavy deer use with an estimated 70 deer days use/acre. Elk sign was less common. Pellet group data from 1998 estimate 87 deer and 6 elk days use/acre. Surrounding mesas are similarly flat-topped and dominated by pinyon-juniper, with use concentrated within the sagebrush flats.

Located in a sagebrush basin surrounded by rocky, pinyon-juniper covered ridges, the study site has a 1-2% slope and a northerly aspect. The elevation is 6,800 feet, about 400 feet higher than the surrounding fields. Sandstone bedrock is exposed on the sides of the mesa, but on top the sandy soil appears to be quite deep. Effective rooting depth (see methods) is estimated at 16 inches with no rock on the surface or within the profile. Texture is a loamy sand with a slightly acid pH (6.3). Phosphorus may be limiting to plant growth at just 3.8 ppm when 10 ppm is thought to be a minimum value for normal plant development. Although the soil is light and loose, erosion is not a significant problem with the lack of slope.

A moderately dense stand of Wyoming big sagebrush characterizes the site. The sagebrush is overly mature and 63% of the shrubs were classified as decadent in 1987. This percentage increased in 1991 to 85%. There were very few young plants or seedlings. Density was estimated at 4,799 plants/acre in 1987, declining 24% to 3,666 by 1991. The much larger sample used in 1998 estimated 2,440 plants/acre. Some of the change in density would be due to the larger sample, but it is apparent that the population is in a state of decline. During the 1991 reading, 30% of the decadent sagebrush were classified as dying, which equates to 940 plants/acre. By 1998, 39% or 560 plants/acre of the decadent sagebrush were classified as dying. Dead plants, first included in the 1998 sample, are numerous at 1,060 plant/acre. Reproduction is limited and percent decadency has declined to 59%, but this is still very high. Utilization has been light to moderate since 1987 with a few individuals displaying heavy use.

Only a few scattered pinyon and juniper were encountered on the study. Point quarter data from 1998 estimate 69 pinyon and 24 juniper trees/acre. Average diameter of pinyon is 1.8 inches while juniper averages 5.2 inches. The few other browse species observed occur along the edge or in the trees. These include black sagebrush, bitterbrush, Ephedra, and serviceberry. All are heavily hedged except for black sagebrush. Some old lone junipers near the site are highlined.

Herbaceous vegetation is diverse but not abundant. Blue grama, sandhill muhly, and Indian ricegrass are the most common grasses. However, all grasses combined produced only 5% cover in 1998. Ten species of forbs occur on the study site. Currently ('98), the most common forbs include: rockcress, Carruth sage, cryptantha, and hoary aster. Total forb cover is nearly 3%.

1991 TREND ASSESSMENT

Basic cover for soil has experienced some unfavorable changes since 1987. Vegetative basal cover improved from 7% to 10%, but litter cover declined from 44% to 34% and percent bare ground expanded from 46% to 53%. Total ground cover has dropped from 54% down to 47%. Trend for soil is down. The key browse on

the site is Wyoming big sagebrush. Its population has declined by 24%. The more serious problem is that percent decadency has risen from 63% up to 85%. One possible explanation is that it has been noted in the past that the sagebrush stand is on a flat that drains to the center from all sides. The lower central area during the winters of 1983 and 1984 experienced highly saturated soils for extended periods of time which has caused a noticeable change in the sagebrush as they are all dead. This could have had an effect on the rest of the sagebrush population within the sagebrush flat as well. Since those wet years, we have experienced an extended drought which have also affected the sagebrush population. The trend for browse is down. The herbaceous understory has the grasses which show some improvement (sum of nested frequency improved) , but the forbs demonstrate a decline. The overall trend would be stable.

TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - stable

1998 TREND ASSESSMENT

Trend for soil is stable with similar amounts of bare ground compared to 1991. Litter cover increased slightly but cryptogamic cover declined. Trend for the key browse species, Wyoming big sagebrush, continues to be down with a decline in density, similar poor vigor compared to 1991, and lower but still high percent decadence at 59%. Reproduction is poor with only a few young plants encountered in 1998. Decadent/dying plants currently number 560 plants/acre which will likely be dead by the time the site is read again. Trend for the herbaceous understory is mixed. Sum of nested frequency of grasses has declined. The only grass to increase in nested frequency since 1991 is blue grama. All other perennial grasses declined in frequency. Sum of nested frequency of forbs increased. Trend is considered stable, but in poor condition. This area is being developed for houses. It is not known if homes will be built on the sagebrush flat where the study is located but any development will likely reduce deer and especially elk use of this mesa top. The site will be reevaluated in 5 years to determine if a trend study is still useful.

TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - stable, but in poor condition

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 24

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
G	<i>Bouteloua gracilis</i>	85	107	115	37	46	46	2.56
G	<i>Hilaria jamesii</i>	3	-	-	2	-	-	-
G	<i>Muhlenbergia pungens</i>	_{ab} 67	_b 78	_a 36	28	28	15	.49
G	<i>Oryzopsis hymenoides</i>	25	39	23	15	17	13	.27
G	<i>Sitanion hystrix</i>	6	7	5	4	4	2	.06
G	<i>Sporobolus cryptandrus</i>	_a -	_b 17	_a 3	-	7	2	.01
G	<i>Stipa comata</i>	_b 16	_{ab} 4	_a 2	7	3	1	.03
G	<i>Vulpia octoflora</i> (a)	-	-	139	-	-	46	1.35
Total Annual Grasses		0	0	139	0	0	46	1.35
Total Perennial Grasses		202	252	184	93	105	79	3.43

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
F	Arabis spp.	a-	a-	b56	-	-	26	.36
F	Artemisia carruthii	a28	ab39	b57	12	16	23	.46
F	Astragalus convallarius	b34	a15	a2	18	7	2	.01
F	Cordylanthus wrightii (a)	85	-	9	42	-	5	.07
F	Cryptantha cinerea	a14	a14	b86	9	9	34	1.14
F	Cruciferae	b7	a-	a-	5	-	-	-
F	Descurainia pinnata (a)	-	-	2	-	-	2	.01
F	Eriogonum cernuum (a)	b55	a10	a-	28	7	-	-
F	Heterotheca villosa	3	2	-	1	1	-	-
F	Hymenopappus filifolius	ab2	b10	a-	1	5	-	-
F	Machaeranthera canescens	a-	a11	b48	-	5	19	.43
F	Oenothera pallida	a-	a3	b23	-	2	12	.08
F	Plantago patagonica (a)	-	-	31	-	-	14	.12
F	Tradescantia occidentalis	a7	b25	a3	4	14	1	.00
F	Unknown forb-perennial	3	-	-	2	-	-	-
Total Annual Forbs		140	10	42	70	7	21	0.20
Total Perennial Forbs		98	119	275	52	59	117	2.52

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

BROWSE TRENDS --

Herd unit 25C, Study no: 24

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	72	16.87
B	Opuntia spp	4	-
B	Pinus edulis	1	.38
Total for Browse		77	17.25

BASIC COVER --

Herd unit 25C, Study no: 24

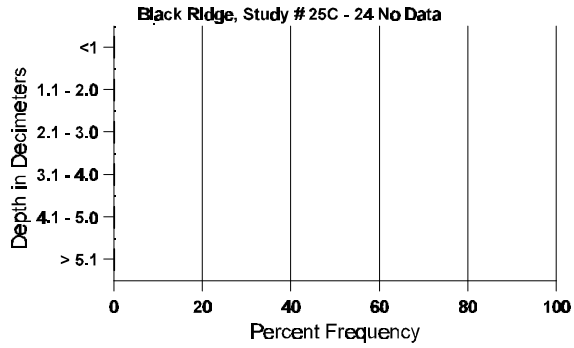
Cover Type	Nested Frequency '98	Average Cover %		
		'87	'91	'98
Vegetation	291	7.25	9.75	27.49
Rock	-	0	0	0
Pavement	28	0	0	.22
Litter	388	44.00	34.00	39.02
Cryptogams	50	3.00	3.25	.48
Bare Ground	371	45.75	53.00	51.87

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 24, Study Name: Black Ridge

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.2	60.8 (16.3)	6.3	86.0	5.4	8.6	.6	3.8	28.8	.3

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 24

Type	Quadrat Frequency '98
Rabbit	14
Elk	2
Deer	64
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 24

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 wyomingensis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	12	13	1	-	-	-	-	-	-	20	4	2	-	1733	22	21	26
	91	2	4	-	-	-	-	-	-	-	6	-	-	-	400	23	24	6
	98	33	13	-	1	-	-	-	-	-	47	-	-	-	940	24	40	47
D	87	28	13	4	-	-	-	-	-	-	35	2	8	-	3000			45
	91	17	12	1	12	4	1	-	-	-	32	1	-	14	3133			47
	98	54	18	-	-	-	-	-	-	-	43	1	-	28	1440			72
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1060			53
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		36%			07%			14%			-24%							
'91		36%			04%			25%			-33%							
'98		25%			00%			23%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	4799	Dec:	63%			
												'91	3666		85%			
												'98	2440		59%			
Opuntia spp.																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	2	5	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	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			
Pinus edulis																	
S	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'91	2	-	-	-	-	-	-	-	-	1	-	1	-	133		2
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
		'87			00%			00%			00%						
		'91			00%			00%			00%						
		'98			00%			00%			00%						
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'98	20		-		

Trend Study 25C-25-98

Study site name: Center Creek .

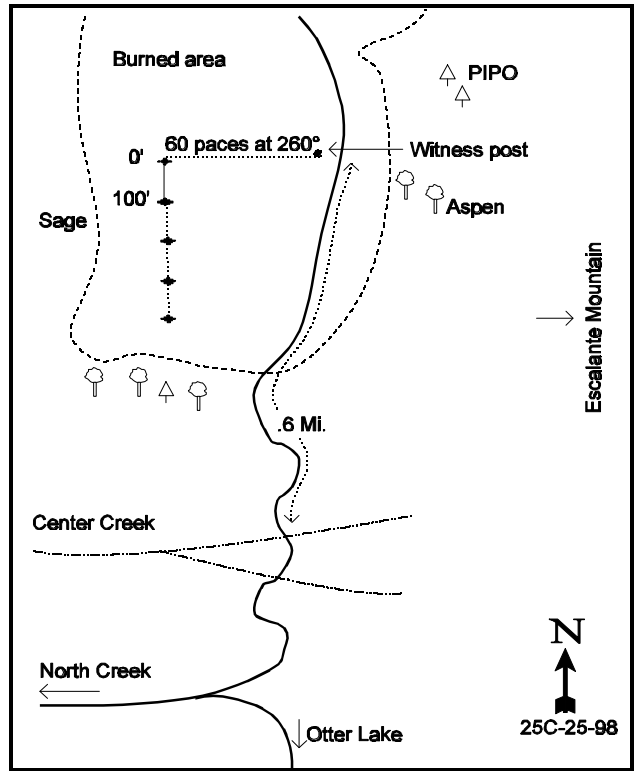
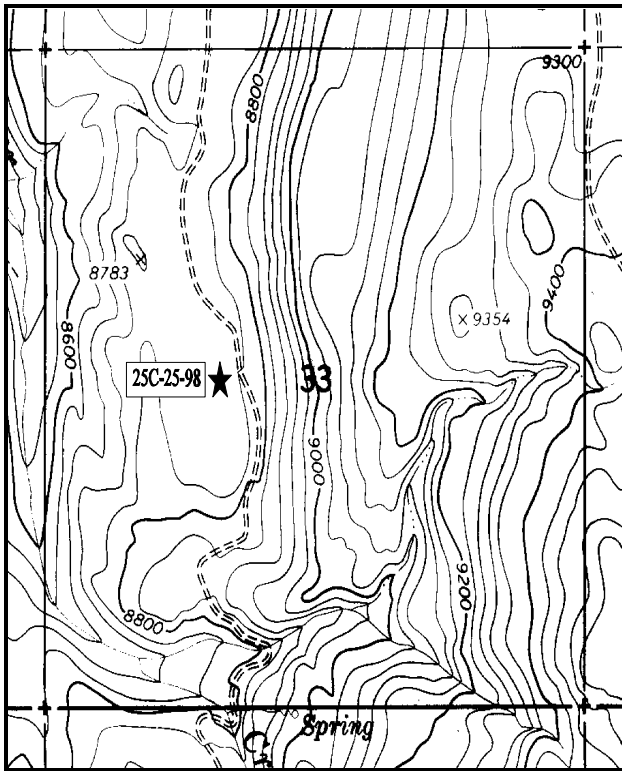
Range type: Burn .

Compass bearing: frequency baseline 183 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

LOCATION DESCRIPTION

From the intersection of SR12 and Rt. 1660 (to22) turn left onto Johns Flat Road. Go 17.2 miles to the Grass Lake Road (USFS sign) and turn east. Travel 1.2 miles on this road to a fork by some fields. Turn right and continue 0.4 miles to the Horse Creek Fork. Turn left and go 1.15 miles to a fork with a sign. Stay left and continue 0.25 miles on the main road. Past the buildings, at Birch Creek, take the right fork and go 0.6 miles. Stay left at the fork and go 0.75 miles to a cattleguard. Continue 0.75 miles to a fork. Stay left and go 1.65 miles to a USFS enclosure. Continue 2.55 miles to a cattleguard. Continue 0.5 miles to North Creek. Go 2.6 miles, past the North Creek transect, to the Center Creek-Otter Lake intersection. Bear left and go 1.25 miles to a witness post on the left side of the road. Walk 60 paces west to the 1st baseline stake, a short fencepost marked with a red browse tag.



Map Name: Grass Lakes

Diagrammatic Sketch

Township 32S , Range 1W , Section 33

UTM 4203856.298 N , 420338.903 E

DISCUSSION

Trend Study No. 25C-25 (44-25)

The Center Creek range study is in a sagebrush flat north and east of Center Creek that was burned as part of a 1984 treatment. It is now occupied by rabbitbrush and herbaceous vegetation. The old sagebrush flat is on a high bench on the west side of the Escalante Mountains (Aquarius Plateau). Terrain in the small valley is relatively flat with a slight southwest aspect. Elevation at the site is 8,750 feet. Deer often utilize high elevation winter ranges on the west side of herd unit between Widtsoe and Antimony during light to moderate winters. There was fairly abundant deer (15 deer days use/acre) and elk (15 elk days use/acre) pellet groups on the study site in 1991, with apparently more use made of the surrounding sagebrush hillsides and aspen stands. Pellet group data from 1998 estimate 36 deer, 12 elk, and 33 cow days use/acre. Cattle pats appeared to be from the previous year, while most of the elk pellet groups appear to be from the past 6 months. Deer sign was more recent with about half within a few weeks of age. There is a considerable amount of ant hills on the site.

Soil on the site is moderately deep with an effective rooting depth (see methods) of almost 18 inches. Texture is a loam with a slightly acid pH (6.1). Pavement is common on the surface with a cover value of 33% in 1998. Current erosion is minimal due to good soil protection and gentle terrain.

Mountain big sagebrush has reestablish itself in the flat with a density of 200 plants/acre in 1987, 733 in 1994, 1,380 in 1994, and 1,420 by 1998. Utilization has remained light to moderate through the years with good vigor and low percent decadence. Reproduction remains good.

The dominant woody plant is mountain low rabbitbrush which currently ('98) provides 83% of the browse cover. Density was estimated at almost 4,000 plants/acre in 1987. Ninety-eight percent of these medium-sized shrubs encountered were mature vigorously prolific plants. This population exploded since the first reading, increasing its density nearly 9 times to an estimated density of 35,065 plants/acre, 84% of which were classified as young. Competition and drought have since thinned the high density to 25,360 plants/acre, 77% of which are young. Density continued to decline in 1998 to 12,360 plants/acre. The number of young plants also declined considerably, but density of mature plants rose from 4,500 to 6,060 plants/acre. The population appears to have stabilized. Utilization of these shrubs appears light. There is also some horsebrush, rubber rabbitbrush, and snowberry plants on the site, however it is really the herbaceous vegetation that is important here as the woody plants appear to be unutilized.

There is a good mix and diversity of grasses and forbs, but grasses dominate the understory with a cover value of 19% in 1994 and 24% by 1998. The most common grasses are the native pinewoods needlegrass and mutton bluegrass, and the seeded grasses, crested wheatgrass and smooth brome. Forbs are diverse, but only a few species are abundant. The large silky lupine is the dominant forb along with red root eriogonum and Utah deervetch which combined produce 81% of the forb cover. Utilization of these plants appears light.

1991 TREND ASSESSMENT

The soil trend appears to be stable since percent bare ground has remained at around 10% cover since 1987. The most common browse, low rabbitbrush, is increasing dramatically while the key species, mountain big sagebrush, has also increased from 200 to 733 plants/acre. Its biotic potential is good at 27%. We would expect it to continue to expand in numbers in the coming years. Trend for browse is improving, but still poor because of the overwhelming numbers of the increaser shrub, mountain low rabbitbrush, which was brought on by the fire. The most important aspect of this site is the herbaceous understory. There are 40 species of grasses and forbs sampled on this site. The inspection of the sum of nested frequencies for the grasses and forbs show differing trends. The grasses show increases, while the forbs display slightly lower nested frequency values. The overall trend is considered up slightly because the grasses are considered more important to big game than forbs for winter and transition range use.

TREND ASSESSMENT

soil - stable

browse - improving, but still poor composition

herbaceous understory - up slightly

1994 TREND ASSESSMENT

Basic ground cover characteristics have improved slightly since 1991 due to a decline in percent bare ground. The browse component is still dominated by mountain low rabbitbrush, but its density has declined considerably since 1991, while the population density of the preferred mountain big sagebrush increased by 47%. The browse composition is still poor, but slowly improving. The herbaceous trend is down due to a major decline in the sum of nested frequencies for both grasses and forbs. Some of this decline may be the result of the natural thinning process after a fire. The extremely dry springs and summers of 1993 and 1994 are also an additional cause for these declines along with the continuing extended drought.

TREND ASSESSMENT

soil - slightly improved

browse - slowly improving

herbaceous understory - down

1998 TREND ASSESSMENT

Trend for soil is up slightly due to a slight decline in percent bare ground combined with an increase in litter and vegetation cover. Trend for browse is up. Density of mountain big sagebrush increased slightly, while the number of mountain low rabbitbrush declined 51%. Utilization of the sagebrush remains light, vigor good, and percent decadence low at only 1%. Dead plants counted in 1998 were burned stems from the 1984 fire. Age class analysis suggests that the sagebrush population will probably continue to increase slowly. Mountain low rabbitbrush declined in density, but there are still an estimated 12,360 plants/acre, 48% of which are young plants. Seedlings are also abundant. The decline in density came from the young age class which numbered 19,620 plants/acre in 1994. Mature plant density actually rose from 4,500 to 6,060 plants/acre since 1994. The population will likely become more mature in the future, although density will probably not drop significantly any time soon. Trend for the herbaceous understory is up compared to 1994 data. Sum of nested frequency of perennial grasses and forbs increased. Production is also improved since 1994, especially for forbs. Cover of grasses has increased from 20% to 24% while forb cover has gone from 3% to 12%.

TREND ASSESSMENT

soil - up slightly

browse - up, but still dominated by increasers

herbaceous understory - up

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 25

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
G	<i>Agropyron cristatum</i>	a110	b148	ab131	b165	46	63	53	65	3.22	5.21
G	<i>Agropyron intermedium</i>	19	11	5	25	9	6	2	9	.03	.29
G	<i>Agropyron spicatum</i>	4	3	4	12	2	1	2	5	.03	.24
G	<i>Bouteloua gracilis</i>	26	27	26	15	10	11	10	5	1.58	.48
G	<i>Bromus inermis</i>	a58	b124	b124	c176	33	51	56	70	2.25	6.44
G	<i>Bromus japonicus</i> (a)	6	-	-	1	3	-	-	1	-	.03
G	<i>Carex</i> spp.	8	3	2	4	3	1	1	2	.03	.03
G	<i>Festuca ovina</i>	-	1	5	7	-	1	2	3	.03	.09
G	<i>Koeleria cristata</i>	-	-	-	-	-	-	-	-	-	.03
G	<i>Poa fendleriana</i>	b49	b62	a18	c127	21	27	9	49	.43	3.45
G	<i>Poa pratensis</i>	-	-	3	3	-	-	1	1	.15	.38
G	<i>Poa secunda</i>	-	-	-	1	-	-	-	1	-	.03
G	<i>Sitanion hystrix</i>	b126	c200	a83	b136	51	76	37	60	.56	3.11
G	<i>Stipa comata</i>	a-	c54	a-	b27	-	22	-	12	-	.38
G	<i>Stipa pinetorum</i>	a171	b198	c272	b166	72	76	93	60	11.32	4.17
Total Annual Grasses		6	0	0	1	3	0	0	1	0	0.03
Total Perennial Grasses		571	831	673	864	247	335	266	342	19.66	24.35
F	<i>Agoseris glauca</i>	-	4	-	3	-	2	-	3	-	.01
F	<i>Alyssum alyssoides</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Antennaria parvifolia</i>	-	1	4	7	-	1	2	3	.03	.33
F	<i>Androsace septentrionalis</i> (a)	a14	a5	a20	b73	9	3	10	30	.07	.35
F	<i>Arabis</i> spp.	-	-	-	3	-	-	-	1	-	.00
F	<i>Astragalus convallarius</i>	a-	ab4	ab6	b15	-	2	3	6	.01	.22
F	<i>Astragalus</i> spp.	-	-	-	1	-	-	-	1	-	.03
F	<i>Castilleja linariaefolia</i>	a-	a-	ab2	b11	-	-	1	5	.00	.07
F	<i>Carduus nutans</i> (a)	-	-	3	-	-	-	1	-	.00	-
F	<i>Castilleja linariaefolia</i>	-	-	-	1	-	-	-	1	-	.03
F	<i>Chenopodium album</i> (a)	-	-	5	3	-	-	3	1	.01	.03
F	<i>Chaenactis douglasii</i>	a37	b46	a22	a19	15	23	10	8	.05	.09
F	<i>Collomia linearis</i> (a)	-	-	-	2	-	-	-	1	-	.00
F	<i>Crepis acuminata</i>	-	-	-	4	-	-	-	3	-	.01
F	Cruciferae	4	6	-	-	3	2	-	-	-	-
F	<i>Descurainia pinnata</i> (a)	b17	b22	a-	a3	11	11	-	1	-	.00
F	<i>Dracocephalum parviflorum</i>	2	-	-	-	2	-	-	-	-	-
F	<i>Eriogonum cernuum</i> (a)	-	2	-	2	-	1	-	2	-	.01
F	<i>Erodium cicutarium</i> (a)	-	-	1	-	-	-	1	-	.00	-
F	<i>Erigeron eatonii</i>	a-	b16	a-	b27	-	7	-	11	-	.15
F	<i>Erigeron flagellaris</i>	a-	ab8	a-	b9	-	3	-	4	-	.05

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	04	08
F	<i>Eriogonum hookeri</i> (a)	_b 12	_b 9	_b 20	_a -	5	5	8	-	.09	-
F	<i>Erigeron pumilus</i>	_{ab} 13	_{bc} 33	_c 36	_a 8	7	15	14	4	.26	.09
F	<i>Eriogonum racemosum</i>	_a 63	_{ab} 79	_{ab} 87	_b 109	26	35	35	41	.77	2.04
F	<i>Holosteum umbellatum</i> (a)	-	-	-	1	-	-	-	1	-	.00
F	<i>Hymenoxys richardsonii</i>	-	3	-	-	-	1	-	-	-	-
F	<i>Ipomopsis aggregata</i>	-	4	6	5	-	2	2	2	.01	.18
F	<i>Lappula occidentalis</i> (a)	3	5	-	2	2	3	-	1	-	.00
F	<i>Lotus utahensis</i>	_c 188	_b 136	_a 98	_{ab} 108	74	62	45	51	.40	2.66
F	<i>Lupinus sericeus</i>	_b 132	_a 59	_a 32	_a 54	61	32	19	26	1.29	5.44
F	<i>Lychnis drummondii</i>	_a 1	_b 22	_a -	_a -	1	10	-	-	-	-
F	<i>Machaeranthera canescens</i>	-	3	4	2	-	1	2	2	.03	.03
F	<i>Penstemon comarrhenus</i>	_{ab} 12	_{ab} 9	_b 17	_a 5	5	5	9	3	.09	.01
F	<i>Phlox longifolia</i>	_d 198	_c 79	_b 34	_a 5	77	41	17	2	.08	.03
F	<i>Potentilla biennis</i>	1	-	-	-	1	-	-	-	-	.00
F	<i>Polygonum douglasii</i> (a)	-	-	6	-	-	-	2	-	.01	-
F	<i>Senecio multilobatus</i>	_a 8	_b 34	_{ab} 22	_a 2	3	14	10	2	.05	.01
F	<i>Taraxacum officinale</i>	_c 209	_c 187	_a 38	_b 74	80	71	15	33	.07	.41
F	<i>Tragopogon dubius</i>	_b 6	_{ab} 6	_a -	_{ab} 7	4	2	-	3	-	.01
Total Annual Forbs		46	43	55	87	27	23	25	38	0.18	0.39
Total Perennial Forbs		874	739	408	479	359	331	184	215	3.21	12.00

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

BROWSE TRENDS --

Herd unit 25C, Study no: 25

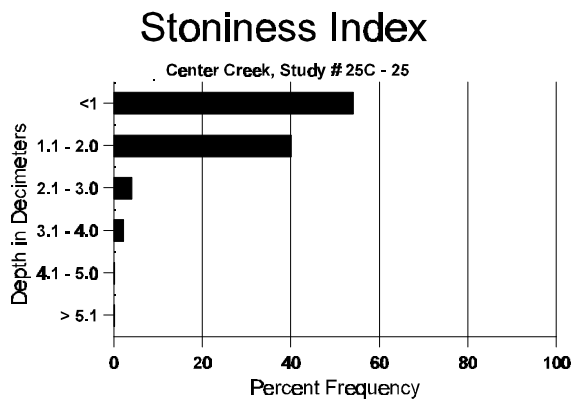
Type	Species	Strip Frequency		Average Cover %	
		04	08	04	08
B	<i>Artemisia tridentata vaseyana</i>	34	37	1.42	1.50
B	<i>Chrysothamnus nauseosus</i>	17	7	.33	-
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	96	100	14.60	14.51
B	<i>Leptodactylon pungens</i>	0	0	-	-
B	<i>Symphoricarpos oreophilus</i>	2	3	.41	.76
B	<i>Tetradymia canescens</i>	22	15	1.01	.69
Total for Browse		171	162	17.79	17.47

BASIC COVER --
Herd unit 25C, Study no: 25

Cover Type	Nested Frequency		Average Cover %			
	'84	'88	'87	'91	'94	'98
Vegetation	283	374	18.25	11.25	28.89	54.06
Rock	198	41	.50	.75	1.66	.29
Pavement	247	313	41.50	42.00	17.14	32.76
Litter	317	395	30.25	35.75	25.67	41.45
Cryptogams	-	3	0	0	0	.01
Bare Ground	198	136	9.50	10.25	6.39	4.53

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 25, Study Name: Center Creek

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.9	56.2 (17.7)	6.1	48.4	31.1	20.6	2.7	15.3	249.6	.4



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 25

Type	Quadrat Frequency	
	'84	'88
Rabbit	12	14
Elk	11	5
Deer	21	25
Cattle	1	8

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 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 vaseyana																	
S	'87	27	-	-	-	-	-	-	-	-	27	-	-	-	1800		27
	'91	9	-	-	3	-	-	-	-	-	12	-	-	-	800		12
	'94	86	-	-	-	-	-	-	-	-	86	-	-	-	1720		86
	'98	24	-	-	-	-	-	-	-	-	24	-	-	-	480		24
Y	'87	31	-	-	-	-	-	-	-	-	31	-	-	-	2066		31
	'91	14	5	1	6	-	-	2	-	-	28	-	-	-	1866		28
	'94	56	-	-	-	-	-	-	-	-	56	-	-	-	1120		56
	'98	23	-	-	-	-	-	-	-	-	23	-	-	-	460		23
M	'87	36	19	12	-	-	-	-	-	-	64	3	-	-	4466	28 24	67
	'91	18	21	1	7	2	-	2	-	-	51	-	-	-	3400	25 24	51
	'94	162	43	6	-	-	-	-	-	-	211	-	-	-	4220	24 34	211
	'98	15	11	-	-	-	-	-	-	-	26	-	-	-	520	15 23	26
D	'87	19	8	1	-	-	-	-	-	-	23	2	-	3	1866		28
	'91	23	9	-	10	2	-	2	-	-	36	-	-	10	3066		46
	'94	37	33	1	-	-	-	-	-	-	55	-	1	15	1420		71
	'98	13	2	-	-	-	-	-	-	-	13	-	-	2	300		15
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	360		18
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	3960		198
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		21%			10%			02%			- 1%						
'91		31%			02%			08%			-19%						
'94		22%			02%			05%			-81%						
'98		20%			00%			03%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	8398	Dec:	22%			
											'91	8332		37%			
											'94	6760		21%			
											'98	1280		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													
Chrysothamnus nauseosus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	94	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	26	26	1
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133	34	35	2
	94	17	3	-	-	-	-	-	-	-	20	-	-	-	400	50	47	20
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120	30	22	6
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>								
'87		00%		00%		00%				+80%								
'91		00%		00%		00%				+55%								
'94		08%		00%		03%				-76%								
'98		00%		00%		11%												
Total Plants/Acre (excluding Dead & Seedlings)										'87	66	Dec:	0%					
										'91	333		0%					
										'94	740		5%					
										'98	180		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				
Chrysothamnus viscidiflorus lanceolatus									
S	87	-	-	-	-	-	-	0	0
	91	209	-	-	21	-	-	293	523
	94	24	-	-	-	-	-	-	24
	98	43	-	-	-	-	-	-	43
Y	87	1	-	-	-	-	-	-	1
	91	412	-	-	10	-	-	23	445
	94	974	-	7	-	-	-	-	981
	98	293	2	4	-	-	-	-	280
M	87	59	-	-	-	-	-	-	59
	91	77	3	-	1	-	-	-	71
	94	215	3	7	-	-	-	-	225
	98	300	-	2	1	-	-	-	303
D	87	-	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	-	0
	94	67	-	-	-	-	-	-	63
	98	16	-	-	-	-	-	-	6
X	87	-	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	-	0
	94	-	-	-	-	-	-	-	40
	98	-	-	-	-	-	-	-	60
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>			<u>%Change</u>		
'87		00%	00%	00%			+89%		
'91		.57%	00%	02%			-27%		
'94		.23%	01%	.31%			-51%		
'98		.32%	.97%	05%					
Total Plants/Acre (excluding Dead & Seedlings)					'87	3999	Dec:	0%	
					'91	35066		0%	
					'94	25460		5%	
					'98	12360		3%	
Leptodactylon pungens									
M	87	-	-	-	-	-	-	-	0
	91	-	-	-	-	-	-	-	0
	94	-	-	-	-	-	-	-	0
	98	-	-	-	-	-	-	-	0
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>			<u>%Change</u>		
'87		00%	00%	00%					
'91		00%	00%	00%					
'94		00%	00%	00%					
'98		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'87	0	Dec:	-	
					'91	0		-	
					'94	0		-	
					'98	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									
Symphoricarpos oreophilus																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	-	-	-	-	-	-	-	2	-	-	-	40	17	43	2
	98	2	-	-	-	-	-	-	-	2	-	-	-	40	22	74	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'94		00%			00%			00%			+ 0%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-				
										'91	0		-				
										'94	60		-				
										'98	60		-				
Tetradymia canescens																	
Y	87	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	5	-	-	-	-	-	-	-	5	-	-	-	333		5	
	94	9	-	-	-	-	-	-	-	9	-	-	-	180		9	
	98	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	5	-	-	-	-	-	-	-	5	-	-	-	333	11	11	5
	91	2	1	-	-	-	-	-	-	3	-	-	-	200	13	17	3
	94	17	1	2	2	-	-	-	-	22	-	-	-	440	34	41	22
	98	11	3	-	2	-	-	-	-	16	-	-	-	320	16	22	16
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	98	2	1	-	-	-	-	-	-	2	-	-	1	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+ 0%						
'91		13%			00%			00%			+17%						
'94		06%			06%			00%			-38%						
'98		20%			00%			05%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	533	Dec:	0%				
										'91	533		0%				
										'94	640		3%				
										'98	400		15%				

Trend Study 25C-26-98

Study site name: Black Canyon .

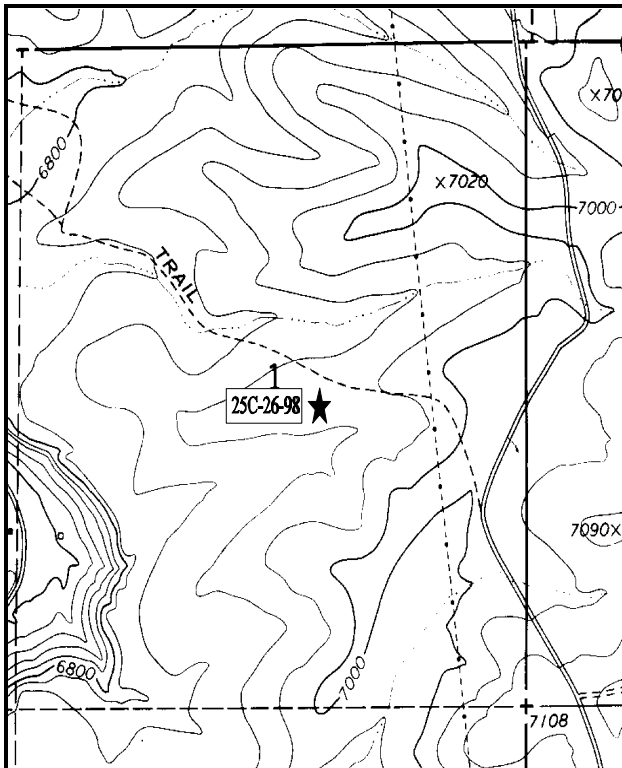
Range type: Big Sagebrush .

Compass bearing: frequency baseline 254 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

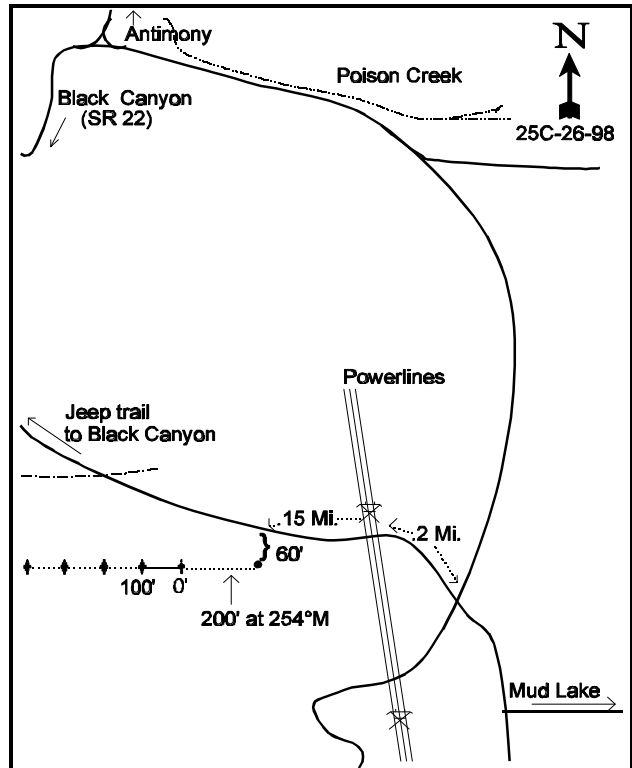
LOCATION DESCRIPTION

From Antimony, travel south on SR22 to the turnoff to the Mud Lake road. Turn east, go along Poison Creek for 1.2 miles to a fork, stay right. Continue east and south for 2.2 miles to another major fork. At this point there is a faint jeep trail heading back to the north. Follow this jeep trail 0.35 miles, under the powerlines and up on the ridge to a green fence post (witness post) about 20 yards off the south (left) of the road. The transect starts 200 feet west of the witness post. It is marked by 1 1/2-foot tall fenceposts.



Map Name: Antimony

Township 32S, Range 2W, Section 1



Diagrammatic Sketch

UTM 4211709.893 N, 416173.229 E

DISCUSSION

Trend Study No. 25C-26 (51B-16)

The Black Canyon trend study samples a critical deer winter range south of Antimony. Antelope also use the area during the fall and spring. The Wyoming big sagebrush range type dominates most of this low, rolling bench. The country is marked with short, dry washes which drain west into Black Canyon of the East Fork of the Sevier River. The study is set up on the top of a gentle ridge which is nearly level and has a slight eastern aspect near the start of the base line, but more of a western aspect near the end. The elevation is 6,950 feet. Pellet group data from 1998 estimate 37 deer, 6 elk, and 19 antelope days use/acre. Cattle also used the area with 6 cow days use/acre estimated. Some of the antelope pellet groups were more recent but all others appeared older. The area is within an allotment which receives spring use by cattle from May 15 to June 15.

The soil is rocky, hard-packed and moderately deep with an estimated effective rooting depth (see methods) of almost 14 inches. Texture is a sandy clay loam with a neutral pH (7.1). Phosphorus may be limiting to plant development at only 3.5 ppm, when 10 ppm is thought to be the minimum for normal development. A hard pan appears to be present starting around 14 inches in depth. There is a high percentage of coarse fragments in the profile and concentrated on the surface as erosion pavement. There is evidence of slight surface (sheet) erosion and movement of rock down slope. But it does not appear to be serious due to the adequate protective ground cover combined with the gentle slope.

Except for the rocky slopes covered with pinyon-juniper, the dominant overstory for many miles is Wyoming big sagebrush. The plants are short in stature, and in some places are associated with black sagebrush. On the study site, there were only two plants identified as black sagebrush in 1991. The Wyoming big sagebrush numbered 6,799 plants/acre in 1987 and 8,732 by 1991. During the 1998, reading many of the sagebrush were classified as black sagebrush. It is apparent that these two species are hybridizing which makes identification difficult. Some plants had the color of Wyoming big sagebrush, but the growth form of black sagebrush and vice versa. Combined black/Wyoming big sagebrush density has remained similar to 1987 estimates. The decline in density from 8,732 plants/acre estimated in 1987 to 6,520 in 1998 comes mostly from the young age class. Young plants numbered 4,800 plants/acre in 1991 and only 520 by 1998. The number of decadent plants also declined between 1991 and 1998 (2,266 to 300 plants/acre). Due to the lack of large numbers of dead plants (460 plants/acre) it appears that many of the decadent plants regained their vigor prior to the 1998 reading. Utilization was moderate to heavy in 1987 and 1991, but light to moderate in 1998. Currently, the population appears healthy, in good vigor with low decadence. Reproduction is adequate to maintain the stand.

Other common shrubs include two increasers, broom snakeweed and narrowleaf low rabbitbrush. During the 1987 reading, it appeared that the broom snakeweed population (11,999 plants/acre) along with it's high proportion of young and seedlings would continue to increase on the site. By 1991, the population had crashed from 11,999 plants/acre to only 2,266 plants/acre, an 81% decrease. This decline continued in 1998 when only 360 plants/acre were estimated. Narrowleaf low rabbitbrush has had a more stable population of 1,065 plants/acre in 1987 declining slightly to 980 by 1998.

The herbaceous understory is poor and totally dominated by blue grama which provides 99% of the grass and 94% of the total herbaceous cover on the site. Other grasses are rare. Only 5 forb species were sampled during the 1998 reading. These forbs combined to produce less than 1% cover. The lack of herbaceous vegetation lowers the value of this area for deer during the spring period.

1991 TREND ASSESSMENT

Basic cover for soil changed little overall, 89% to 90% protective ground cover. There was some improvement of vegetative basal cover (12% to 15%) with increases in pavement cover (34% to 44%) and

decreases in litter cover (36% to 25%). Generally, the trend is considered stable as long as there are no substantial increases in bare ground. The key browse species is Wyoming big sagebrush. It's population has grown by 22% to 8,732 plants/acre. The rate of decadency has risen to 26% which is not uncommon for a Wyoming sagebrush site, especially with the extended drought. The broom snakeweed population has experienced large reductions in density (11,999 down to 2,266 plants/acre) which again is not unusual during a long period of drought. Trend for browse is up. The herbaceous understory is mostly made up of only one species, blue grama. By the inspection of the sum of nested frequencies for grasses and forbs, the trend is stable.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - stable

1998 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1991. The only significant change is in the decline in pavement cover from 44% to 34%. Trend for browse is stable. Density of black/Wyoming big sagebrush has declined, however this is almost all due to the increased sample size giving more accurate estimates for browse species. Currently, utilization is lighter, vigor improved and percent decadence is lower (26% to 11%). In addition, density of broom snakeweed has continued to decline to only 360 plants/acre. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses declined slightly, although the frequency of the dominant grass, blue grama, remained similar to 1991 estimates. Sum of nested frequency of perennial forbs increased slightly. Composition is still poor and perennial forbs are lacking.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable, but poor

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 26

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
G	Aristida purpurea	_b 8	_a -	_a -	5	-	-	-
G	Bouteloua gracilis	261	251	245	81	85	81	12.51
G	Sitanion hystrix	_a 1	_a 1	_b 11	1	1	6	.06
G	Sporobolus cryptandrus	_a 2	_b 17	_a 3	1	7	1	.03
G	Stipa comata	11	12	8	6	5	3	.04
Total Annual Grasses		0	0	0	0	0	0	0
Total Perennial Grasses		283	281	267	94	98	91	12.65
F	Astragalus spp.	15	32	26	8	14	12	.48
F	Chenopodium spp. (a)	_a -	_b 43	_a 4	-	19	2	.01
F	Draba spp. (a)	-	-	1	-	-	1	.00
F	Erigeron pumilus	_b 7	_a -	_b 20	4	-	10	.15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
F	Machaeranthera canescens	1	-	-	1	-	-	-
F	Phlox longifolia	5	1	5	2	1	3	.01
F	Sphaeralcea coccinea	_b 9	_{ab} 6	_a -	6	2	-	-
F	Unknown forb-perennial	_b 15	_a -	_a -	6	-	-	-
Total Annual Forbs		0	43	5	0	19	3	0.01
Total Perennial Forbs		52	39	51	27	36	25	0.65

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

BROWSE TRENDS --

Herd unit 25C, Study no: 26

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	56	6.09
B	Artemisia tridentata wyomingensis	73	5.59
B	Chrysothamnus viscidiflorus stenophyllus	12	.14
B	Echinocereus spp.	-	.00
B	Ephedra nevadensis	1	.03
B	Gutierrezia sarothrae	13	.17
B	Opuntia spp.	3	.03
Total for Browse		158	12.06

BASIC COVER --

Herd unit 25C, Study no: 26

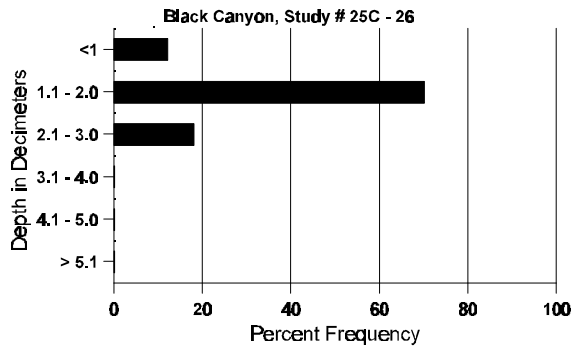
Cover Type	Nested Frequency '98	Average Cover %		
		'87	'91	'98
Vegetation	299	12.00	14.50	28.67
Rock	237	7.00	7.50	7.03
Pavement	368	34.00	43.75	34.29
Litter	370	36.25	24.50	21.10
Cryptogams	101	0	0	.59
Bare Ground	288	10.75	9.75	11.03

SOIL ANALYSIS DATA --

Herd Unit 25C, Study # 26, Study Name: Black Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.6	72.6 (15.5)	7.1	62.0	19.4	26.6	1.8	3.5	134.4	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 26

Type	Quadrat Frequency '98
Rabbit	13
Elk	2
Deer	15
Cattle	1
Antelope	6

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 26

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 nova																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	11	1	-	-	-	-	-	-	-	12	-	-	-	240			12
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	91	13	-	4	-	-	-	-	-	108	-	-	-	2160	10	21	108
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	1	-	-	1	-	-	-	-	1	-	-	1	133			2
	98	14	5	1	-	-	-	-	-	-	10	-	-	10	400			20
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	620			31
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		100%			00%			50%			+95%							
'98		14%			.71%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'91	133		100%			
												'98	2800		14%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																	
S	87	6	2	-	-	-	-	-	-	-	8	-	-	-	533		8
	91	1	-	-	-	-	-	1	-	-	2	-	-	-	133		2
	98	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9
Y	87	16	41	9	-	-	-	-	-	-	66	-	-	-	4400		66
	91	3	68	-	-	-	-	1	-	-	72	-	-	-	4800		72
	98	20	6	-	-	-	-	-	-	-	26	-	-	-	520		26
M	87	2	11	18	-	-	-	-	-	-	31	-	-	-	2066	11 18	31
	91	3	15	6	-	1	-	-	-	-	25	-	-	-	1666	7 17	25
	98	89	49	7	-	-	-	-	-	-	145	-	-	-	2900	11 22	145
D	87	-	2	3	-	-	-	-	-	-	5	-	-	-	333		5
	91	1	13	7	-	12	1	-	-	-	12	-	-	22	2266		34
	98	8	5	1	-	-	-	1	-	-	5	-	-	10	300		15
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	2	-	-	-	460		23
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		53%			29%			00%			+22%						
'91		83%			11%			17%			-57%						
'98		32%			04%			05%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	6799	Dec:	5%		
												'91	8732		26%		
												'98	3720		8%		
<i>Chrysothamnus viscidiflorus stenophyllus</i>																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
Y	87	9	1	-	-	-	-	-	-	-	10	-	-	-	666		10
	91	2	1	-	-	-	-	-	-	-	3	-	-	-	200		3
	98	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10
M	87	4	1	-	-	-	-	-	-	-	5	-	-	-	333	10 13	5
	91	7	5	-	-	-	-	2	-	-	14	-	-	-	933	5 6	14
	98	26	-	-	1	-	-	-	-	-	27	-	-	-	540	8 15	27
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	91	1	6	-	-	-	-	-	-	-	2	-	-	5	466		7
	98	12	-	-	-	-	-	-	-	-	6	-	-	6	240		12
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		13%			00%			00%			+33%						
'91		50%			00%			21%			-39%						
'98		00%			00%			12%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	1065	Dec:	6%		
												'91	1599		29%		
												'98	980		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				
<i>Ephedra nevadensis</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	14	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'98	20		-			
<i>Gutierrezia sarothrae</i>																		
S	87	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
Y	87	50	-	-	-	-	-	-	-	-	50	-	-	-	3333		50	
	91	4	1	-	-	-	-	-	-	-	5	-	-	-	333		5	
	98	6	-	-	-	-	-	1	-	-	7	-	-	-	140		7	
M	87	122	-	-	-	-	-	-	-	-	122	-	-	-	8133	7	6	122
	91	23	2	-	1	-	-	-	-	-	26	-	-	-	1733	6	6	26
	98	10	-	-	-	-	-	-	-	-	10	-	-	-	200	8	10	10
D	87	8	-	-	-	-	-	-	-	-	6	-	2	-	533		8	
	91	2	-	-	1	-	-	-	-	-	1	-	-	2	200		3	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			01%			-81%							
'91		09%			00%			06%			-84%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	11999	Dec:	4%			
												'91	2266		9%			
												'98	360		6%			
<i>Opuntia spp.</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	3	4	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	1	-	-	-	-	-	2	-	-	-	40	4	12	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%			- 9%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'91	66		-			
												'98	60		-			

Trend Study 25C-27-98

Study site name: Poison Creek Bench .

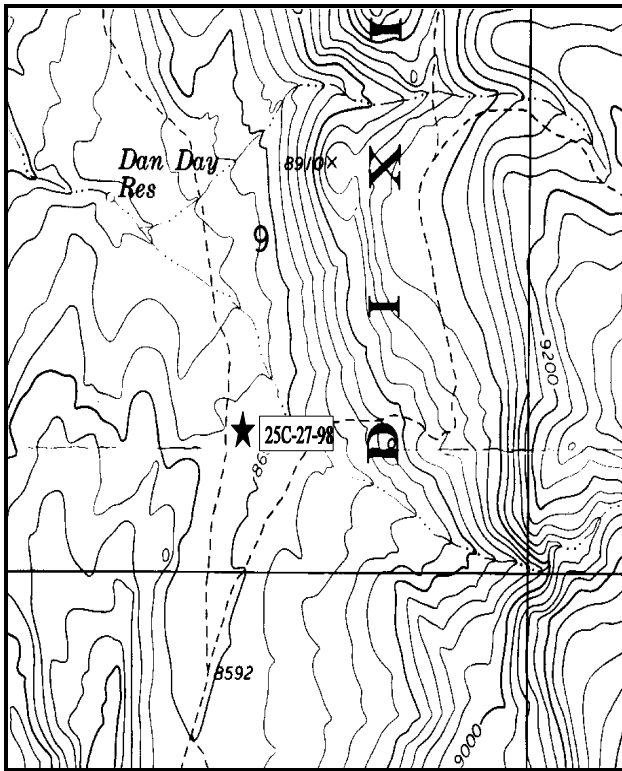
Range type: Big Sagebrush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

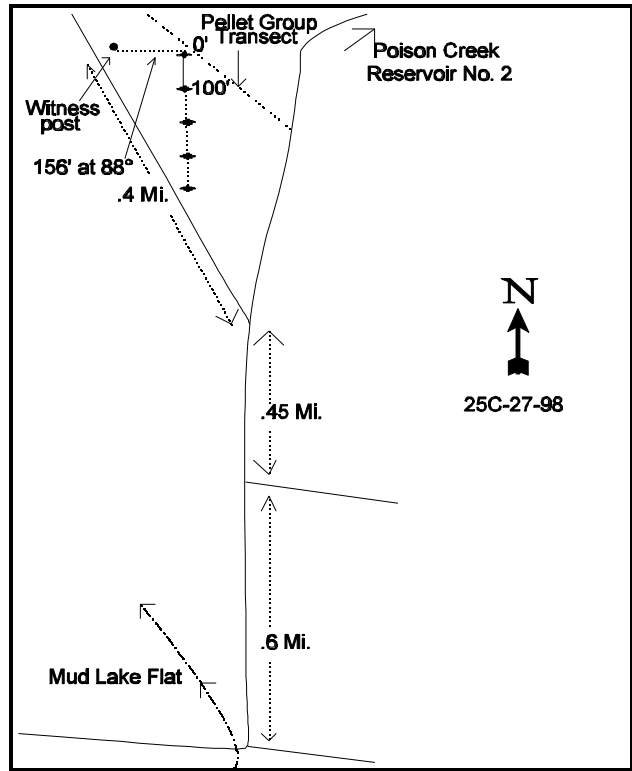
LOCATION DESCRIPTION

From the Center Creek study site (25C-25-98), continue north on the main road for 2.3 miles to the Mud Lake/Pacer Lake fork. Continue straight on the main road for 0.4 miles to a fork near an intermittent stream and turn right. This area can also be reached by coming from the north along the Poison Creek and Mud Lake roads. Drive 0.6 miles to a fork. Proceed straight through the fork for 0.45 miles to another fork. Bear left and proceed 0.4 miles to the study site, identified by a witness post on the right side of the road. The 0-foot baseline stake is about 30 paces east of the witness post. The 2-foot metal fencepost has a browse tag, #9001, attached.



Map Name: Antimony

Township 32S, Range 1W, Section 9



Diagrammatic Sketch

UTM 4209788.044 N, 420665.871 E

DISCUSSION

Trend Study No. 25C-27 (44-27)

The Poison Creek Bench trend study samples high elevation winter range on the west side of the unit which appears to receive substantial use by deer in the winter. The bench where the study is located is dominated by mountain big sagebrush. Surrounding ridges support aspen, Rocky Mountain juniper, and ponderosa pine. The bench slopes gently, 1-2% to the west-northwest with an elevation of 8,600 feet. Pellet group data from 1998 estimate 11 deer, 1 elk, and 11 cow days use/acre. Most of the deer pellet groups appear fresh indicating that deer use this area during for summer as well as winter range. After the reading in 1994, the area was part of a prescribed burn.

Soil at the site is very rocky on the surface and in the profile. Effective rooting depth (see methods) is estimated at just over 13 inches. Texture is a sandy clay loam with a moderately acid pH (6.0). There is little bare ground exposed due to the abundant vegetation and litter cover. The small areas that are exposed have a protective covering of pavement. Overall, the hazard of erosion is minimal.

Ten browse species occurred on the site including a dense stand of vigorous mountain big sagebrush. Data from the density plots taken in 1987 indicate a stand of 8,398 plants/acre which has remained fairly stable. During the 1994 reading, a total of 6,760 sagebrush plants/acre were estimated. Most of the decrease in density was the result of the much larger sample taken in 1994, which gives much better population estimates for browse species. Twenty-five percent of the population was classified as young in 1987, 22% in 1991, and 17% in 1994. The biotic potential was also high in 1987 at 21%. Biotic potential has since fallen to 10% in 1991. Ten percent of the larger plants showed heavy hedging in 1987 with utilization being more moderate in 1991 (2%) and 1994 (9%). The majority of the sagebrush are only lightly used. Percent decadency has remained similar at around 20% with the exception of 37% in 1991.

The less common bitterbrush have steadily increased in density from 1,332 plants/acre in 1987 to 2,280 by 1994. They show heavier use than sagebrush with 70% of the large, bushy plants heavily hedged in 1987. In 1991, only 26% of the shrubs were heavily hedged, however, nearly half displayed poor vigor and decadency was extremely high at 83%. By 1994, only 4% of the shrubs displayed heavy use, no plants were classified with poor vigor and percent decadency dropped to only 17%. Bitterbrush has shown a lower biotic potential since 1987 and reduced number of young plants. However, the population increased with each reading.

Rubber rabbitbrush was fairly common in 1987 with a high proportion being seedlings and young which appeared to be unutilized. Since that reading, the population has increased slightly from 732 plants/acre in 1987, to 799 plants/acre in 1991, and 740 plants/acre in 1994. Utilization was heavier in 1991. No seedlings were encountered and half as many young plants were counted during the 1991 reading. Percent decadency also increased from 27% in 1987 to 42% in 1991, with the decadent individuals being utilized the most. During the 1994 reading, only a few seedlings and young were found, but no decadent plants were encountered.

Some time after the 1994 reading, a fire burned the area eliminating most of the shrubs. During the 1998 reading, only 1,280 sagebrush plants/acre were estimated. Mature and decadent plants numbered 820 plants/acre. Dead plants consisting of burned stems numbered an estimated 3,960 per acre. It was difficult to determine if the stems were from sagebrush or bitterbrush. Utilization of sagebrush is light to moderate and vigor normal on most plants. Seedlings and young are numerous and the population will likely increase in the future. Nearly all of the bitterbrush was eliminated by the fire and only 40 young plants/acre remain. All of the rubber rabbitbrush was killed by the fire, but the sprouting stickyleaf low rabbitbrush increased slightly since 1994 from 1,920 to 2,520 plants/acre.

The herbaceous understory was quite diverse and productive even before the fire. Prior to the fire the most abundant grasses included: Letterman needlegrass, bottlebrush squirreltail, mutton bluegrass, a sedge, and blue

grama. After the fire production of perennial grasses doubled, but composition remained similar. The most common species is currently a Carex species which provides 49% of the grass cover. Blue grama, mutton bluegrass, bottlebrush squirreltail, needle-and-thread and Letterman needlegrass are also common. It is not known if the site was seeded after the fire, but crested wheatgrass and intermediate wheatgrass were encountered in one of the 100 quadrats in 1998. Forbs are especially diverse. Twenty-eight species were identified on the transect in 1994. As with the grasses, utilization was very light. Only the tall narrowleaf paintbrush, a few penstemon, and buckwheat showed any signs of use. Composition remained similar after the fire with 30 species classified in 1998, including many preferred and valuable as forage. Currently, the most common species include: Indian paintbrush, redroot and sulfur eriogonum, Utah deervetch, silvery lupine, and Uinta groundsel. Sum of nested frequency of forbs had been declining steadily since 1987, but has rebounded after the burn. Production also increased dramatically from 3% cover estimated in 1994 to 16% by 1998.

1991 TREND ASSESSMENT

Basic cover features are almost the same except for the decline in vegetative basal cover which dropped from 12% to 8%. Rock-pavement cover has not really changed (39% to 40%) and litter cover has only increased slightly (44% to 45%). The most critical parameter, percent bare ground, only changed from 5% to 7%. Percent bare ground is still very low when compared to most sites. Trend for Poison Creek Ridge is stable. The two key browse species for the site are mountain big sagebrush and antelope bitterbrush. The mountain big sagebrush population has not shown any significant changes since 1987. It decreased by less than 1%. Rate of decadency has risen from 22% to 37%. This should be monitored closely to see if any significant losses should occur in the future. This rate of decadency should be expected with such a high density (8,332 plants/acre) in association with the extended drought we have been in since 1987. Antelope bitterbrush has actually experienced a 13% increase in it's numbers (1,332 to 1,532), but it too has demonstrated increases in percent decadency (20% to 83%). A high rate of decadency for bitterbrush has been found on many sites throughout Utah and would be expected to decrease with an end to this unusually long drought. Trend for key browse is stable to slightly declining, depending on future trends in decadence. The herbaceous understory is a little more difficult to determine since the grasses are slightly increasing while the forbs are declining. Since this area is considered a winter range for big game, the grass component is weighted more heavily, making the trend stable at this time.

TREND ASSESSMENT

soil - stable

browse - stable to slightly declining

herbaceous understory - stable

1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1987, however percent bare ground has steadily increased from 5% in 1987 to 9% by 1994, and pavement cover declined. The trend for soil is still stable due to the abundance of herbaceous vegetation. Percent bare ground will likely decline with the return of normal precipitation patterns. Trend for browse is up slightly. Density of mountain big sagebrush declined 19% due primarily to a reduction in the number of young and decadent plants. Density of mature plants increased from 3,400 to 4,220 plants/acre. Percent decadence has declined from 37% to 21%. Trend for the other key species, antelope bitterbrush, is up due to decreased decadency, improved vigor and a gradual increase in density. However, biotic and reproductive potentials are low. Trend for the herbaceous understory is down slightly due to declining sum of nested frequencies of forbs and grasses. Nested frequencies of forbs declined 40% while those of grasses declined nearly 17%.

TREND ASSESSMENT

soil - stable

browse - up slightly

herbaceous understory - down slightly

1998 TREND ASSESSMENT

Trend for soil is considered stable. Percent bare ground increased from 9% to 14% and litter declined from 44% to 30% due to the fire. However, vegetation cover increased and herbaceous cover currently provides 87% of that cover. Trend for browse is down due to the fire. Some sagebrush appears to have survived the fire and current population density is estimated at 1,280 plants/acre. Biotic potential is 8% and young plants account for 36% of the population. Most of the bitterbrush appear to have been eliminated and only 40 young plants/acre remain on the site. The increaser, stickyleaf low rabbitbrush, has increased 24% since 1994. Trend for the herbaceous understory is up. Sum of nested frequency of grasses and forbs has increased. Production has also increased especially for forbs which are an important component of big game spring range. Pellet group data suggest that this area is currently used more in the spring and summer than in winter.

TREND ASSESSMENT

soil - stable

browse - down due to the fire

herbaceous understory - up

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 27

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
G	Agropyron cristatum	-	-	-	3	-	-	-	1	-	.03
G	Agropyron intermedium	-	-	-	1	-	-	-	1	-	.00
G	Bouteloua gracilis	_b 64	_b 73	_a 37	_a 33	23	29	16	14	1.07	1.01
G	Bromus inermis	8	-	-	-	2	-	-	-	-	-
G	Bromus japonicus (a)	-	-	-	-	-	-	-	-	-	.00
G	Carex spp.	_a 36	_a 48	_b 130	_c 175	17	17	47	56	2.08	11.49
G	Koeleria cristata	6	9	14	5	3	5	6	3	.10	.06
G	Poa fendleriana	84	69	81	55	38	32	32	25	2.15	1.56
G	Sitanion hystrix	_b 160	_b 158	_a 76	_a 100	72	68	38	48	.78	2.99
G	Stipa columbiana	_a -	_a -	_a -	_b 24	-	-	-	8	-	.95
G	Stipa comata	_a -	_c 35	_b 8	_c 59	-	18	4	25	.36	2.41
G	Stipa lettermani	_b 147	_b 149	_a 106	_a 82	69	66	42	34	3.65	2.75
Total Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total Perennial Grasses		505	541	452	537	224	235	185	215	10.21	23.28
F	Agoseris glauca	-	1	-	-	-	1	-	-	-	-
F	Antennaria parvifolia	_c 25	_{bc} 19	_a -	_{ab} 5	15	7	-	2	-	.06
F	Androsace septentrionalis (a)	-	-	_a 3	_b 30	-	-	2	16	.01	.28

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'84	'88
F	<i>Arabis demissa</i>	b ₅₃	ab ₂₇	a ₁₁	a ₁₄	25	14	5	6	.02	.08
F	<i>Artemisia ludoviciana</i>	2	-	1	1	1	-	1	1	.00	.03
F	<i>Astragalus convallarius</i>	13	8	9	17	8	5	4	9	.10	.24
F	<i>Astragalus</i> spp.	3	-	4	-	1	-	2	-	.01	-
F	<i>Castilleja linariaefolia</i>	b ₆₉	a ₃₃	a ₂₄	a ₃₆	33	19	12	20	.32	1.11
F	<i>Chaenactis douglasii</i>	b ₆₃	a ₈	a ₂	a ₁₀	33	4	2	5	.01	.07
F	<i>Crepis acuminata</i>	-	3	-	5	-	2	-	3	-	.04
F	<i>Cryptantha flavoculata</i>	a ₅	b ₂₀	a ₅	a ₋	2	10	3	-	.01	-
F	Cruciferae	-	2	-	-	-	2	-	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	-	8	-	-	-	3	-	.04
F	<i>Erigeron eatonii</i>	b ₇₂	b ₇₉	a ₁₁	a ₂₆	34	41	6	10	.05	.49
F	<i>Erigeron pumilus</i>	b ₃₇	ab ₃₂	a ₁₆	ab ₂₂	19	17	9	12	.14	.43
F	<i>Eriogonum racemosum</i>	b ₆₇	b ₆₈	a ₃₈	ab ₃₇	32	31	19	19	.21	.72
F	<i>Eriogonum umbellatum</i>	b ₃₅	ab ₃₈	ab ₂₉	a ₁₂	17	16	16	7	.25	.58
F	<i>Gilia</i> spp. (a)	b ₂₃	a ₋	a ₅	a ₋	10	-	2	-	.01	-
F	<i>Hymenoxys richardsonii</i>	5	7	3	3	2	2	1	2	.03	.15
F	<i>Ipomopsis aggregata</i>	1	4	5	7	1	2	4	4	.02	.36
F	<i>Linum lewisii</i>	6	7	2	3	2	3	1	2	.00	.04
F	<i>Lotus utahensis</i>	b ₁₁₈	a ₂₈	a ₆₀	a ₃₃	55	16	25	18	.22	1.35
F	<i>Lupinus argenteus</i>	b ₁₀₁	a ₅₉	ab ₇₂	a ₆₃	43	27	33	28	1.46	6.75
F	<i>Lychnis drummondii</i>	a ₋	b ₁₂	a ₋	ab ₈	-	6	-	3	-	.06
F	<i>Lygodesmia spinosa</i>	10	13	2	6	6	7	2	3	.06	.09
F	<i>Machaeranthera canescens</i>	b ₂₆	ab ₁₃	a ₇	a ₁	11	8	4	1	.07	.03
F	<i>Microsteris gracilis</i> (a)	-	-	-	2	-	-	-	1	-	.03
F	<i>Orthocarpus</i> spp. (a)	-	-	3	-	-	-	1	-	.00	-
F	<i>Penstemon comarrhenus</i>	b ₁₇	a ₆	a ₃	ab ₁₆	12	5	1	6	.00	.05
F	<i>Petradoria pumila</i>	2	3	2	1	2	2	1	1	.03	.00
F	<i>Phlox longifolia</i>	b ₆₇	b ₆₅	a ₁₆	a ₁₂	33	34	7	7	.04	.06
F	<i>Potentilla anersina</i>	6	3	2	1	2	1	2	1	.03	.01
F	<i>Senecio multilobatus</i>	c ₁₀₈	a ₂₃	a ₁₅	b ₇₃	53	14	9	33	.04	2.23
F	<i>Taraxacum officinale</i>	ab ₇	ab ₄	a ₋	b ₅	3	2	-	4	-	.05
F	Unknown forb-perennial	2	-	-	-	1	-	-	-	-	-
F	<i>Veronica biloba</i> (a)	-	-	-	3	-	-	-	1	-	.15
Total Annual Forbs		3	0	11	43	10	0	5	21	0.02	0.50
Total Perennial Forbs		940	585	339	417	446	298	169	207	3.20	15.13

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

BROWSE TRENDS --
Herd unit 25C, Study no: 27

Type	Species	Strip Frequency		Average Cover %	
		'04	'08	'04	'08
B	Artemisia nova	7	0	1.84	-
B	Artemisia tridentata vaseyana	98	23	20.42	2.53
B	Cercocarpus ledifolius	0	1	-	-
B	Chrysothamnus nauseosus	19	0	.20	-
B	Chrysothamnus viscidiflorus	47	58	.46	2.99
B	Echinocereus spp.	0	10	-	.03
B	Gutierrezia sarothrae	4	6	-	.01
B	Juniperus scopulorum	0	0	.15	-
B	Leptodactylon pungens	13	2	.36	.00
B	Opuntia spp.	4	0	.05	-
B	Purshia tridentata	32	2	8.53	.18
B	Symphoricarpos oreophilus	1	0	-	-
B	Tetradymia canescens	3	6	.00	.00
Total for Browse		228	108	32.02	5.76

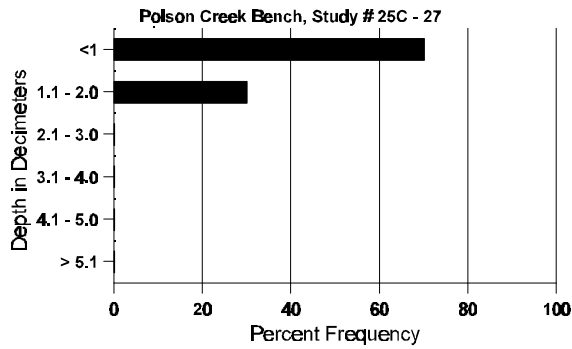
BASIC COVER --
Herd unit 25C, Study no: 27

Cover Type	Nested Frequency		Average Cover %			
	'04	'08	'87	'91	'94	'98
Vegetation	312	334	11.75	7.50	42.77	51.95
Rock	285	193	20.50	13.75	18.45	9.80
Pavement	246	344	18.75	26.50	3.72	21.64
Litter	379	367	44.25	45.00	43.79	30.38
Cryptogams	20	5	.25	.25	.12	.01
Bare Ground	234	203	4.50	7.00	8.98	13.82

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 27, Study Name: Poison Creek Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.1	60.2 (15.1)	6.0	54.0	27.4	18.6	5.4	35.2	313.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 27

Type	Quadrat Frequency	
	Ø4	Ø8
Rabbit	21	9
Elk	-	1
Deer	30	19
Cattle	5	3

BROWSE CHARACTERISTICS --

Herd unit 25C, Study no: 27

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 nova																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'94	12	2	-	-	-	-	-	-	-	14	-	-	-	280	6	18	14
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	8	4	-	-	-	-	-	-	-	1	-	-	11	240			12
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		23%			00%			42%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'91	0		0%			
												'94	520		46%			
												'98	0		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total						
		1	2	3	4									
<i>Artemisia tridentata vaseyana</i>														
S	87	27	-	-	-	-	-	27	-	-	-	1800		27
	91	9	-	-	3	-	-	12	-	-	-	800		12
	94	86	-	-	-	-	-	86	-	-	-	1720		86
	98	24	-	-	-	-	-	24	-	-	-	480		24
Y	87	31	-	-	-	-	-	31	-	-	-	2066		31
	91	14	5	1	6	-	-	28	-	-	-	1866		28
	94	56	-	-	-	-	-	56	-	-	-	1120		56
	98	23	-	-	-	-	-	23	-	-	-	460		23
M	87	36	19	12	-	-	-	64	3	-	-	4466	28 24	67
	91	18	21	1	7	2	-	51	-	-	-	3400	25 24	51
	94	162	43	6	-	-	-	211	-	-	-	4220	24 34	211
	98	15	11	-	-	-	-	26	-	-	-	520	15 23	26
D	87	19	8	1	-	-	-	23	2	-	3	1866		28
	91	23	9	-	10	2	-	36	-	-	10	3066		46
	94	37	33	1	-	-	-	55	-	1	15	1420		71
	98	13	2	-	-	-	-	13	-	-	2	300		15
X	87	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	360		18
	98	-	-	-	-	-	-	-	-	-	-	3960		198
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>				
'87		21%		10%		02%				- 1%				
'91		31%		02%		08%				-19%				
'94		22%		02%		05%				-81%				
'98		20%		00%		03%								
Total Plants/Acre (excluding Dead & Seedlings)									'87	8398	Dec:	22%		
									'91	8332		37%		
									'94	6760		21%		
									'98	1280		23%		
<i>Cercocarpus ledifolius</i>														
Y	87	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	0		0
	98	2	-	-	-	-	-	2	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>				
'87		00%		00%		00%								
'91		00%		00%		00%								
'94		00%		00%		00%								
'98		00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)									'87	0	Dec:	-		
									'91	0		-		
									'94	0		-		
									'98	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											
Chrysothamnus nauseosus																
S	87	3	-	-	-	-	-	-	3	-	-	-	200		3	
	91	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	1	-	-	-	-	-	-	-	1	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	7	-	-	-	-	-	-	-	7	-	-	466		7	
	91	3	-	-	-	-	1	-	-	4	-	-	266		4	
	94	1	-	-	-	-	-	-	-	1	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	1	-	-	66	8	6	1
	91	2	1	-	-	-	-	-	-	3	-	-	200	7	7	3
	94	22	7	5	2	-	-	-	-	36	-	-	720	8	5	36
	98	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	87	3	-	-	-	-	-	-	-	3	-	-	200		3	
	91	-	1	3	-	-	1	-	-	2	-	-	333		5	
	94	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		00%		00%		00%		+ 8%								
'91		17%		33%		25%		- 7%								
'94		19%		14%		00%										
'98		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	732	Dec:	27%			
										'91	799		42%			
										'94	740		0%			
										'98	0		0%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total					
		1	2	3	4		1	2						
Chrysothamnus viscidiflorus														
S	87	2	-	-	-	-	-	-	2	-	-	133		2
	91	2	-	-	-	-	-	-	2	-	-	133		2
	94	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	3	-	-	60		3
Y	87	3	-	-	-	-	-	-	3	-	-	200		3
	91	2	-	-	1	-	-	-	3	-	-	200		3
	94	7	-	-	-	-	-	-	7	-	-	140		7
	98	25	-	-	-	-	-	-	25	-	-	500		25
M	87	7	-	-	-	-	-	-	7	-	-	466	15 18	7
	91	4	4	-	1	-	-	1	10	-	-	666	6 6	10
	94	71	6	7	2	-	-	-	86	-	-	1720	12 13	86
	98	99	-	-	-	-	-	-	99	-	-	1980	13 16	99
D	87	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	1	-	1	-	-	1	-	1	133		2
	94	2	-	1	-	-	-	-	3	-	-	60		3
	98	2	-	-	-	-	-	-	1	-	-	40		2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>				
'87		00%		00%		00%				+33%				
'91		33%		07%		07%				+48%				
'94		06%		08%		00%				+24%				
'98		00%		00%		.79%								
Total Plants/Acre (excluding Dead & Seedlings)										'87	666	Dec:	0%	
										'91	999		13%	
										'94	1920		3%	
										'98	2520		2%	
Echinocereus spp.														
Y	87	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	3	-	-	60		3
M	87	-	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	-	0	- -	0
	94	-	-	-	-	-	-	-	-	-	-	0	- -	0
	98	9	-	-	-	-	-	-	9	-	-	180	2 3	9
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>				
'87		00%		00%		00%								
'91		00%		00%		00%								
'94		00%		00%		00%								
'98		00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-	
										'91	0		-	
										'94	0		-	
										'98	240		-	

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total			
		1	2	3	4						
Gutierrezia sarothrae											
S	'87	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	0	-	0	
	'94	-	-	-	-	-	-	0	-	0	
	'98	3	-	-	-	-	-	60	-	3	
Y	'87	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	0	-	0	
	'94	-	-	-	-	-	-	0	-	0	
	'98	4	-	-	-	-	-	80	-	4	
M	'87	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	0	-	0	
	'94	6	-	-	-	-	-	120	8	7	6
	'98	6	-	-	-	-	-	120	8	9	6
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>						
'87		00%	00%	00%							
'91		00%	00%	00%							
'94		00%	00%	00%	+40%						
'98		00%	00%	00%							
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-		
						'91	0		-		
						'94	120		-		
						'98	200		-		
Juniperus osteosperma											
X	'87	-	-	-	-	-	-	0	-	0	
	'91	-	-	-	-	-	-	0	-	0	
	'94	-	-	-	-	-	-	0	-	0	
	'98	-	-	-	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>						
'87		00%	00%	00%							
'91		00%	00%	00%							
'94		00%	00%	00%							
'98		00%	00%	00%							
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-		
						'91	0		-		
						'94	0		-		
						'98	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				
Leptodactylon pungens																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66	9	10	
	94	36	-	-	-	-	-	1	-	-	37	-	-	-	740	5	8	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	11	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%			+73%							
'94		00%			00%			00%			-89%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%				
											'91	199		0%				
											'94	740		0%				
											'98	80		100%				
Opuntia spp.																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	2	60	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'94	80		-				
											'98	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																		
S	'87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'91	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1	
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	'87	-	-	2	-	-	-	-	-	-	2	-	-	-	133		2	
	'91	1	-	-	-	-	-	-	-	1	-	-	-	66		1		
	'94	3	-	2	-	-	-	-	-	5	-	-	-	100		5		
	'98	-	-	-	2	-	-	-	-	2	-	-	-	40		2		
M	'87	-	4	10	-	-	-	-	-	14	-	-	-	933	23	29	14	
	'91	-	-	-	1	1	-	1	-	3	-	-	-	200	11	14	3	
	'94	15	4	2	-	-	-	-	-	21	-	-	-	420	28	59	21	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	0	29	47	0	
D	'87	1	1	2	-	-	-	-	-	4	-	-	-	266		4		
	'91	-	1	2	2	4	4	6	-	8	-	-	11	1266		19		
	'94	1	18	-	-	1	-	-	-	20	-	-	-	400		20		
	'98	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	'91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	'94	-	-	-	-	-	-	-	-	-	-	-	-	40		2		
	'98	-	-	-	-	-	-	-	-	-	-	-	-	160		8		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		25%			70%			00%			+13%							
'91		26%			26%			48%			-40%							
'94		50%			09%			00%			-96%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1332	Dec:	20%				
											'91	1532		83%				
											'94	920		43%				
											'98	40		0%				
Symphoricarpos oreophilus																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'94	1	-	-	-	-	-	-	-	1	-	-	-	20	10	11	1	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	0	13	36	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			00%			00%										
'94		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'94	20		-				
											'98	0		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Tetradymia canescens																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	3	1	-	1	-	-	-	-	-	5	-	-	-	333		5	
	'94	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	'98	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4	
M	'87	2	-	-	-	-	-	-	-	-	2	-	-	-	133	11 10	2	
	'91	-	1	-	-	-	-	-	-	-	1	-	-	-	66	4 3	1	
	'94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	3 2	2	
	'98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	11 12	3	
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'94	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+67%							
'91		33%			00%			00%			-85%							
'94		00%			00%			00%			+57%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	-			
												'91	399		-			
												'94	60		-			
												'98	140		-			

Trend Study 25C-28-98

Study site name: North Creek .

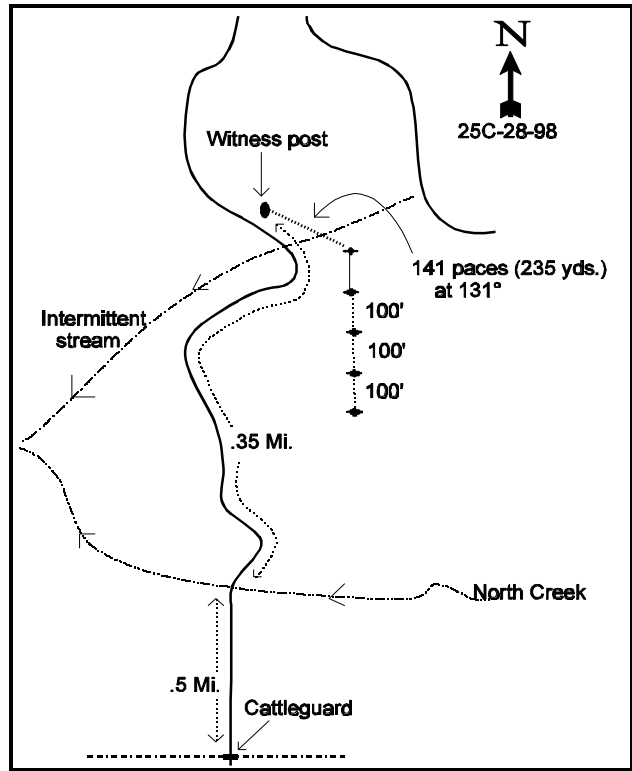
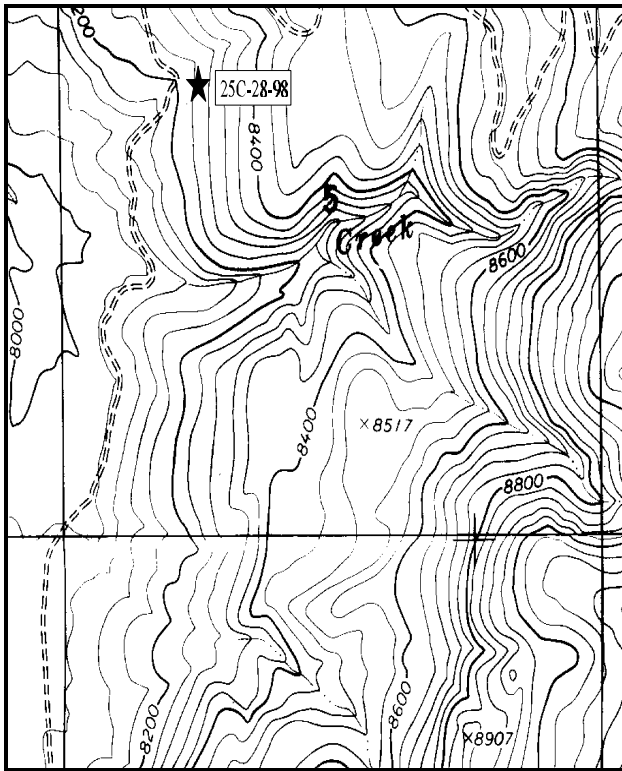
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of SR12 and Rt. 1660 (to 22) turn left onto Johns Flat Road. Drive 17.2 miles north to Grass Lake road (USFS sign) and turn east. Travel 1.2 miles on this road to a fork by hayfields. Turn right and continue 0.4 miles to the Horse Creek fork. Turn left and proceed 1.15 miles to a signed fork. Stay left and continue 0.25 miles on the main road. Past the buildings, at Birch Creek, take the right fork and go 0.6 miles. Stay left at the fork and go 0.75 miles to a cattleguard. Continue 0.75 miles to a fork. Stay left and go 1.65 miles to a U.S. Forest Service enclosure. Continue 2.55 miles to a cattleguard. Continue 0.5 miles to North Creek. Cross and go 0.35 miles, over an intermittent stream and partway up a hill to a witness post on the right. The transect is 140 paces bearing 131 degrees up on a hillside. The 0-foot baseline stake is tagged #7168.



Map Name: Grass Lakes

Diagrammatic Sketch

Township 33S , Range 1W , Section 5

UTM 4202464.240 N, 418663.197 E

DISCUSSION

Trend Study No. 25C-28 (51B-18)

The North Creek study site, located in the upper drainage of North Creek, samples a mixed mountain brush range dominated by pinyon-juniper, big sagebrush, and bitterbrush. The site has a westerly exposure and a moderate slope of 10%, which extends down to a narrow sagebrush valley below. It is a light to moderately used deer winter range with a study site elevation of 8,300 feet. From 1985-1991, deer days use/acre averaged 12 (Jense 1991). Pellet group data taken along the study site baseline in 1998 estimates 18 deer and 21 cow days use/acre. One elk pellet group was also encountered. Rabbit sign was moderately abundant. Most of the deer pellet groups appeared old.

The soil is an extremely rocky loam with a slightly acid pH (6.1). Rock is abundant on the soil surface with a cover value currently of almost 50%. The soil profile also contains high amounts of rock and gravel. Soil depth is relatively shallow with an effective rooting depth (see methods) of just over 11 inches. Phosphorus may be limiting at 8.3 ppm, when 10 ppm is considered the minimum for normal plant development. An abandoned road on the hillside has water bars to check erosion, which could become a problem on the site except for the protection afforded by the rocky surface. There is evidence of soil pedestaling around shrubs and other signs of natural erosion, but is not excessive.

There is an overstory of scattered pinyon pine and Rocky Mountain juniper on the site. Point quarter data from 1998 estimate 46 pinyon and 29 juniper trees/acre. Average basal diameter is 3.4 inches for pinyon and 5.4 inches for juniper. Overhead tree canopy cover is variable, but averages 5% over the site. The principal understory shrubs include mountain big sagebrush and bitterbrush. Sagebrush currently ('98) provides 56% of the browse cover. The density of sagebrush was estimated at 8,466 plants/acre in 1987 increasing to 12,599 plants/acre in 1991. Density was very high considering the limited soil on the site. Over half (1,866 plants/acre) of the decadent plants sampled in 1991 were classified as dying. The much larger sample used in 1998 estimated a much lower density of 6,380 plants/acre. Most of the change in density is due to the larger sample as the dead plants in the population can only explain 26% of the decrease. It appears that most of the decadent/dying plants sampled in 1991 died prior to the 1998 reading. Currently ('98), 47% (580 plants/acre) of the decadent sagebrush appeared to be dying, indicating further reductions in sagebrush density is probable. Reproduction is limited and not adequate to maintain the stand at current levels. Utilization of the sagebrush has been mostly light to moderate since 1987, with some heavy use on some individual plants indicating preferential ecotypic variation within the population.

Bitterbrush is also a key species on the site, although not as numerous. It currently ('98) provides 28% of the shrub cover. Density increased 64% between 1987 and 1991, from 599 to 1,666 plants/acre. The larger sample used in 1998 estimates a similar density of 1,100 plants/acre. It generally displays moderate hedging, good vigor, and low decadence. Other preferred browse species such as curleaf mountain mahogany, serviceberry, and snowberry are found scattered in the area but they are relatively uncommon.

Grass and forb frequencies are very low, undoubtedly due to the rocky soil surface. Seven grass species were sampled in 1998 but they combined to produce less than 1% cover. The most common species are bottlebrush squirreltail and blue grama. Forbs are diverse with 17 species encountered in 1998. However, none occur more than occasionally and production is poor with these species combining to produce less than 1% cover.

1991 TREND ASSESSMENT

Basic cover characteristics have changed little since 1987. Vegetative basal cover and rock-pavement cover have remained the same. Litter cover decreased from 40% to 36% with percent bare ground increasing from 5% to 7%. With bare ground still less than 10%, the trend for soils on this site would still be considered stable. However, percent bare ground should be monitored closely. There are two key browse species on site,

mountain big sagebrush and antelope bitterbrush. Mountain big sagebrush has increased substantially since 1987. Its percent decadency is only 26%, which should not be considered a problem when it's high density (12,599 plants/acre) and extended drought are figured in. The bitterbrush has more than doubled its population (599 to 1,666 plants/acre) with a biotic potential of 11% seedlings. The percent decadency is relatively high, but bitterbrush, during this extended drought, have consistently shown these numbers. With an end of this drought, this would be expected to go down by at least half. Trend for browse is up. Trend for grasses and forbs is down. Sum of nested frequency for both groups of species have fallen slightly during this extended drought.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - down

1998 TREND ASSESSMENT

Trend for soil appears stable with similar amounts of bare ground, rock, pavement and litter cover. Vegetation cover is higher due to the change in methods since 1991. Previously only basal cover was estimated, now total aerial cover is estimated. Trend for browse is mixed. Mountain big sagebrush has a declining population which has gone down 49% since 1991. Percent decadence is moderate at 19%, but 47% (580 plants/acre) of the decadent plants appear to be dying. Reproduction is poor and not adequate to maintain the population. Trend for bitterbrush appears stable. Density has declined slightly, although use is lighter and percent decadence reduced from 32% to 9%. Leader growth is excellent and reproduction is good. Since mountain big sagebrush provides 56% of the browse cover on the site, overall browse trend is considered down slightly. The herbaceous understory is deficient producing only 1.6% cover. Sum of nested frequency of grasses has declined while frequency of forbs has remained stable. Overall trend for the herbaceous understory is considered down slightly and in very poor condition.

TREND ASSESSMENT

soil - stable

browse - down slightly

herbaceous understory - down slightly and very poor

HERBACEOUS TRENDS --

Herd unit 25C, Study no: 28

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
G	Agropyron cristatum	_b 28	_a 10	_a 1	12	5	1	.01
G	Agropyron spicatum	2	-	-	1	-	-	-
G	Bouteloua gracilis	-	2	2	-	1	1	.15
G	Bromus inermis	_b 12	_{ab} 6	_a 4	8	4	2	.01
G	Bromus tectorum (a)	-	-	2	-	-	1	.00
G	Oryzopsis hymenoides	9	2	1	5	2	1	.00
G	Poa fendleriana	-	3	2	-	1	2	.01
G	Poa secunda	2	3	-	1	1	-	-
G	Sitanion hystrix	82	90	69	36	40	37	.54
G	Stipa lettermani	_b 19	_b 4	_a -	10	3	-	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '98
		'87	'91	'98	'87	'91	'98	
	Total Annual Grasses	0	0	2	0	0	1	0
	Total Perennial Grasses	154	120	81	73	57	45	0.74
F	Antennaria rosea	1	1	1	1	1	1	.00
F	Arabis spp.	16	6	7	9	3	5	.02
F	Astragalus convallarius	2	3	5	2	1	2	.15
F	Astragalus spp.	a ⁻	ab ⁷	b ¹⁴	-	3	7	.07
F	Chaenactis douglasii	a ⁻	ab ⁶	b ⁵	-	3	4	.04
F	Crepis acuminata	-	4	3	-	1	1	.00
F	Cryptantha bakeri	10	8	10	6	3	5	.10
F	Descurainia pinnata (a)	-	-	1	-	-	1	.00
F	Erigeron flagellaris	-	-	1	-	-	1	.00
F	Erigeron pumilus	a ⁻	a ³	b ²¹	-	1	9	.14
F	Eriogonum racemosum	7	6	3	5	3	2	.05
F	Hymenopappus filifolius	b ¹⁰	a ⁻	a ⁻	8	-	-	-
F	Hymenoxys richardsonii	b ¹²	a ⁴	a ⁻	6	2	-	-
F	Linum lewisii	4	2	-	2	2	-	-
F	Lotus utahensis	5	4	6	3	2	2	.01
F	Lygodesmia spinosa	b ¹⁶	ab ¹¹	a ¹	9	6	1	.00
F	Machaeranthera canescens	b ¹³	b ⁶	a ⁻	7	4	-	.03
F	Oenothera caespitosa	8	7	-	4	4	-	-
F	Petradoria pumila	b ¹⁵	b ¹⁴	a ⁴	8	7	3	.09
F	Phlox longifolia	ab ⁹	b ²⁰	a ⁵	7	11	3	.01
F	Physaria spp.	-	3	-	-	1	-	-
F	Senecio multilobatus	b ¹¹	a ⁻	b ³¹	7	-	13	.06
F	Streptanthus cordatus	4	3	1	2	1	1	.00
F	Tragopogon dubius	1	-	-	1	-	-	-
F	Unknown forb-perennial	17	-	-	7	-	-	-
	Total Annual Forbs	0	0	1	0	0	1	0
	Total Perennial Forbs	161	118	118	94	59	60	0.83

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

BROWSE TRENDS --
Herd unit 25C, Study no: 28

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	4	1.67
B	Artemisia tridentata vaseyana	97	21.14
B	Chrysothamnus nauseosus	2	-
B	Chrysothamnus viscidiflorus viscidiflorus	6	.03
B	Eriogonum microthecum	0	-
B	Gutierrezia sarothrae	8	.25
B	Juniperus scopulorum	2	1.50
B	Pinus edulis	8	2.62
B	Purshia tridentata	38	10.36
Total for Browse		165	37.60

CANOPY COVER --
Herd unit 25C, Study no: 28

Species	Percent Cover '98
Juniperus scopulorum	2
Pinus edulis	3

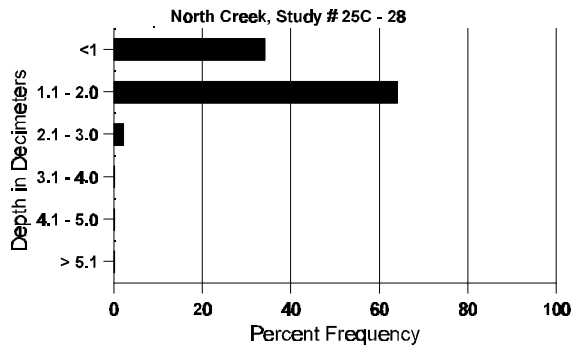
BASIC COVER --
Herd unit 25C, Study no: 28

Cover Type	Nested Frequency '98	Average Cover %		
		'87	'91	'98
Vegetation	218	2.50	4.25	42.77
Rock	275	18.75	21.25	15.84
Pavement	314	34.00	31.25	32.10
Litter	375	39.75	36.25	34.57
Cryptogams	-	0	0	0
Bare Ground	124	5.00	7.00	4.58

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 28, Study Name: North Creek

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.3	62.2 (13.3)	6.1	46.0	29.4	24.6	2.7	8.3	211.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 25C, Study no: 28

Type	Quadrat Frequency '98
Rabbit	7
Deer	14

BROWSE CHARACTERISTICS --

Herd unit 25C, 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																		
M	'87	2	2	-	-	-	-	-	-	-	4	-	-	-	266	9	11	4
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	9	4	-	1	-	-	-	-	-	14	-	-	-	280	11	18	14
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	2	1	-	-	-	-	-	-	-	2	-	-	1	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		50%			00%			00%										
'91		00%			00%			00%										
'98		29%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	266	Dec:	0%			
												'91	0		0%			
												'98	340		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				
<i>Artemisia tridentata vaseyana</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2	
Y	87	7	1	-	-	-	-	-	-	-	7	1	-	-	533		8	
	91	-	3	1	5	-	-	2	-	-	11	-	-	-	733		11	
	98	6	2	-	1	-	-	1	-	-	10	-	-	-	200		10	
M	87	61	37	-	1	-	-	-	-	-	99	-	-	-	6600	12 15	99	
	91	72	28	7	7	4	-	10	-	-	121	7	-	-	8533	12 16	128	
	98	137	97	2	7	-	-	4	-	-	218	-	29	-	4940	15 26	247	
D	87	14	6	-	-	-	-	-	-	-	19	1	-	-	1333		20	
	91	21	16	4	7	1	-	1	-	-	22	-	-	28	3333		50	
	98	37	21	2	2	-	-	-	-	-	29	-	4	29	1240		62	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1600		80	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		35%			00%			00%			+33%							
'91		28%			06%			15%			-49%							
'98		38%			01%			19%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	8466	Dec:	16%			
												'91	12599		26%			
												'98	6380		19%			
<i>Chrysothamnus nauseosus</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	2	-	-	-	-	-	-	2	-	-	-	133	4	4	2
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	10	14	2
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	1	1	-	-	-	-	-	1	-	-	1	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'91		00%			75%			25%			-85%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'91	266		50%			
												'98	40		0%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	-	-	20			1
M	87	7	-	-	-	-	-	-	-	-	-	-	-	466	11	7	7
	91	2	1	-	-	-	-	-	-	-	-	-	-	200	5	5	3
	98	6	-	-	-	-	-	-	-	-	-	-	-	120	10	9	6
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	1	-	-	-	-	-	-	-	-	-	-	66			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-43%						
'91		50%			00%			00%			-47%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	466	Dec:	0%		
												'91	266		25%		
												'98	140		0%		
<i>Eriogonum microthecum</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	1	-	-	-	-	-	-	-	-	66	5	8	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	66		-		
												'98	0		-		
<i>Gutierrezia sarothrae</i>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	-	-	-	-	-	-	-	-	-	60			3
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	-	-	-	133			2
	98	1	-	-	-	-	-	-	-	-	-	-	-	20			1
M	87	12	-	-	-	-	-	-	-	-	-	-	-	800	9	7	12
	91	12	-	-	1	-	-	-	-	-	-	-	-	866	7	5	13
	98	6	-	-	2	-	-	-	-	-	-	-	-	160	11	9	8
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	-	-	-	133			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+29%						
'91		00%			00%			06%			-84%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	800	Dec:	0%		
												'91	1132		12%		
												'98	180		0%		
<i>Juniperus scopulorum</i>																	

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			
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'98	40		-		
Pinus edulis																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	5	-	-	2	-	-	-	-	-	7	-	-	-	140		7
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	1	-	-	-	-	-	-	1	-	2	-	-	-	40	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'91		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'98	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				
Purshia tridentata																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	98	-	-	-	2	-	-	1	-	-	3	-	-	-	60		3	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	1	1	-	1	-	-	3	-	-	-	200		3	
	98	5	-	-	-	-	-	1	-	-	6	-	-	-	120		6	
M	87	6	2	-	-	-	-	-	-	-	8	-	-	-	533	33 37	8	
	91	-	3	-	-	9	2	-	-	-	14	-	-	-	933	35 44	14	
	98	16	21	-	4	3	-	-	-	-	44	-	-	-	880	28 56	44	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	4	-	-	4	-	-	-	-	8	-	-	-	533		8	
	98	2	2	-	1	-	-	-	-	-	3	-	-	2	100		5	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		22%			00%			00%			+64%							
'91		84%			08%			00%			-34%							
'98		47%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	599	Dec:	0%			
												'91	1666		32%			
												'98	1100		9%			

Trend Study 25C-30-98

Study site name: Pole Corral Draw .

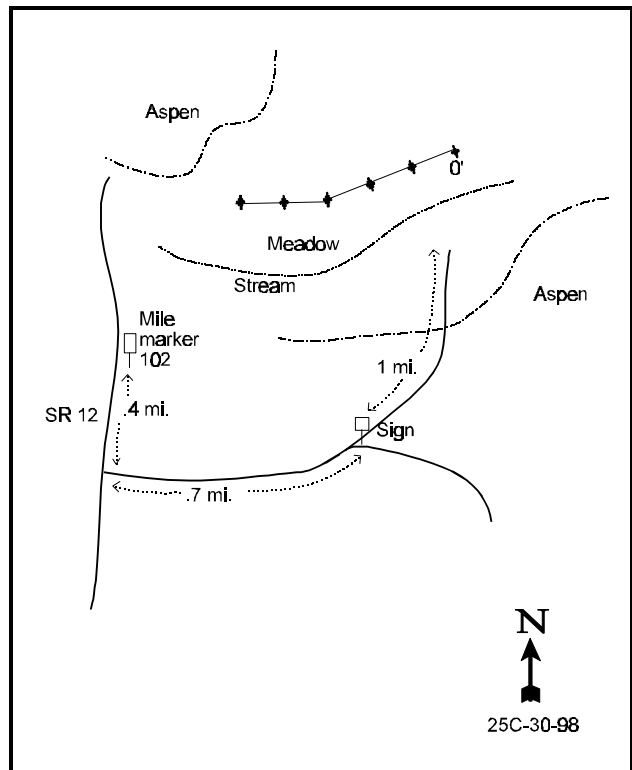
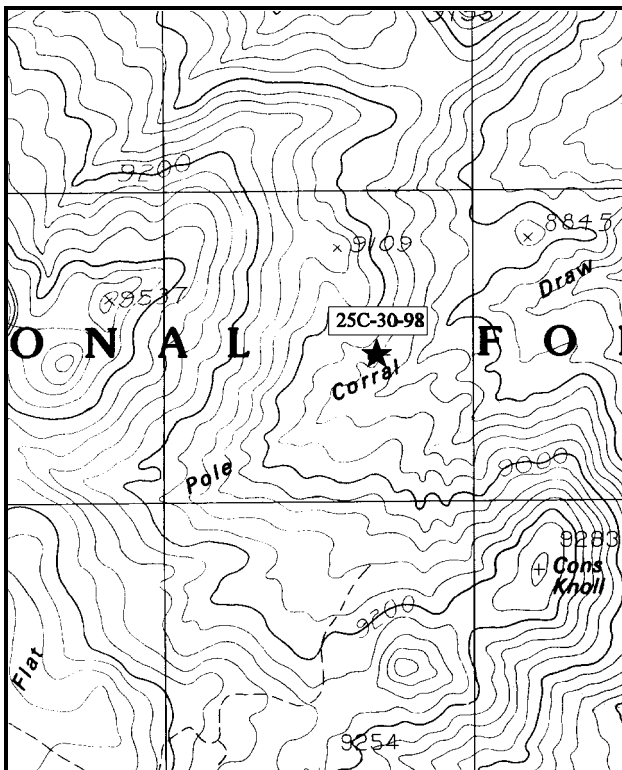
Range type: Meadow .

Compass azimuth: frequency baseline 227 M degrees. Lines 4-5 233°M

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From mile marker 102 on SR 12, drive south 0.4 miles to a road heading east. Drive 0.7 miles to fork with a sign. Take the left fork heading towards Pole Corral Draw. Go 1 mile to a meadow and stop by the creek. The site is on the other side of the creek. The 0-foot stake is near the first set of clipping baskets. The site is marked by short fenceposts and runs at 227 degrees magnetic.



Map name: Lower Bowns Reservoir .

Diagrammatic Sketch

Township 31 S. , Range 5 E. ,

UTM 4211415.681 N, 472711.776 E

DISCUSSION

Trend Study No. 25C-30

The Pole Corral Draw study is a new trend site placed in Pole Corral Draw. It samples a meadow community along the banks of the south fork of Oak Creek. The study area has a gentle 1% to 3% slope with a southeast aspect. Elevation is about 8,900 feet. Water runs in the nearby creek year round. During the spring, parts of the meadow are saturated and water can be found on the surface. Further away from the creek it gradually becomes drier with slight changes in the plant composition. Nearby slopes contain a sagebrush-grass type with pockets of aspen.

The area is used by elk in the early spring which is a cause for concern with the Forest Service and local permittees. For this reason a utilization study was also placed on the meadow during the fall of 1997 to determine the amount of early elk use, cow use, and forage production. Pellet group data taken on June 1st 1998, before cattle were allowed on the allotment, estimated 29 elk use days/acre. No deer or cattle use was observed. As of June 1st, herbaceous production with no grazing was estimated at 736 lbs/acre. Production with early elk use was estimated at 799 lbs/acre. This demonstrates that production with early elk use was higher by 64 lbs/acre. This phenomenon occurs often with the thought that early spring use stimulates additional growth of grasses and forbs. This has been observed on other utilization studies around the state during years of normal and above normal spring precipitation. The site was revisited in October to estimate cow use and total annual production but early heavy snow made clipping impossible.

Soil at the site is moderately deep and relatively rock free. There are some boulders on the surface along the creek edge and side slopes. Effective rooting depth (see methods) is estimated at an average of almost 26 inches. Texture is a sandy clay loam with a slightly acid pH (6.2). Parent material is a basalt. There is no erosion on the meadow itself due to the abundant herbaceous vegetation cover.

There are few shrubs on the meadow. The most common species is Wood's rose which occurs mainly along the drier edges of the meadow. Density is estimated at 980 of mostly young plants/acre. There are also a few broom snakeweed and snowberry plants, but all shrubs appear unutilized.

The most important aspect of this site is the herbaceous understory which provides virtually all of the cover on the site. Production during study site establishment on July 31, 1998 was excellent and much higher than the early June estimate. Vegetation was knee high and very dense in most places. Eighteen species of grasses, sedges, and a rush were classified which produced 47% cover. Forbs are also diverse with 29 species encountered. These produce an additional 61% cover. However, composition is poor with the grass component dominated by the increaser Kentucky bluegrass which provides 76% of the grass cover and has a quadrat frequency of 94%. All other grasses have quadrat frequencies of less than 20%. The forb component is also dominated by increasers which include: western yarrow, rose pussytoes, Louisiana sage, pacific aster, trailing fleabane, dandelion, and clover. These forbs account for 97% of the forb cover. Of these species, dandelion and white clover are by far the most abundant, producing 75% of the forb cover.

Due to the narrow nature of the meadow, there is a gradient of wet to dry on some of the sampling belts. Composition on the wetter areas is dominated by two sedges, a rush, tufted hair-grass, carpet bentgrass, and a few forbs. As the soil becomes slightly drier, dandelion, clover, and Kentucky bluegrass totally dominate the composition. This characterizes most of the meadow. The drier side slopes have a greater diversity as clover disappears and dandelion becomes less abundant. Elk use appears to be concentrated along the Kentucky bluegrass, dandelion, and clover band.

1998 APPARENT TREND ASSESSMENT

The soil is well protected and erosion will not be a problem unless heavy grazing combined with drought occurs. The browse component is not important and consists mostly of a small population of Woods rose.

The most important aspect of this site is the herbaceous plants. Production was excellent in 1998 with thick vegetation growing knee high. Unfortunately, the bulk of the grasses and forbs are considered increasers which increase under heavy grazing pressure. Kentucky bluegrass provides 76% of the grass cover, while dandelion and clover account for 75% of the forb cover. Some of the more preferred native species are present in small numbers. Future trends will depend on compositional changes which will take a considerable length of time.

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 30

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	<i>Agropyron smithii</i>	12	5	.10
G	<i>Agrostis stolonifera</i>	26	8	1.27
G	<i>Agropyron trachycaulum</i>	20	8	.14
G	<i>Bouteloua gracilis</i>	44	10	2.19
G	<i>Carex nebraskensis</i>	15	3	.91
G	<i>Carex</i> spp.	57	17	2.19
G	<i>Deschampsia caespitosa</i>	17	6	.66
G	<i>Hordeum brachyantherum</i>	26	9	1.45
G	<i>Hordeum jubatum</i>	7	5	.12
G	<i>Juncus</i> spp.	14	6	.03
G	<i>Muhlenbergia montana</i>	8	3	.09
G	<i>Poa fendleriana</i>	17	5	.36
G	<i>Poa pratensis</i>	420	94	35.76
G	<i>Sitanion hystrix</i>	13	6	.11
G	<i>Stipa columbiana</i>	18	6	.20
G	<i>Stipa comata</i>	8	4	.19
G	<i>Stipa lettermani</i>	31	11	.78
G	<i>Carex rostrata</i>	7	2	.18
Total Annual Grasses		0	0	0
Total Perennial Grasses		760	208	46.77
F	<i>Achillea millefolium</i>	156	46	7.33
F	<i>Agastache urticifolia</i>	6	2	.01
F	<i>Antennaria rosea</i>	9	3	.30
F	<i>Androsace septentrionalis</i> (a)	27	11	.15
F	<i>Arabis</i> spp.	12	6	.03
F	<i>Artemisia dracunculus</i>	2	1	.15
F	<i>Artemisia ludoviciana</i>	20	5	.62
F	<i>Aster chilensis</i>	133	50	2.67
F	<i>Castilleja flava</i>	16	6	.22

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
F	Chenopodium spp. (a)	2	1	.03
F	Collinsia parviflora (a)	3	2	.01
F	Descurainia pinnata (a)	2	2	.01
F	Draba spp. (a)	1	1	.00
F	Equisetum spp.	19	8	.06
F	Erigeron flagellaris	61	20	2.09
F	Erigeron spp.	15	4	.24
F	Eriogonum spp.	3	1	.03
F	Eriogonum racemosum	5	2	.06
F	Hymenoxys richardsonii	3	2	.09
F	Lepidium spp. (a)	15	5	.07
F	Oenothera spp.	21	7	.10
F	Penstemon spp.	6	2	.03
F	Potentilla anersina	4	3	.07
F	Polygonum douglasii (a)	7	4	.02
F	Potentilla gracilis	8	3	.09
F	Senecio spp.	1	1	.00
F	Taraxacum officinale	315	89	17.77
F	Trifolium repens	261	59	28.26
F	Vicia americana	4	2	.38
Total Annual Forbs		57	26	0.29
Total Perennial Forbs		1080	322	60.68

BROWSE TRENDS --
Herd unit 25C, Study no: 30

Type	Species	Strip Frequency '98	Average Cover % '98
B	Gutierrezia sarothrae	2	.18
B	Rosa woodsii	5	.33
B	Symphoricarpos oreophilus	0	-
Total for Browse		7	0.50

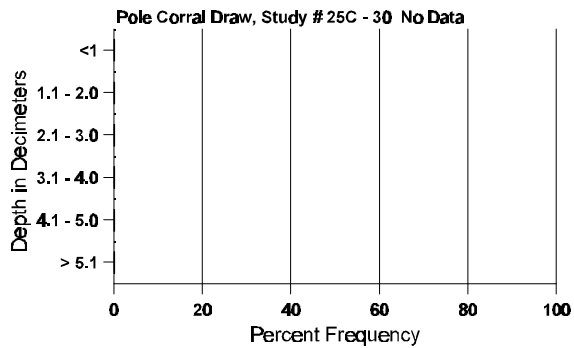
BASIC COVER --
Herd unit 25C, Study no: 30

Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	497	88.15
Rock	27	1.41
Pavement	41	.19
Litter	195	13.53
Cryptogams	6	.02
Bare Ground	98	1.10

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 30, Study Name: Pole Corral Draw

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
25.6	45.5 (17.7)	6.2	50.2	24.0	25.8	4.7	28.0	284.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 30

Type	Quadrat Frequency '98
Elk	2
Cattle	12

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 30

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Gutierrezia sarothrae</i>																		
M	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	6	9	2
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)													'98	40	Dec:	-		
<i>Rosa woodsii</i>																		
Y	98	46	-	-	-	-	-	-	-	-	46	-	-	-	920			46
M	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	24	24	3
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)													'98	980	Dec:	-		
<i>Symphoricarpos oreophilus</i>																		
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20	39	0
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)													'98	0	Dec:	-		

SUMMARY

WILDLIFE MANAGEMENT UNIT - 25C (44) - BOULDER

Trend study sites #1 through #11 and #30 sample the north part of the Boulder management unit. All are considered winter range sites except the Pleasant Creek Exclosure studies and Pole Corral #30 which occur on deer and elk summer range. The Pole Corral study site was established in 1998 to monitor elk that are thought to concentration in the area. All other trend study sites were established in 1987 and most were reread in 1991, 1994, and 1998. Soil trends on these sites are all stable to improving with the exception of Terza Flat (#6) and Dry Wash (#9) which displayed slightly downward trends. Browse trends are stable on all sites except Cedar Grove (#7) and Dry Wash (#9) which show slightly downward trends. On most sites, utilization of key browse is lighter, vigor good and percent decadence lower than in 1994. Trends for the herbaceous understories are stable to improving on most sites with greater production due to the better precipitation patterns seen in 1997 and 1998. Downward herbaceous trends were noted at Cedar Grove (#7) and the poor composition at Pleasant Creek Exclosure Out, caused a slightly downward trend. Several sites have poor herbaceous understories caused by lack of grasses and forbs or poor compositions due to dominance of increasers. These include: Yergy (#1), Giles Hollow (#5), Terza Flat (#6), South Narrows (#8), and Dry Wash (#9).

Sites sampling the southern half of the unit are represented by study sites #12 through #28 which were established in 1987 and all were reread in 1991. During 1994, 7 of the sites were not read with priority given to the other 9 sites. In 1998 all sites were revisited except Rock Bench #19 which was dropped.

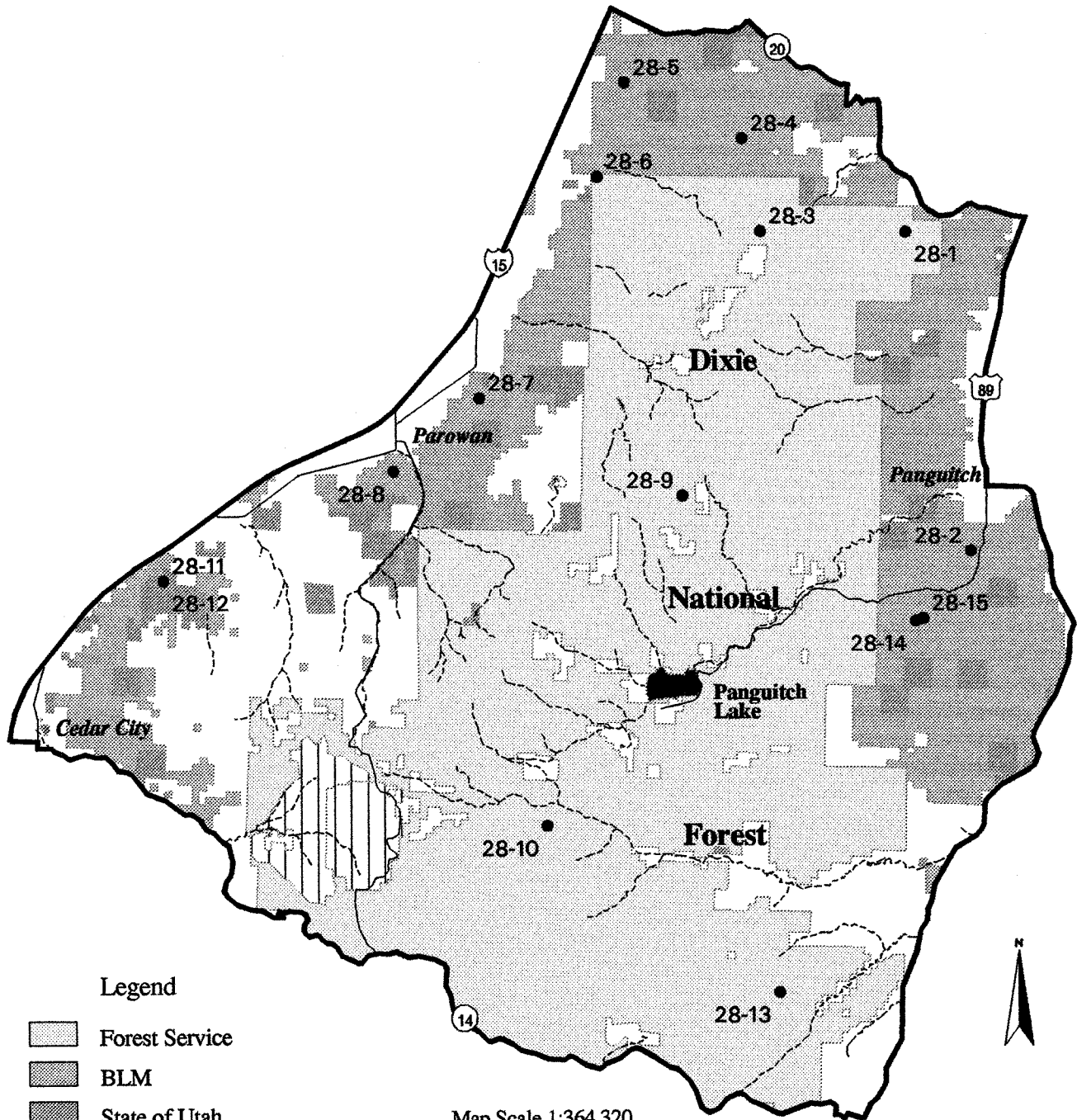
During the 1998 reading, none of the sites displayed a downward soil trend. Browse trends were stable to improving on most sites but Steep Creek Bench #15, Salt Gulch #22, Black Ridge #24, and North Creek #28 had downward to slightly downward trends. Poison Creek Bench #27 also had a downward browse trend due to a fire since the last reading in 1994. This high elevation winter/spring range is currently in excellent condition with a good mix of grasses and forbs. Herbaceous trends are stable to improving on all but 2 sites, Salt Gulch #22 and North Creek #28. Good precipitation patterns in 1997 and 1998 also brought about improved production on some sites. Study sites at White's Flat #16, Baldy's #20, Griffin #21, Salt Gulch #22, Coal Bench #23, Black Ridge #24, Black Canyon #26, and North Creek #28, have poor herbaceous understories either due to a lack of grasses and forbs or a composition dominated by increasers. A summary table of trends for the unit is found below.

Site	1991			1994			1998		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & Forbs
25C-1 Yergy	-	+	0	-	0	0	+	0	0
25C-2 Wildcat	-	+	+	+	0	0	+	0	+
25C-3 Happy Valley	0	-	0	+	-	0	0	0	+
25C-4 North Slope	0	0	0	NR	NR	NR	0	0	0
25C-5 Giles Hollow	0	-	-	0	-	-	+	0	+
25C-6 Terza	-	-	-	+	0	0	-	0	0
25C-7 Cedar Grove	0/-	0	0	NR	NR	NR	+	-	-
25C-8 South Narrows	-	+	+	0	0	+	0	-	0
25C-9 Dry Wash	0	-	-	0	-	+	-	-	0










25C-10 Pleasant Creek Exclosure, In	Established in 1991			0	0	-	+	0	+
25C-11 Pleasant Creek Exclosure, Out	Established in 1991			0	0	-	+	0	-
25C-12 Nazer Draw	-	+	-	0/-	0	0	+	0	+
25C-13 Short Neck	0	-	0	0	+	-	+	+	+
25C-14 New Home Bench	0/-	-	-	NR	NR	NR	+	+	0
25C-15 Steep Creek Bench	-	-	-	-	0	-	+	-	+
25C-16 Whites Flat	0	0	-	-	0	0	+	0/-	0
25C-17 Varney-Griffin Chaining	0	0	-	NR	NR	NR	+	+	0
25C-18 Allen Canyon	0	0	-	NR	NR	NR	+	0	0
25C-19 Rock Bench	0	+	+	NR	NR	NR	NR	NR	NR
25c-20 Baldys	0	+	0	0	0	-	0	0	+
25C-21 Griffin	0	0	+	0	-	+	0	0	0
25C-22 Salt Gulch	-	-	-	-	-	-	0	-	-
25C-23Coal Bench	-	+	-	NR	NR	NR	+	0	0
25C-24 Black Ridge	-	-	0	NR	NR	NR	0	-	0
25C-25 Center Creek	0	+	+	+	+	-	+	+	+
25C-26 Black Cyn	0	+	0	NR	NR	NR	0	0	0
25C-27 Poison Creek Bench	0	0/-	0	0	+	-	0	-	+
25C-28 North Creek	0	+	-	NR	NR	NR	0	-	-
25C-30 Pole Corral Draw	Site established in 1998								

(+) = upward trend, (-) = downward trend, (0) = stable trend, (0/-) = stable to slightly down, (NR) = not read

Management Unit 28



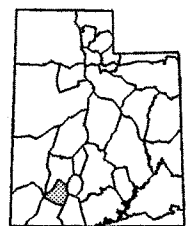
Legend

-  Forest Service
-  BLM
-  State of Utah
-  Private Land
-  Other Federal Land
-  Water Body
-  Transect Location
-  Road
-  Perennial Stream

Map Scale 1:364,320
(1" = 5.75 miles)



Unit Location



MANAGEMENT UNIT 28 (47) - PANGUITCH LAKE

Boundary Description

Garfield, Iron and Kane counties - Boundary begins at Highway SR-14 and Highway US-89; then north on US-89 to Highway SR-20; then west on SR-20 to Interstate 15; then south on I-15 to Highway SR-14; then east on SR-14 to US-89 and beginning point.

Winter Range Description

Most or all of Herd units 57 A, B, C, & D were combined and renamed deer herd unit 47 in 1993. Guinta (1982) presents a complete description of the summer and winter range on herd unit 57A and 57B. These subunits were combined in 1979 to better reflect the contributions made by both the northern and southern portions to the seasonal requirements of the deer herd. The winter range on the eastern portion of the unit is higher in elevation and experiences colder temperatures than on the Parowan side; and consequently, far fewer deer winter on the Panguitch side. The key areas that were identified on the winter range on the eastern side of the unit are: pinyon-juniper woodlands south of Panguitch, seeded range at the north end of Upper Bear Valley, the mixed brush type in Buckskin Valley, and the pinyon-juniper chainings in Three Creeks drainage. These study sites range in elevation from 7,100 to 7,600 feet and represent key areas within the limits of normal winter range on the east side. The only severe winter range available on the unit is located on the pinyon-juniper slopes below the Hurricane Cliffs and on the sagebrush flats that extend from the slopes to I-15. During severe winters the deer on this herd unit are packed into the narrow area between the cliffs and the interstate. Habitat availability is effectively reduced by 80% during these severe winters. The key areas that were identified by the local interagency committee for this area include; the Wyoming big sagebrush type west of Swayback Knoll, a Wyoming big sagebrush type in the mouth of Cottonwood Creek, a pinyon-juniper chaining east of Paragonah, a big sagebrush/ pinyon-juniper ecotone in Grass Valley south of Parowan, and a mountain big sagebrush/pinyon-juniper ecotone in Elliker Basin. The importance of each of these areas for deer has increased over the years as sagebrush flats have been converted to sprinkler irrigated agricultural lands; mainly from Highway U-20 to Parowan. Due to depredation problems, deer fences are being constructed around many of these fields. In addition, the deer-proof fence along I-15 from summit to Cedar City severely limits the winter range available to deer on the west side of the freeway. Urbanization of former winter range is continuing, especially in the Fiddler's Canyon area north of Cedar City. Of particular concern is the fact that 41% of the severe winter range, from U-20 to Cedar City, is privately owned. Additional habitat losses are to be expected on these privately owned parcels of land.

Summer range is not considered a limiting factor for this deer herd. Summer range on the northern portion of the unit generally lies between 8,000 and 9,000 feet and consists largely of gentle rolling terrain. Key summer range areas that were identified in this unit were also classified as transition range (Buckskin Valley and Upper Bear Valley). Studies were established in the Mammoth Creek drainage and in the Little Valley area. Two more studies were established in 1998 on the Sheep Hollow area near Panguitch (Sheep Hollow West and Sheep Hollow East).

Livestock Grazing on Key Areas

Eastern Portion - Normal Winter Deer Range

The Three Creeks study site is located in the USFS Three Creeks Cattle Allotment. A rest-rotation grazing system is used to manage livestock on this unit. The allotment is grazed from 6/1 to 10/15, with use on the study site occurring during the spring. The Upper Bear Valley site is located within the USFS Red Creek Cattle Allotment. This area was grazed by sheep and cattle prior to 1940. Since then, cattle have used the area exclusively. A deferred-rotation grazing system is used to manage livestock on the allotment. The season of use is from 6/16 to 10/15. The Buckskin Valley site is located in the BLM administered Buckskin

Mountain Allotment. The unit is grazed annually during the late spring by sheep and cattle. No grazing system is in use. The active preference for livestock has been set at 582 AUMs.

Western Portion - Severe Winter Deer Range

The Swayback Knoll site lies within the BLM, Bone Hollow Cattle Allotment. Recently, a three-pasture rotation system has been implemented on this unit. This is one of the few allotments in the area that permits winter grazing on crucial deer winter range. The Paragonah study site is in an unallotted area of BLM land. Use by cattle does occur since forage production has been enhanced by an old chaining and seeding project. No monitoring of livestock use is carried out by BLM on this area. The Cottonwood site is located in the same allotment as the Upper Bear Valley site. This site is located in a unit that is grazed during the spring in most years.

The Grass Valley study is located in the P-Hill Allotment and is used by cattle from spring to mid-summer. The allotment is used season-long on an annual basis with no provision for deferred or rested pastures. The Elliker Basin study is located on DWR land which was acquired by way of a trade from the BLM. Spring grazing by cattle will probably continue in order to promote shrub production.

High Elevation - Summer Range

The summer range sites, Red Desert and Little Valleys, are located in the Red Desert and Little Valleys Cattle Allotments. Both areas were grazed by sheep and cattle prior to 1939. Sheep use continued until 1947 in the Red Desert and until 1973 in Little Valleys. Cattle are managed on a deferred-rotation system in both allotments. The season of use runs from 7/6 to 9/20 on the Red Desert Allotment and from 6/1 to 10/15 in Little Valleys allotment. Suitable range appears to be twice as productive on the Little Valleys Allotment (5 acres/AUM) than on the Red Desert Allotment (11 acres/AUM). Asay Knoll, a new study site, occurs on the large Uinta Flat burn. It is located within the Buck Knoll pasture of the Asay Knoll Grazing Allotment. Currently 266 cattle use the area for about one month beginning on June 16th. They are then moved to another pasture.

Many of the herd unit allotments received drought reductions of 10% to 15% during the summer of 1990.

Herd Unit Management Objectives

The objective for this unit is to maintain a harvest of 1,500 buck deer annually. To achieve this level of harvest it will be necessary to maintain the amount of acreage providing severe winter deer range habitat on the west side of the unit (approximately 44,500 acres). As winter range habitat is lost to other land uses on private land, it will be necessary to increase the carrying capacity of key areas on public lands.

The Panguitch Lake deer herd was at or near carrying capacity at the time of the 1987 reading. Antlerless harvest averaged 466 does/yr between 1984 and 1987. Buck harvest exceeded the objective of 1,500 that was identified in the herd unit management plan during the 1987 and 1989 hunts. Buck harvests steadily increased from a low of about 600 in 1975 to a high of 1,935 in 1987 (Jense 1993). However, harvests have declined since that time. During the 1992 hunt only 604 bucks were harvested. Data from pellet group transects also show a declining number of deer days use/ha since 1987. Fawn doe ratios have actually increased from 64 fawns per 100 does in 1987 to 73 by 1992. The overall average since 1987 is considered low at 69 fawns per 100 does.

Trend Study 28-1-98

Study site name: Three Creeks .

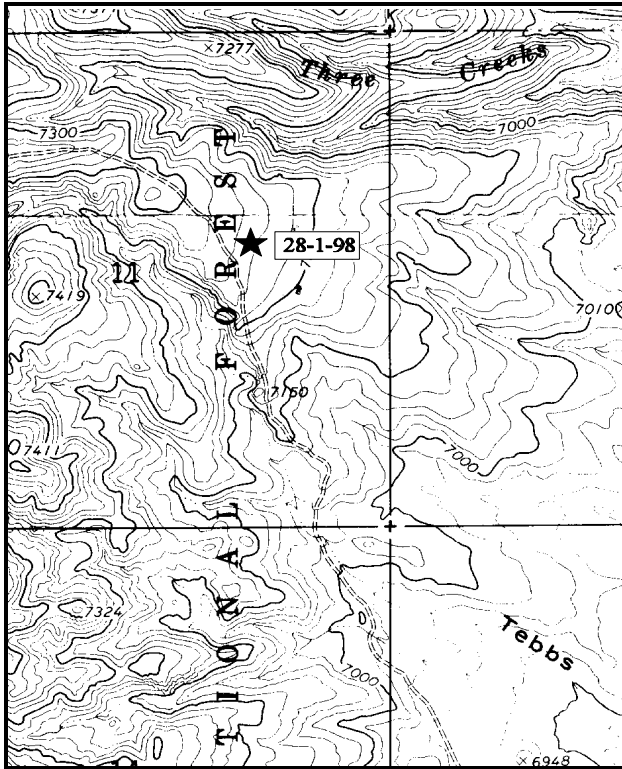
Range type: Chained, Seeded Pinyon-Juniper.

Compass bearing: frequency baseline 167 M degrees.

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

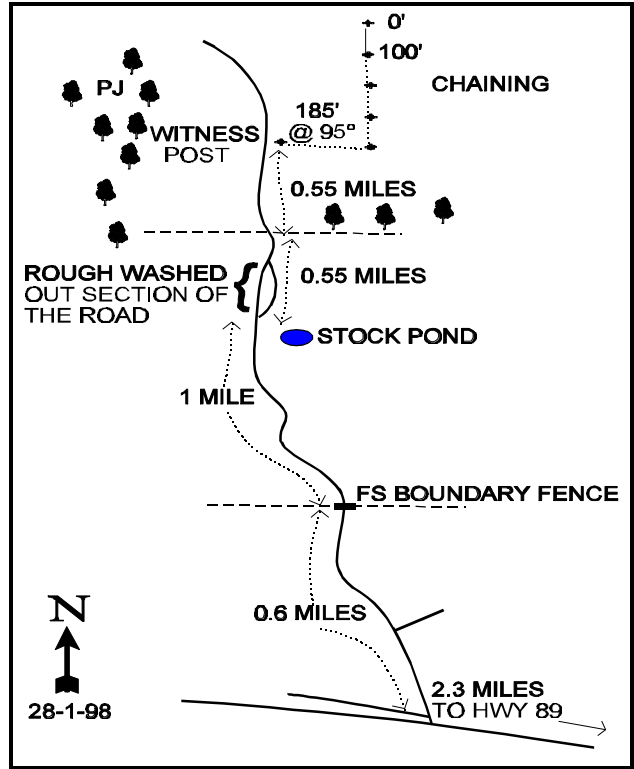
LOCATION DESCRIPTION

From the SR20-US89 junction, proceed south on 89 for 3.1 miles to the Three Creeks road. Travel west on this road (do not take north fork by gate) for 0.5 miles to a fork. Bear right and go 1.85 miles to three forks taking the rightmost one. Travel 0.6 miles to a cattleguard. Continue 1.0 mile to a stockpond. Proceed up the washed out road for 0.55 miles to a fence taking a right fork at 0.3 miles. Continue 0.55 miles up to the chaining and to the witness post which is a short yellow fencepost. From the witness post by the road, walk 185 feet east to the 400-foot stake. The 0-foot baseline stake is 400 feet north, and the short green fencepost is tagged #7164.



Map Name: Panguitch NW .

Township 33 S , Range 6W , Section 11



Diagrammatic Sketch

UTM 4201855.995 N , 369050.510 E

DISCUSSION

Trend Study No. 28-1 (47-1)

The Three Creeks trend study is found on the northeast edge of the Markagunt Plateau. The site is at an elevation of 7,200 feet with a gentle 8% to 10% slope which drains easterly into the Sevier River. Numerous intermittent streams are nearby with a stock pond one mile to the south. The area is utilized by deer in light winters, by an expanding elk herd, and grazed in the summer by cattle. The study area was chained and seeded in 1967. Now it is a sagebrush-grass type with some scattered pinyon and juniper trees, which are increasing in size. A follow up treatment on these trees was done with chainsaws between 1987 and 1992.

The soil is tightly compacted with a high percentage of coarse fragments throughout the soil profile. Soil textural analysis indicates a sandy loam with a neutral pH (7.1). Both phosphorus and potassium could be limiting to vegetative growth and development with values of 7.3 ppm for phosphorus and 28.8 ppm for potassium. Values of 10 ppm and 70 ppm respectively are thought to be minimal for normal plant development. During the 1987 reading, it was observed that the road and washes nearby showed signs of severe gully erosion and signs of minor sheet erosion on the study site. At that time, soil movement was detectable and some grasses were pedestaled. During the 1992 and 1998 surveys, no active gully erosion was observed and recent soil movement was not detected. Both percent vegetation and litter cover has increased since 1992, while percent bare ground and rock-pavement cover have declined.

Mountain big sagebrush is the dominant shrub species. Hybridization is occurring which makes identification difficult. In 1987, most of the sagebrush was classified as basin big sagebrush (Artemisia tridentata tridentata). During the 1992 survey, the majority of the sagebrush was determined to be mountain big sagebrush (A. t. vaseyana). The mountain big sagebrush density estimate for 1987 was 33 plants/acre. The density increased in 1992 to 1,760 plants/acre, then declined in 1998 to 1,340 plants/acre. The large increase from 1987 to 1992 was more reflective of the increased sampling size and improved sampling design, not actual increases in the population. In 1987 and 1992, utilization was moderate with a few individual plants displaying heavy hedging. In 1998, utilization is mostly light. Currently, these plants average 22 inches in height with a crown of 30 inches. Vigor is good over all years and percent decadency continues to be low. The basin big sagebrush density has changed very little since the change in sampling design in 1992, with an estimated density of 120 plants/acre in 1998.

Another important browse species on the site is a few scattered bitterbrush plants. In 1987, the estimated density for antelope bitterbrush was 66 plants/acre. These plants were all classified as mature and were heavily hedged. In 1992, the population density was nearly the same with an estimated 60 plants/acre. These plants exhibited less utilization with 33% heavily hedged and 67% lightly hedged. Antelope bitterbrush density increased slightly in 1998 to 100 plants/acre. Moderate utilization was evident and only one young plant was encountered. The small invader subshrub broom snakeweed was the most abundant shrub with 5,133 plants/acre in 1987 and 4,300 in 1992. Currently, the estimated density has greatly declined to an estimated 900 plants/acre. This great decline in density is likely due to extended drought as this species fluctuates greatly with annual precipitation patterns.

Point-centered quarter data from 1992 estimated 53 pinyon pine trees/acre and 43 Utah juniper trees/acre. Fifty five percent of the junipers sampled were tipped trees that were still growing. These were taken out during the follow up chainsaw treatment. In 1998, the point-centered quarter data estimated 42 Utah juniper trees/acre and 59 pinyon pine trees/acre. Five percent of the Utah juniper trees and none of the pinyon pine trees sampled were tipped. Most of the trees are currently in the four to eight foot size class with many young plants encountered. Photographs from all years show a great increase in size of the trees as well.

The herbaceous understory is dominated by the seeded grasses, crested wheatgrass and intermediate wheatgrass, both of which were moderately utilized during the summer of 1998. Crested wheatgrass had a nested frequency value of 288 in 1987 which significantly decreased to 216 in 1992. The sum of nested

frequency then significantly increased to 281 in 1998, a value similar to that initially recorded in 1987. Conversely, intermediate wheatgrass had a nested frequency value of 45 in 1987 which significantly increased to 143 in 1992. In 1998, the nested frequency value significantly decreased to 60. Crested wheatgrass currently accounts for 84% of the grass cover and 74% of the herbaceous understory. Indian ricegrass nested frequency has significantly decreased since 1992, but is still significantly higher than reported in 1987. Other common grasses include blue grama and western wheatgrass. Cheatgrass was encountered in one quadrat and is currently not a factor on this site. Forb diversity continues to be high, but most species are rare. Silvery lupine continues to be the most common forb species.

1987 APPARENT TREND ASSESSMENT

Fourteen percent of the ground cover on the site comes from erosion pavement and a few larger rocks. Vegetative cover is scattered, but litter covers 54% of the soil surface while bare soil has a cover value of 26%. Erosion is evident, yet not a serious problem on the site. Sagebrush is well established on the site and should increase. Seeded grasses are also well established but forbs are deficient.

1992 TREND ASSESSMENT

Visual observations of the site indicate stable soil conditions with no active gullies or recent soil movement. Bare ground, mostly the result of livestock trampling, has increased since the last reading from 26% to 35% in 1992. Trend for soil appears to be stable. The key browse species are basin big sagebrush and mountain big sagebrush. Their combined density increased greatly since 1986, but this was because of the larger sample size which gives much better estimates of browse densities. The age structures for the sagebrush are good with acceptable percentages of decadency. The browse trend is up. Nested and quadrat frequencies of perennial grasses have increased while those of forbs have declined. Overall trend for herbaceous understory is up.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - up for grasses

1998 TREND ASSESSMENT

The soil trend appears to be stable. Percent vegetation and litter cover have increased slightly while percent bare ground and percent rock and pavement cover combined have decreased slightly. Percent bare ground is still quite high and there is still some erosion potential during moderate to intense rain events. The browse trend is stable. The mountain big sagebrush population density has decreased slightly since 1992 with only a few dead plants encountered in 1998. The age structure has changed very little since 1992 with a mostly mature population with a low biotic potential. The bitterbrush population is also stable and exhibits moderate to heavy hedging. Broom snakeweed density has greatly declined since 1992, probably due to annual precipitation patterns. Although the density of pinyon pine and Utah juniper is currently similar to that reported in 1992, the trees have increased in size and will continue to do so to the point it will become more dominant on the site in the future. As these trees increase in size and dominance, the herbaceous understory and browse component will slowly decrease as canopy cover increases. The herbaceous understory trend is stable. Crested wheatgrass dominates the site with a significant increase of nested frequency since 1992. Perennial grass sum of nested frequency has changed little since 1992. Perennial forb sum of nested frequency shows a slight increase, but forbs are currently a minor component of the herbaceous understory.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	_b 288	_a 216	_b 281	92	81	94	12.81	17.80
G	Agropyron intermedium	_a 45	_b 143	_a 60	17	53	24	4.77	1.26
G	Agropyron smithii	_a -	_b 39	_b 35	-	18	13	1.27	.66
G	Agropyron spicatum	_a -	_{ab} 4	_b 8	-	1	4	.63	.05
G	Bouteloua gracilis	_a 27	_b 53	_{ab} 51	11	22	21	2.32	.62
G	Bromus tectorum (a)	-	-	2	-	-	1	-	.00
G	Carex spp.	_a 3	_{ab} 12	_b 22	1	5	8	.27	.31
G	Elymus junceus	-	4	-	-	2	-	.06	-
G	Oryzopsis hymenoides	_a -	_c 27	_b 12	-	13	5	.63	.06
G	Poa fendleriana	_a -	_{ab} 4	_b 13	-	1	6	.03	.06
G	Poa secunda	-	-	4	-	-	2	-	.01
G	Sitanion hystrix	_a -	_{ab} 6	_b 14	-	3	7	.33	.10
G	Stipa comata	9	7	6	6	4	3	.24	.22
Total Annual Grasses		0	0	2	0	0	1	0	0
Total Perennial Grasses		372	515	506	127	203	187	23.39	21.17
F	Alyssum alyssoides (a)	-	-	3	-	-	1	-	.00
F	Arabis spp.	_b 11	_a -	_a -	5	-	-	-	-
F	Astragalus argophyllus	1	-	-	1	-	-	-	-
F	Astragalus convallarius	-	-	2	-	-	1	-	.03
F	Astragalus spp.	2	1	-	1	1	-	.00	-
F	Castilleja chromosa	-	3	3	-	1	1	.03	.03
F	Cryptantha fulvocanescens	_b 15	_{ab} 13	_a 5	9	5	2	.07	.04
F	Descurainia spp. (a)	-	_b 16	_a -	-	7	-	.23	-
F	Draba spp. (a)	-	-	1	-	-	1	-	.00
F	Erigeron pumilus	4	-	-	3	-	-	-	-
F	Ipomopsis aggregata	7	3	-	3	1	-	.00	-
F	Lappula occidentalis (a)	-	-	3	-	-	1	-	.00
F	Lupinus argenteus	46	49	51	19	26	25	2.59	2.61
F	Lygodesmia spinosa	-	2	2	-	1	1	.00	.03
F	Machaeranthera canescens	3	-	4	1	-	2	-	.01
F	Penstemon spp.	11	5	4	5	3	1	.06	.00
F	Phlox longifolia	_a 8	_a 11	_b 39	3	6	19	.08	.17
F	Polygonum douglasii (a)	-	-	3	-	-	3	-	.01
F	Senecio multilobatus	13	4	3	7	2	2	.01	.03
F	Sphaeralcea coccinea	-	6	5	-	3	2	.09	.01
F	Streptanthus cordatus	3	-	-	1	-	-	-	-
F	Tragopogon dubius	-	-	-	-	-	-	-	.00
F	Trifolium spp.	-	-	1	-	-	1	-	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
F	Unknown forb-annual (a)	-	2	-	-	1	-	.03	-
F	Unknown forb-perennial	-	3	6	-	1	3	.00	.01
Total Annual Forbs		0	16	10	0	7	6	0.23	0.01
Total Perennial Forbs		124	102	125	58	51	60	2.99	3.02

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

BROWSE TRENDS --

Herd unit 28 , Study no: 1

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Artemisia nova	1	1	-	.00
B	Artemisia tridentata tridentata	5	5	2.77	1.29
B	Artemisia tridentata vaseyana	33	45	4.02	6.34
B	Chrysothamnus viscidiflorus viscidiflorus	1	1	-	.00
B	Gutierrezia sarothrae	53	24	.51	.42
B	Juniperus osteosperma	6	4	1.13	.84
B	Leptodactylon pungens	0	0	-	-
B	Opuntia spp.	12	5	.33	.06
B	Pinus edulis	5	6	.15	.18
B	Purshia tridentata	2	5	.18	.68
Total for Browse		118	96	9.11	9.83

BASIC COVER --

Herd unit 28 , Study no: 1

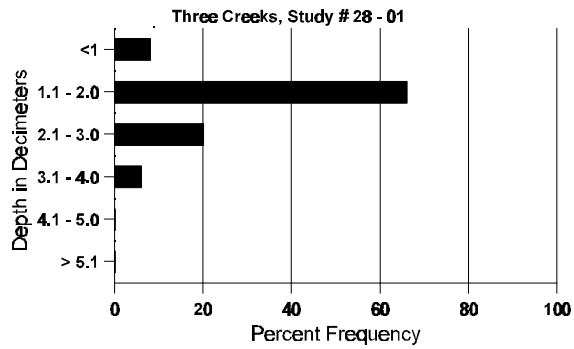
Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	314	332	4.75	31.85	35.06
Rock	60	143	3.25	12.85	3.88
Pavement	108	206	11.00	0	5.90
Litter	247	387	54.25	36.66	46.38
Cryptogams	4	18	.75	.03	.25
Bare Ground	217	299	26.00	35.43	30.17

SOIL ANALYSIS DATA --

Herd Unit 28, Study # 01, Study Name: Three Creeks

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.7	57.0 (14.7)	7.1	54.2	38.0	7.8	2.2	7.3	28.8	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 28 , Study no: 1

Type	Quadrat Frequency	
	'92	'98
Rabbit	61	29
Elk	-	7
Deer	18	18
Cattle	5	16

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 1

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 nova																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	2	-	-	-	-	-	-	-	-	-	2	40	-	-	2
	'98	1	-	-	-	-	-	-	-	-	-	-	1	20	18	30	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			100%			00%			-50%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'92	40		-				
											'98	20		-				

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata tridentata</i>																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	1	3	-	-	-	-	-	-	-	4	-	-	-	133		4
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
M	87	1	5	2	-	-	-	-	-	-	8	-	-	-	266	31 31	8
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	- -	1
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	44 64	4
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		67%			17%			00%			-75%						
'92		20%			00%			00%			+17%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	399	Dec:	0%			
											'92	100		20%			
											'98	120		0%			
<i>Artemisia tridentata vaseyana</i>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	17	12	-	2	-	-	-	-	-	31	-	-	-	620		31
	98	20	-	-	-	-	-	-	-	-	20	-	-	-	400		20
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33	9 11	1
	92	2	40	3	1	-	-	-	-	-	44	-	2	-	920	- -	46
	98	40	6	-	-	-	-	-	-	-	46	-	-	-	920	22 30	46
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	7	4	-	-	-	-	-	-	11	-	-	-	220		11
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		100%			00%			00%			+98%						
'92		67%			08%			02%			-24%						
'98		10%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	0%			
											'92	1760		13%			
											'98	1340		1%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
	98	1	-	-	-	-	-	-	-	-	-	-	-	20	19	42	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%			+ 0%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	20		-		
												'98	20		-		
<i>Gutierrezia sarothrae</i>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	16	-	-	-	-	-	-	-	-	-	-	-	320			16
	98	6	-	-	-	-	-	-	-	-	-	-	-	120			6
Y	87	11	-	-	-	-	-	-	-	-	-	-	-	366			11
	92	102	-	-	-	-	-	-	-	-	-	-	-	2040			102
	98	8	-	-	-	-	-	-	-	-	-	-	-	160			8
M	87	141	-	-	-	-	-	-	-	-	-	-	-	4700	9	9	141
	92	104	-	-	9	-	-	-	-	-	-	-	-	2260	-	-	113
	98	32	-	-	4	-	-	-	-	-	-	-	-	720	9	7	36
D	87	2	-	-	-	-	-	-	-	-	-	-	-	66			2
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-16%						
'92		00%			00%			00%			-79%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	5132	Dec:	1%		
												'92	4300		0%		
												'98	900		2%		
<i>Juniperus osteosperma</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	4	-	-	-	-	-	-	-	-	-	-	-	80			4
	98	3	-	-	-	-	-	-	-	-	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	1	-	-	-	-	-	-	-	-	40	-	-	2
	98	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%			-33%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	120		-		
												'98	80		-		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4					
Leptodactylon pungens																		
M	87	10	-	-	-	-	-	-	-	-	10	-	-	-	333	6	7	10
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	10	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	333	Dec:	-				
											'92	0		-				
											'98	0		-				
Opuntia spp.																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	7	-	-	-	-	-	-	-	-	6	-	1	-	233	4	14	7
	92	12	-	-	-	-	-	-	-	-	12	-	-	-	240	-	-	12
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120	5	8	6
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	4	-	-	-	-	-	-	-	-	-	-	4	-	80			4
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			13%			+34%							
'92		00%			00%			20%			-65%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	266	Dec:	0%				
											'92	400		20%				
											'98	140		14%				
Pinus edulis																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	92	2	-	2	-	-	-	-	-	-	4	-	-	-	80			4
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+67%							
'92		00%			40%			00%			+17%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	33	Dec:	-				
											'92	100		-				
											'98	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				
Purshia tridentata																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'87	-	-	2	-	-	-	-	-	-	2	-	-	-	66	6	18	2
	'92	2	-	-	-	-	1	-	-	-	1	-	2	-	60	-	-	3
	'98	-	3	-	-	-	1	-	-	-	4	-	-	-	80	15	27	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'87 00%			'87 100%			'87 00%			- 9%							
		'92 00%			'92 33%			'92 67%			+40%							
		'98 60%			'98 20%			'98 00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'92	60		-			
												'98	100		-			

Trend Study 28-2-98

Study site name: Panguitch .

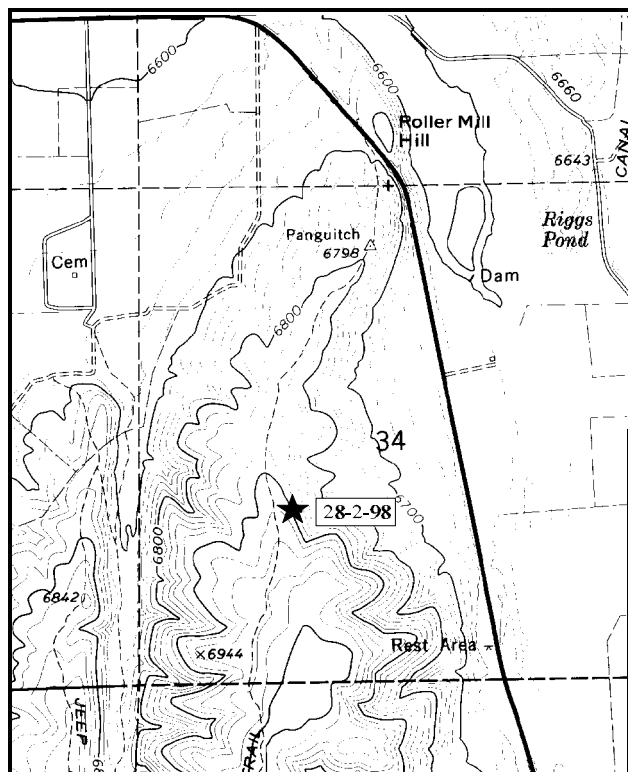
Range type: Pinyon-Juniper .

Compass bearing: frequency baseline 345 degrees.

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

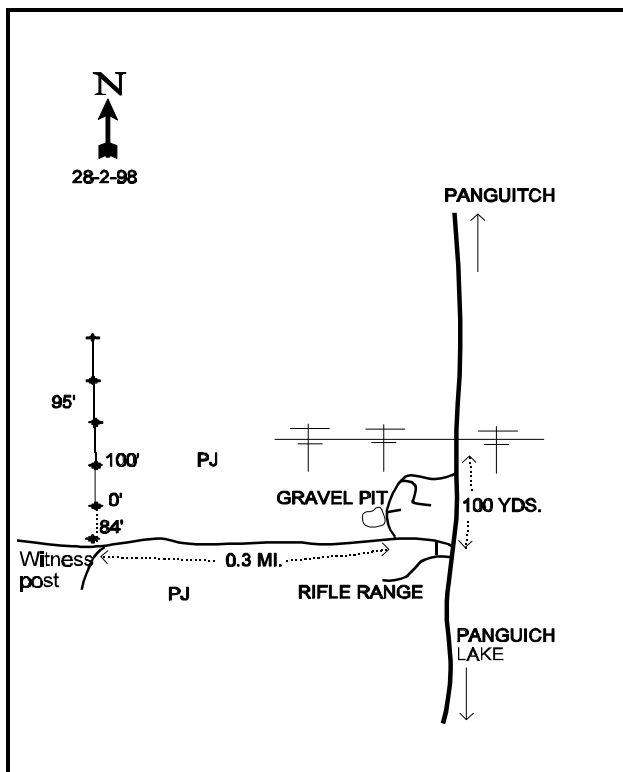
LOCATION DESCRIPTION

From the southern end of Panguitch, head south out of town on the Panguitch Lake road for 1.85 miles. At the top of the hill, you will pass under powerlines and then, in about 100 yards, come to a road turning off to the right leading to the rifle range. Immediately after the cattleguard turn right and follow the fence about 100 feet to a faint road heading west. Follow this trail 0.3 miles, behind the rifle range, to a fork. The transect begins just northeast of this fork. There is a witness post on the north side of the road. The 0-foot stake is 14 paces at 335°M from the witness post. The 0-foot baseline stake is a red 18" tall fencepost tagged #7170. The transect runs north through the pinyon and juniper.



Map Name: Panguitch

Township 35S, Range 5W, Section 34



Diagrammatic Sketch

UTM 4183193.184 N, 372796.398 E

DISCUSSION

Trend Study No. 28-2 (47-2)

The Panguitch transect is located in an extensive pinyon-juniper area south of town. Elevation of the site is 7,100 feet. Slope is nearly level (2%) with a northeast aspect. The site samples a black sagebrush flat which is being overtaken by invading pinyon pine and Utah juniper trees. The study was put in the same location as a line-intercept transect established in 1978. Winter range is limited in this high valley on the east side of the plateau. This area may have once been more important, but now receives light use with an estimated 22 deer days use/acre in 1998. These pinyon-juniper woodlands are utilized more as cover while adjacent sagebrush flats and fields near town are used for foraging.

The soil is moderately deep with rock and pavement scattered across the surface. Soil textural analysis indicates a loam with a neutral pH (6.8). The effective rooting depth (see methods) is estimated at almost 18 inches. Potassium could limit vegetative development at an estimated 16 ppm where 70 ppm are thought to be minimal for normal plant development. Even with the nearly level terrain, there is evidence of past erosion. There is little sign of current erosion, but some of the shrubs are pedestaled from past erosion events. The areas with mature pinyon-juniper as cover have an almost complete covering of pavement.

Black sagebrush is the most abundant shrub with an estimated density of 3,999 plants/acre in 1987, increasing to 6,040 by 1992 and then decreasing to 4,060 plants/acre in 1998. Percent decadency increased from 71% in 1987 to 78% in 1992, no seedlings and few young were encountered in 1992, and vigor declined with 53% of the shrubs encountered displaying poor vigor. Currently, the population appears to be improving slightly with a significant decrease in percent decadence and a decrease in the percentage of plants classified with poor vigor. Many young and seedling plants were encountered in 1998 which could help replace the decadent and dead plants. This will likely only stabilize the population for a short period of time. As the photographs show throughout all years, there is an obvious downward trend of black sagebrush, primarily due to increasing numbers of pinyon and juniper trees which shade out smaller shrubs.

Mountain big sagebrush also occurs on the site but in significantly lower numbers. The population density increased from 199 plants/acre in 1987 to 900 plants/acre in 1992. Currently, the estimated density is 200 plants/acre. Percent decadency has increased and the percentage of plants with poor vigor has decreased. There has not been a seedling mountain big sagebrush encountered in any year. Other shrubs which occur on the site include: Parry rabbitbrush, low rabbitbrush, broom snakeweed, and prickly-pear cactus.

Pinyon, and to a lesser extent juniper, definitely dominate the site. Point-centered quarter data taken in 1992 estimated 444 pinyon pine and 18 Utah juniper trees/acre. In 1998, point-centered quarter data indicates 478 pinyon pine and 36 Utah juniper trees/acre. Average tree diameter is 4.4 inches for pinyon pine and 8 inches for Utah juniper. The trees appear to be increasing in areas formerly occupied by sagebrush. Canopy cover is now estimated at 20%, meaning that the understory production is reduced by 50%. This trend will only get worse through time.

Herbaceous vegetation is infrequent, especially under the larger pinyon trees. Five species of native grass were found including blue grama, Indian ricegrass, bottlebrush squirreltail, muttongrass, and needle-and-thread grass. The rings of blue grama appear to be quite old. Forbs are rare and produce very little forage.

1987 APPARENT TREND ASSESSMENT

Due to past erosion, 23% of the ground is covered by erosion pavement. Soil depth is greatest where herbaceous vegetation and cryptogams are present. Litter cover is nonexistent in the interspaces; but litter buildup is found under the shrubs and trees. Shrubs are being crowded out by increasing numbers of pinyon and juniper trees and herbaceous vegetation is sparse. Chaining would improve the browse and herbaceous trends of this site, but the average diameter of pinyon is less than five inches making treatment difficult.

1992 TREND ASSESSMENT

Soil conditions are still poor on the site and appear to be declining with increasing pinyon and juniper cover. Soil movement in the form of sheet erosion is evident, but due to the lack of slope, no gullies have formed yet. Rock and pavement cover provide some protection for the soil in the bare interspaces. Black sagebrush, the only abundant browse, is declining primarily due to the increase in pinyon and juniper tree cover. Percent decadency increased, vigor has declined, and no seedlings, and few young were encountered. Herbaceous plants have also declined. Treatment of the pinyon and juniper will be required to reverse these trends.

TREND ASSESSMENT

soil - down slightly and poor condition

browse - down

herbaceous understory - down

1998 TREND ASSESSMENT

The soil trend is stable with little erosion apparent at this time. Percent vegetation cover declined slightly, while percent litter cover increased. Percent bare ground remained nearly the same. This site is nearly level which decreases the chance that erosion will occur, except under an intense summer storm event. A majority of the vegetation cover is contributed by shrubs or trees (86%), which is not very effective in slowing erosion and runoff as would herbaceous cover closer to the ground. The browse trend is stable for now with substantial losses since 1992. The key browse, black sagebrush, shows a decline in percent decadency and fewer plants were classified in poor vigor. However, there was a loss of one-third of the population since 1992, and all the losses can be explained by the number of dead plants in the population. Biotic potential is good with an estimated 760 seedling plants/acre. Utilization is currently, mostly light. Although this population looks better at this time than it has in the past, this will not likely last with the increasing density and dominance of pinyon pine and Utah juniper. The herbaceous understory trend is stable, but very poor contributing to barely 3% total cover. Grasses and forbs are rare throughout the area, especially under the trees.

TREND ASSESSMENT

soil - stable

browse - stable, the black sagebrush population looks better but likely only for a short time with pinyon pine and Utah juniper trees increasing in density

herbaceous understory - stable, however grasses and forbs are rare

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Bouteloua gracilis	_b 85	_a 52	_a 46	38	22	21	.72	1.37
G	Oryzopsis hymenoides	_b 34	_a 18	_a 18	16	7	8	.08	.56
G	Poa fendleriana	-	-	8	-	-	4	-	.04
G	Sitanion hystrix	_b 72	_a 41	_{ab} 54	34	19	25	.20	.97
G	Stipa comata	-	4	10	-	2	4	.03	.19
Total Annual Grasses		0	0	0	0	0	0	0	0
Total Perennial Grasses		191	115	136	88	50	62	1.03	3.14

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
F	Arabis spp.	a-	ab1	b11	-	1	5	.00	.02
F	Astragalus spp.	a-	b11	b6	-	7	4	.03	.02
F	Chaenactis douglasii	-	-	2	-	-	1	-	.00
F	Cruciferae	3	-	-	2	-	-	-	-
F	Cryptantha spp.	-	-	1	-	-	1	-	.00
F	Erigeron pumilus	5	3	4	3	2	3	.01	.04
F	Ipomopsis aggregata	-	3	8	-	1	3	.03	.04
F	Linum lewisii	-	-	3	-	-	2	-	.01
F	Lupinus spp.	-	3	-	-	1	-	.03	-
F	Phlox longifolia	-	5	7	-	2	3	.01	.04
F	Senecio multilobatus	-	-	2	-	-	1	-	.00
F	Sphaeralcea coccinea	8	1	2	4	1	1	.00	.03
Total Annual Forbs		0	0	0	0	0	0	0	0
Total Perennial Forbs		16	27	46	9	15	24	0.12	0.21

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

BROWSE TRENDS --

Herd unit 28 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Artemisia nova	76	75	11.49	8.67
B	Artemisia tridentata vaseyana	22	7	.15	2.63
B	Chrysothamnus viscidiflorus viscidiflorus	2	3	.03	-
B	Echinocereus spp.	-	-	.01	-
B	Gutierrezia sarothrae	3	14	.00	.07
B	Juniperus osteosperma	4	3	.88	1.00
B	Mammillaria spp.	3	0	-	-
B	Opuntia spp.	4	1	-	-
B	Pinus edulis	30	21	14.21	8.41
B	Sclerocactus	0	1	-	.00
Total for Browse		144	125	26.78	20.81

CANOPY COVER --

Herd unit 28 , Study no: 2

Species	Percent Cover '98
Juniperus osteosperma	2
Pinus edulis	18

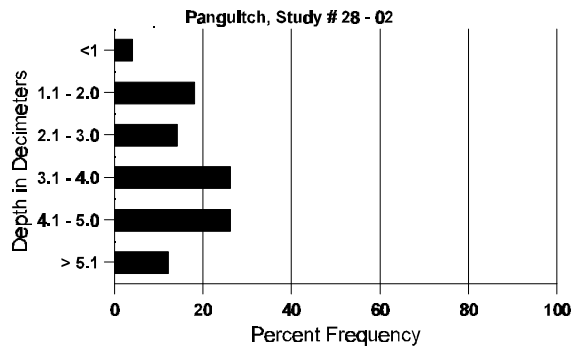
BASIC COVER --
Herd unit 28 , Study no: 2

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	142	171	3.75	27.31	25.87
Rock	199	90	1.00	10.07	1.46
Pavement	122	242	23.25	8.36	23.48
Litter	261	381	31.75	33.18	43.62
Cryptogams	148	123	5.00	3.70	2.28
Bare Ground	256	253	35.25	23.83	23.13

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 02, Study Name: Pangultch

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.6	50.2 (17.4)	6.8	46.2	32.0	21.8	1.7	13.5	16.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 2

Type	Quadrat Frequency	
	'92	'98
Rabbit	-	21
Deer	-	19

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 2

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4				
<i>Artemisia nova</i>									
S	87	8	-	-	-	-	-	8	
	92	-	-	-	-	-	-	0	
	98	37	-	-	1	-	-	38	
Y	87	10	4	-	-	-	-	14	
	92	5	-	2	-	-	1	8	
	98	17	-	-	2	-	-	19	
M	87	4	7	10	-	-	-	21	
	92	18	27	10	-	3	-	57	
	98	111	14	-	1	-	-	126	
D	87	35	30	20	-	-	-	55	
	92	45	133	48	2	7	-	76	
	98	39	18	-	1	-	-	49	
X	87	-	-	-	-	-	-	0	
	92	-	-	-	-	-	-	0	
	98	-	-	-	-	-	-	2180	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
'87		34%		25%		25%		+34%	
'92		56%		20%		53%		-33%	
'98		16%		00%		04%			
Total Plants/Acre (excluding Dead & Seedlings)						'87	3999	Dec:	71%
						'92	6040		78%
						'98	4060		29%
<i>Artemisia tridentata vaseyana</i>									
Y	87	-	1	3	-	-	-	4	
	92	8	4	-	1	-	-	12	
	98	2	-	-	-	-	-	2	
M	87	-	1	-	-	-	-	1	
	92	12	11	-	-	-	-	22	
	98	4	1	-	-	-	-	5	
D	87	1	-	-	-	-	-	1	
	92	5	4	-	-	-	-	3	
	98	3	-	-	-	-	-	3	
X	87	-	-	-	-	-	-	0	
	92	-	-	-	-	-	-	0	
	98	-	-	-	-	-	-	160	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
'87		33%		50%		00%		+78%	
'92		42%		00%		18%		-78%	
'98		10%		00%		00%			
Total Plants/Acre (excluding Dead & Seedlings)						'87	199	Dec:	17%
						'92	900		20%
						'98	200		30%

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus viscidiflorus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60	8	7	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			50%			00%			+33%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	40		-			
												'98	60		-			
Gutierrezia sarothrae																		
S	87	9	-	-	-	-	-	-	-	-	9	-	-	-	300			9
	92	15	-	-	-	-	-	1	-	-	16	-	-	-	320			16
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	9	-	-	-	-	-	-	-	-	9	-	-	-	300			9
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	87	5	-	1	-	-	-	-	-	-	6	-	-	-	200	8	4	6
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	18	-	-	-	-	-	-	-	-	18	-	-	-	360	8	9	18
D	87	1	-	-	-	-	-	-	-	-	-	-	-	1	33			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			06%			06%			-85%							
'92		00%			00%			00%			+86%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	533	Dec:	6%			
												'92	80		0%			
												'98	580		0%			
Juniperus osteosperma																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	98	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	157	118	1
	92	-	-	-	-	-	-	2	-	-	2	-	-	-	40	-	-	2
	98	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+67%							
'92		00%			00%			00%			-20%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'92	100		-			
												'98	80		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Mammillaria spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	1	-	-	3	-	-	-	60		3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	80		-			
												'98	0		-			
Opuntia spp.																		
M	87	4	-	-	-	-	-	-	-	-	4	-	-	-	133	4	8	4
	92	2	1	-	1	-	-	-	-	-	3	-	1	-	80	-	-	4
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	13	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-40%							
'92		25%			00%			25%			-75%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	-			
												'92	80		-			
												'98	20		-			
Pinus edulis																		
S	87	12	1	-	-	-	-	-	-	-	10	1	2	-	433		13	
	92	4	-	-	-	-	-	6	-	-	8	-	-	2	200		10	
	98	2	-	-	4	-	-	-	-	-	6	-	-	-	120		6	
Y	87	13	1	-	-	-	-	-	-	-	13	-	-	1	466		14	
	92	12	2	-	5	-	-	1	-	-	12	-	4	4	400		20	
	98	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	87	7	-	-	-	-	-	9	-	-	16	-	-	-	533	144	110	16
	92	9	1	-	-	-	-	5	-	-	14	-	-	1	300	-	-	15
	98	9	-	-	-	-	-	-	1	-	10	-	-	-	200	-	-	10
D	87	-	-	-	-	-	-	1	-	-	1	-	-	-	33		1	
	92	4	-	-	-	-	-	-	-	-	2	-	-	2	80		4	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		03%			00%			03%			-24%							
'92		08%			00%			28%			-38%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1032	Dec:	3%			
												'92	780		10%			
												'98	480		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				
Sclerocactus																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'87	00%			00%			00%										
	'92	00%			00%			00%										
	'98	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	0		-			
												'98	20		-			

Trend Study 28-3-98

Study site name: Bear Valley .

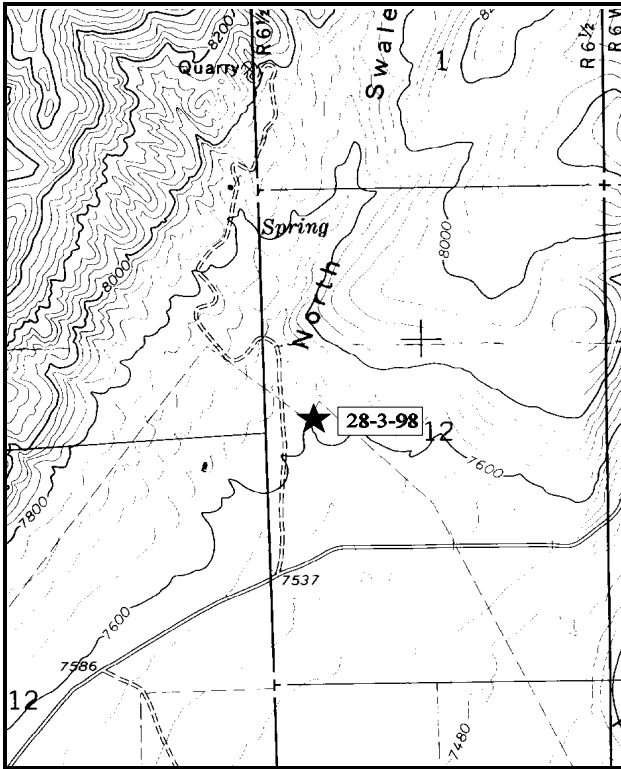
Range type: Chained, Railed Shrubland .

Compass bearing: frequency baseline 77 M degrees. (Lines 2-4 130°M)

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

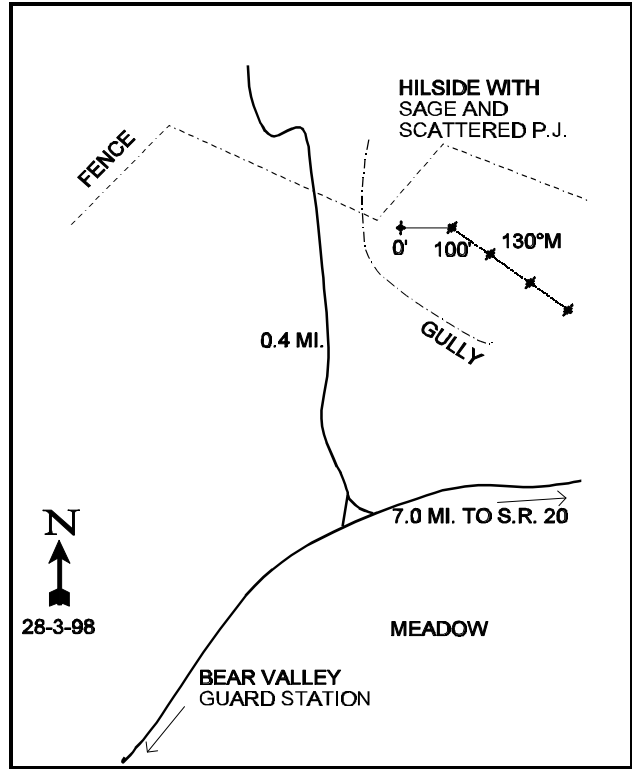
LOCATION DESCRIPTION

From the US 89-SR20 Junction, go approximately 7 miles west on SR20 to a corral past mile marker 14. Turn left on the Little Creek road that leads to Bear Valley. Travel 7.0 miles south on the main road to a minor fork. Turn right and go 0.4 miles to a fence and wire gate. Stop here and walk east along the fenceline to the corner. Walk 4 paces east from the fence corner to a short red fencepost tagged #7163 which is the 0-foot baseline stake.



Map name: Little Creek Peak

Township 33S, Range 6 1/2W, Section 12



Diagrammatic Sketch

UTM 4201913.104 N, 360560.220 E

DISCUSSION

Trend Study No. 28-3 (47-3)

The Bear Valley study samples a seeded range at the north end of Upper Bear Valley. Elevation of the site is 7,600 feet with a gently sloping (3-5%) southeast slope. The area is at the upper limits of normal deer winter range that has also shown light use by elk. Pellet group transect data from 1998 indicates 3 elk days use/acre, 19 deer days use/acre, and 65 cow days use/acre.

Soil textural analysis indicates a sandy loam with a moderately acid pH (5.8). The soil is fairly deep with an average effective rooting depth (see methods) of just over 17 inches. Percent vegetative cover is good, but scattered bare areas show evidence of slight erosion. The soil is potentially erodible, as evidenced by a nearby deep gully showing recent down cutting.

Browse is not a prominent forage component on this seeding. Mountain big sagebrush has increased in density since 1992 to an estimated 1,540 plants/acre in 1998, yet it still only contributes to 9% of the browse cover. Age structure currently indicates a mostly young population with good biotic potential. Utilization was moderate in 1987 and 1992, however it has shifted to light use by 1998. Average height has increased from 7 inches in 1992 to 21 inches in 1998. Low rabbitbrush is abundant with an estimated density of 10,666 plants/acre in 1987 and 17,080 plants/acre in 1992. Currently, the estimated density is 11,320 plants/acre, 38% of which are young. The population is slowly becoming more mature with fewer decadent or dead plants present. The plants are vigorous and lightly utilized. Other shrubs in the lower end of the valley include: rubber rabbitbrush, gray horsebrush, snowberry, Wood's rose, and a few lone juniper trees.

The site is dominated by the seeded grasses, crested wheatgrass and western wheatgrass. These grasses are large and vigorous with light to moderate utilization reported in 1998. Blue grama and a sedge are scattered throughout the site and both show a significant decline in nested frequency since 1987. Forbs are less important as winter forage producers, but the lupine, yellow salsify, groundsel, and dandelion provide desirable spring and summer feed. Grasses currently provide about 41% of the herbaceous understory cover, a decrease from 82% estimated in 1992. However, without the increase in four annual forbs, grasses would make up 77% of the herbaceous cover.

1987 APPARENT TREND ASSESSMENT

Ground cover is good in this seeding even though bare soil makes up 18% of the ground cover, which seems high. Most bare spots are covered with rocks or pavement, which covers 17% of the ground surface. The bunch grasses and associated litter provide good ground cover, but there is apparently room for increase. Browse on the site is dominated by low rabbitbrush which appears to be increasing.

1992 TREND ASSESSMENT

The site had recently been grazed, so bare ground estimates were higher than in 1987 with a cover of 37%. Litter cover has also greatly declined with extended drought. No erosion was evident, although some soil pedestaling was noted. Trend for soil is slightly down. The browse trend is slightly down due to the low densities for mountain big sagebrush and rubber rabbitbrush. The less desirable low rabbitbrush has increased to 17,080 plants/acre and maintains a dynamic reproductive potential. Trend for herbaceous understory is stable. Nested frequencies of perennial grasses and forbs showed little change.

TREND ASSESSMENT

soil - slightly down

browse - slightly down

herbaceous understory - stable

1998 TREND ASSESSMENT

The soil trend is slightly upward with an increase in percent vegetation and litter cover. Erosion potential is still present, but is greatly reduced due to the levelness of the site. The browse trend is stable. The mountain big sagebrush density has increased since 1992, but this is a mostly young population that still needs to become established. The population exhibits good biotic potential, no decadency, and light utilization. The low rabbitbrush population density is fluctuating between years most likely due to precipitation patterns. The herbaceous understory trend is stable. Even though total perennial herbaceous understory sum of nested frequency has increased since 1992, grasses remain an important component for wildlife during the winter. Perennial grass sum of nested frequency has declined slightly, while perennial forb sum of nested frequency has increased since 1992.

TREND ASSESSMENT

soil - slightly upward

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	_b 320	_a 297	_{ab} 299	98	98	98	17.26	17.40
G	Agropyron smithii	41	73	58	20	32	22	.31	.45
G	Bouteloua gracilis	_b 32	_{ab} 25	_a 7	14	10	3	.43	.21
G	Bromus tectorum (a)	-	-	18	-	-	7	-	.52
G	Carex spp.	_b 19	_b 10	_a -	8	5	-	.02	-
G	Elymus junceus	3	1	2	1	1	1	.00	.00
G	Poa pratensis	_a 5	_a 2	_b 12	2	1	7	.03	.37
G	Stipa comata	_{ab} 27	_b 44	_a 13	13	17	5	1.10	.37
Total Annual Grasses		0	0	18	0	0	7	0	0.52
Total Perennial Grasses		447	452	391	156	164	136	19.17	18.82
F	Agoseris glauca	-	-	2	-	-	1	-	.00
F	Androsace septentrionalis (a)	-	_a 15	_b 162	-	6	67	.03	2.82
F	Arabis spp.	2	-	-	2	-	-	-	-
F	Artemisia ludoviciana	11	3	11	3	1	4	.00	.56
F	Astragalus panguicensis	3	8	2	1	3	2	.02	.01
F	Chaenactis douglasii	3	-	-	1	-	-	-	-
F	Cirsium spp.	-	8	4	-	3	2	.04	.15
F	Collinsia parviflora (a)	-	-	112	-	-	40	-	.91

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
F	<i>Crepis acuminata</i>	-	-	4	-	-	2	-	.01
F	<i>Descurainia</i> spp. (a)	-	-	2	-	-	1	-	.00
F	<i>Dracocephalum parviflorum</i>	-	-	3	-	-	3	-	.01
F	<i>Epilobium paniculatum</i> (a)	-	-	1	-	-	1	-	.00
F	<i>Eriogonum cernuum</i> (a)	-	4	-	-	2	-	.01	-
F	<i>Erigeron flagellaris</i>	1	-	-	1	-	-	-	-
F	<i>Euphorbia</i> spp.	-	-	3	-	-	1	-	.03
F	<i>Ipomopsis aggregata</i>	-	-	1	-	-	1	-	.00
F	<i>Lappula occidentalis</i> (a)	-	_a 12	_b 116	-	6	51	.03	1.89
F	<i>Lepidium</i> spp. (a)	-	2	-	-	1	-	.00	-
F	<i>Lupinus argenteus</i>	_b 91	_a 70	_b 109	46	31	55	2.97	1.35
F	<i>Lygodesmia spinosa</i>	_a 10	_b 16	_{ab} 14	5	5	5	.27	.39
F	<i>Microsteris gracilis</i> (a)	-	_a 3	_b 216	-	1	76	.00	2.27
F	<i>Oenothera coronopifolia</i>	_a -	_a -	_b 10	-	-	4	-	.07
F	<i>Oenothera pallida</i>	_b 35	_a 9	_{ab} 27	18	4	9	.05	.31
F	<i>Penstemon</i> spp.	-	-	1	-	-	1	-	.00
F	<i>Phlox longifolia</i>	_a 50	_a 61	_b 140	28	30	62	.15	.86
F	<i>Polygonum douglasii</i> (a)	-	_a 31	_b 94	-	14	36	.07	1.00
F	<i>Senecio douglasii</i>	_b 30	_b 27	_a 1	15	14	1	.54	.00
F	<i>Sphaeralcea coccinea</i>	_a -	_a -	_b 9	-	-	4	-	.07
F	<i>Taraxacum officinale</i>	11	5	12	6	2	7	.01	.06
F	<i>Tragopogon dubius</i>	_a 18	_a 1	_b 55	8	1	25	.00	.62
F	Unknown forb-annual	-	-	37	-	-	15	-	.12
Total Annual Forbs		0	67	703	0	30	272	0.14	6.63
Total Perennial Forbs		265	208	445	134	94	204	4.07	6.98

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

BROWSE TRENDS --

Herd unit 28 , Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	<i>Artemisia tridentata vaseyana</i>	5	31	.13	1.25
B	<i>Chrysothamnus nauseosus</i>	1	13	.15	1.25
B	<i>Chrysothamnus nauseosus albicaulis</i>	0	6	-	-
B	<i>Chrysothamnus viscidiflorus</i>	99	99	4.56	10.96
B	<i>Symphoricarpos oreophilus</i>	0	0	-	-
B	<i>Tetradymia canescens</i>	5	6	.44	.21
Total for Browse		110	155	5.28	13.68

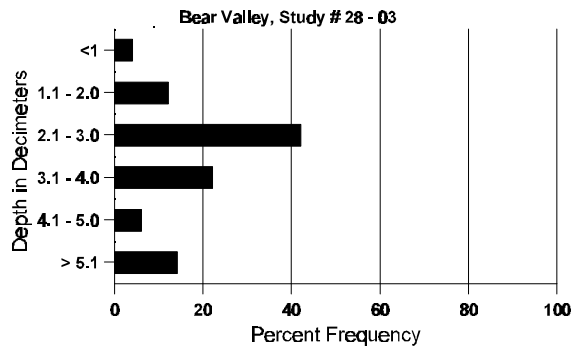
BASIC COVER --
Herd unit 28 , Study no: 3

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	326	365	7.00	28.50	45.32
Rock	19	49	4.75	6.33	.26
Pavement	129	319	11.50	0	11.18
Litter	290	394	58.50	25.89	48.66
Cryptogams	3	4	0	0	.00
Bare Ground	254	333	18.25	37.15	28.85

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 03, Study Name: Bear Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.3	50.0 (17.7)	5.8	64.2	20.0	15.8	2.3	19.9	1542.4	.3

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 3

Type	Quadrat Frequency	
	'92	'98
Rabbit	88	19
Elk	-	2
Deer	10	23
Cattle	3	29

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 3

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata vaseyana</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
Y	87	2	2	-	1	-	-	-	-	-	5	-	-	-	333		5	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	58	2	-	-	-	-	-	-	-	45	-	15	-	1200		60	
M	87	5	3	1	-	-	-	-	-	-	8	-	1	-	600	7	6	9
	92	2	3	-	-	-	-	-	-	-	5	-	-	-	100	-	-	5
	98	12	5	-	-	-	-	-	-	-	16	-	1	-	340	21	28	17
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		36%			07%			07%			-87%							
'92		50%			00%			00%			+92%							
'98		09%			00%			21%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	933	Dec:	-				
											'92	120		-				
											'98	1540		-				
<i>Chrysothamnus nauseosus</i>																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	87	3	-	-	-	-	-	-	-	-	1	2	-	-	200	20	13	3
	92	-	1	-	-	-	-	-	-	-	-	-	1	-	20	-	-	1
	98	23	-	-	-	-	-	-	-	-	23	-	-	-	460	11	17	23
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-92%							
'92		100%			00%			100%			+98%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	266	Dec:	-				
											'92	20		-				
											'98	560		-				

A G R E	Y R	Form Class (No. of 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																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	92	21	-	1	2	-	-	-	-	-	24	-	-	-	480			24
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
Y	87	96	1	-	-	-	-	-	-	-	92	1	4	-	6466			97
	92	371	73	9	-	-	-	-	-	-	453	-	-	-	9060			453
	98	213	-	-	-	-	-	-	-	-	169	44	-	-	4260			213
M	87	54	-	-	-	-	-	-	-	-	49	-	4	1	3600	17	12	54
	92	346	28	1	-	-	-	-	-	-	374	1	-	-	7500	-	-	375
	98	325	18	-	-	-	-	-	-	-	217	116	10	-	6860	14	16	343
D	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	92	21	4	1	-	-	-	-	-	-	18	-	6	2	520			26
	98	10	-	-	-	-	-	-	-	-	-	8	-	2	200			10
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		.62%			00%			06%			+38%							
'92		12%			01%			0.93%			-34%							
'98		03%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	10666	Dec:	6%			
												'92	17080		3%			
												'98	11320		2%			
Symphoricarpos oreophilus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	14	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	0		-			
												'98	0		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Tetradymia canescens																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	'98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	6	1	-	-	-	-	-	-	-	7	-	-	-	140	-	-	7
	'98	7	1	-	-	-	-	-	-	-	8	-	-	-	160	14	21	8
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		08%			00%			00%			-25%							
'98		11%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	240		8%			
												'98	180		0%			

Trend Study 28-4-98

Study site name: Buckskin Valley .

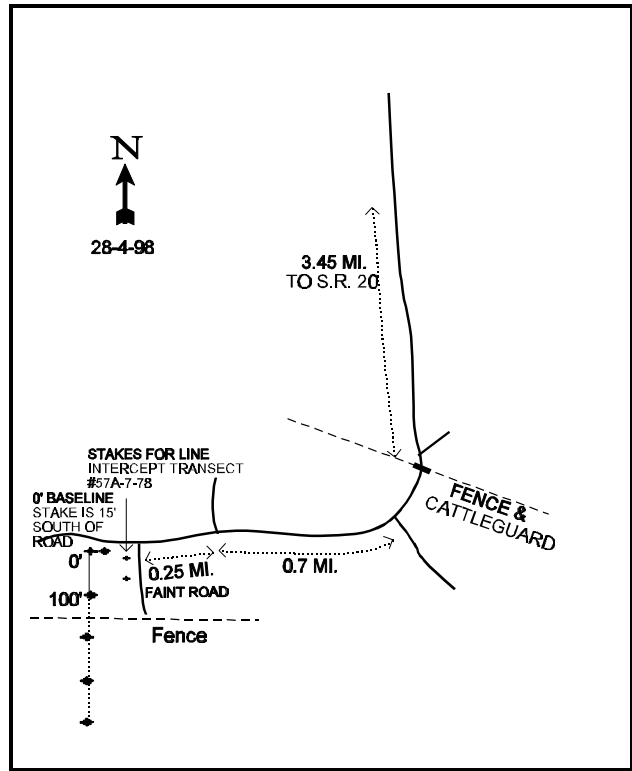
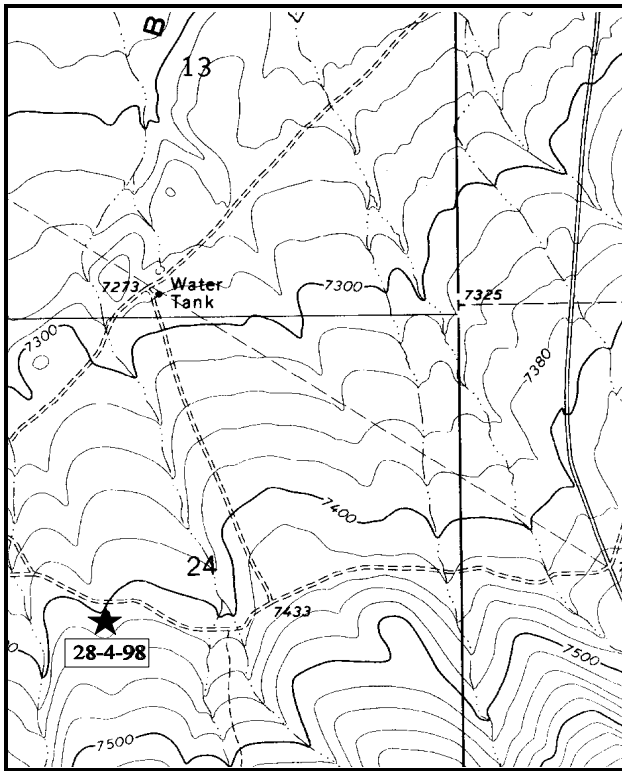
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 182 M degrees.

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

LOCATION DESCRIPTION

From SR 20 just west of mile marker 7, turn south onto the Buckskin Valley road. Travel 3.45 miles to a cattleguard. Just beyond the fence and cattleguard, bear right and proceed west 0.95 miles to an intersection where a very faint road goes to the south. About 60 feet west of this intersection, and 15 feet south of the main road, is the 0-foot baseline stake. This 2-foot tall green fencepost is marked by a red browse tag #9005. The frequency baseline runs south-southwest from here. The old line-intercept transect 57A-7-78 is marked by a red-painted steel fencepost 10 feet east of the new study.



Map Name: Burnt Peak

Diagrammatic Sketch

Township 32S, Range 7W, Section 24

UTM 4207346.233 N, 359510.770 E

DISCUSSION

Trend Study No. 28-4 (47-4)

Buckskin Valley, located on the northern end of the unit, is important as transitional range. Elevation of the site is 7,400 feet on a gentle (5%) north slope. A variety of browse, dominated by sagebrush, is available throughout the valley. The lower areas have been extensively treated by the BLM to enhance livestock grazing. The area of the transect, in the upper part of the valley, is a cattle-sheep allotment used for late spring grazing. Cattle were on the site during the 1992 reading in early August. A pellet group transect read on the study site in 1998 indicates 49 deer days use/acre and 7 cow days use/acre.

Soil textural analysis indicates a loam with a moderately acid pH (5.9). The average effective rooting depth (see methods) is just over 14 inches. The soil is dark in color and rocks are fairly common on the surface. There is evidence of compaction and crusting due to the relatively high clay content (26%), however erosion is not a problem. Vegetation and litter provide abundant cover which helps protect the soil.

A moderately dense stand of mountain big sagebrush dominates the study site with an estimated density of 5,160 plants/acre in 1998. This estimated density is lower than the 1987 estimate of 8,732 plants/acre and the 1992 estimate of 8,980 plants/acre. Mountain big sagebrush currently has a cover estimate of 25%. The proportion of decadent plants increased from 36% in 1987 to 56% in 1992, then decreased to 26% in 1998. Few seedlings were observed during any year. Biotic potential is still very low, but is slowly increasing. Utilization of sagebrush increased in 1992, yet utilization has subsequently decreased to light and moderate use. The proportion of plants displaying poor vigor increased from 7% in 1987 to 16% in 1992, then it declined to 8% in 1998.

Interspersed in the dense sagebrush canopy are highly preferred bitterbrush plants. Density of bitterbrush increased from 1,732 plants/acre in 1987 to 3,080 plants/acre in 1992. The density then decreased to 1,900 plants/acre in 1998. In 1992, 34% of the population were classified as young and 55% were classified as mature. In 1998, 15% of the population were classified as young and 85% were classified as mature. Biotic potential remains good with many seedlings encountered in 1998. During the 1987 reading, 73% of the bitterbrush displayed heavy use. By 1992, 53% of the shrubs were heavily browsed and this has declined slightly to 43% in 1998. The proportion of the plants that exhibit poor vigor is low over all years. Other important browse species which occur in smaller numbers on the site include Gambel oak and snowberry, both of which were moderately hedged in 1992 and lightly hedged in 1998. Less desirable browse encountered on the site include the aggressive increasers prickly-pear cactus and stickyleaf low rabbitbrush.

Sheltered by the dense shrub overstory is a variety of fairly abundant herbaceous species. Western wheatgrass, bottlebrush squirreltail, and Kentucky bluegrass are the predominant grasses. One disturbing change is the significant increase in the nested frequency of cheatgrass since 1992. Perennial grass sum of nested frequency is currently declining, while annual grass sum of nested frequency is increasing. Twenty-five perennial forbs were encountered in frequency plots in 1998. Common palatable species include: sulfur buckwheat, redroot buckwheat, lupine, and clover. As with the perennial grasses, forb perennial sum of nested frequency has declined from 508 in 1992 to 358 in 1998.

1987 APPARENT TREND ASSESSMENT

Soil is well protected from erosion on this site with litter providing an estimated 75% ground cover. Overstory and basal vegetative cover is also good, leaving only 9% bare soil exposed. The soil trend appears stable. The sagebrush population is overly mature with little reproductive potential and a high proportion of decadent plants. Bitterbrush has a younger population with good biotic and reproductive potentials. However, 73% of the bitterbrush encountered displayed heavy use. Trend for these key browse species appears stable for the time being. Herbaceous plants are diverse and fairly abundant.

1992 TREND ASSESSMENT

The soil trend appears stable with abundant litter and vegetation cover with 15% bare ground. Browse trend is down for sagebrush due to low biotic and reproductive potentials and increased heavy use and increases in percent decadency, now at 56%. Sagebrush makes up 72% of the total browse cover. Trend for bitterbrush is up slightly, but it is still being heavily utilized and it only makes up 17% of the browse cover. Overall, the browse trend is slightly down. The herbaceous understory is diverse and abundant. Grasses account for 18% of the total vegetative cover while forbs make up 13%. Perennial herbaceous understory sum of nested frequency slightly increased indicating a slightly upward trend.

TREND ASSESSMENT

soil - stable

browse - slightly down

herbaceous understory - slightly upward

1998 TREND ASSESSMENT

The soil trend is slightly upward with an increase in the proportion of protective ground cover. Although percent bare ground increased slightly, there is adequate vegetative and litter cover to protect against erosion. Ideally, percent browse cover would be lower and more of the cover would be contributed by the herbaceous understory. While browse dominates the site, the herbaceous understory cover will remain low as the grasses and forbs are shaded out. The browse trend is slightly downward. The mountain big sagebrush population will continue to decline as long as the biotic potential stays low. The mountain big sagebrush population has lower percent decadency than 1992, but the percentage of decadent plants classified as dying increased. A slight thinning of the mountain big sagebrush population could occur without being detrimental to the mountain big sagebrush community and actually be beneficial to the herbaceous understory. The antelope bitterbrush population is healthy with good biotic potential and many young plants encountered. The herbaceous understory trend is downward with a decrease in perennial herbaceous understory sum of nested frequency from 919 in 1992 to 705 in 1998. Cheatgrass has significantly increased in nested frequency since 1992 and could easily dominate the understory in a matter of years. If this happens, the site is at risk of being lost due to a wildfire.

TREND ASSESSMENT

soil - slightly upward

browse - slightly downward

herbaceous understory - downward

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 4

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	-	-	6	-	-	2	-	.06
G	Agropyron smithii	_{ab} 173	_b 185	_a 136	61	65	48	4.03	1.58
G	Agropyron spicatum	-	-	2	-	-	1	-	.00
G	Bromus ciliatus	-	2	-	-	1	-	.01	-
G	Bromus tectorum (a)	-	_a 42	_b 167	-	17	58	.11	2.90
G	Poa fendleriana	_a 37	_b 47	_{ab} 33	21	20	14	1.52	.95
G	Poa pratensis	_a -	_a -	_b 44	-	-	14	-	2.20

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	<i>Poa secunda</i>	-	3	2	-	3	2	.01	.01
G	<i>Sitanion hystrix</i>	119	115	89	42	46	39	2.17	1.43
G	<i>Stipa comata</i>	_a 5	_b 31	_a 2	3	11	2	.18	.01
G	<i>Stipa lettermani</i>	_a -	_b 28	_b 33	-	15	14	.51	.22
Total Annual Grasses		0	42	167	0	17	58	0.11	2.90
Total Perennial Grasses		334	411	347	127	161	136	8.46	6.47
F	<i>Agoseris glauca</i>	-	-	4	-	-	3	-	.04
F	<i>Allium</i> spp.	-	3	1	-	1	1	.00	.00
F	<i>Arabis holboellii</i>	_b 44	_b 27	_a 2	18	12	2	.06	.01
F	<i>Astragalus convallarius</i>	1	8	5	1	4	3	.67	.06
F	<i>Astragalus panguicensis</i>	_a 6	_{ab} 9	_b 27	3	6	12	.03	.36
F	<i>Astragalus</i> spp.	_{ab} 15	_b 16	_a 1	8	10	1	.07	.09
F	<i>Balsamorhiza sagittata</i>	-	-	2	-	-	1	-	.00
F	<i>Calochortus nuttallii</i>	2	-	5	2	-	3	-	.01
F	<i>Chaenactis douglasii</i>	_b 84	_a 32	_a 12	44	15	5	.17	.02
F	<i>Cirsium wheeleri</i>	_b 35	_{ab} 24	_a 16	22	12	8	.38	.41
F	<i>Comandra pallida</i>	5	7	6	2	2	2	.03	.03
F	<i>Collinsia parviflora</i> (a)	-	_a 115	_b 262	-	46	84	.55	2.22
F	<i>Crepis acuminata</i>	_a -	_b 9	_b 6	-	4	5	.04	.05
F	<i>Erigeron eatonii</i>	11	-	-	5	-	-	-	-
F	<i>Erigeron</i> spp.	-	-	2	-	-	1	-	.00
F	<i>Eriogonum racemosum</i>	41	32	24	18	16	13	.28	.14
F	<i>Eriogonum umbellatum</i>	19	18	8	8	9	4	.07	.09
F	<i>Ipomopsis aggregata</i>	2	-	-	1	-	-	-	-
F	<i>Linum lewisii</i>	-	-	2	-	-	1	-	.03
F	<i>Lithophragma</i>	-	-	3	-	-	1	-	.03
F	<i>Lomatium</i> spp.	_a -	_b 9	_a -	-	5	-	.03	-
F	<i>Lupinus argenteus</i>	31	45	55	17	22	26	1.42	3.22
F	<i>Machaeranthera canescens</i>	_b 36	_a 4	_a 2	21	2	1	.04	.00
F	<i>Microsteris gracilis</i> (a)	-	_b 112	_a 61	-	44	22	.44	.26
F	<i>Phlox longifolia</i>	_a 118	_b 177	_a 115	65	71	41	1.02	.97
F	<i>Polygonum douglasii</i> (a)	-	-	4	-	-	3	-	.04
F	<i>Senecio douglasii</i>	4	-	-	1	-	-	-	-
F	<i>Senecio multilobatus</i>	_b 18	_a 1	_a 1	12	1	1	.00	.00
F	<i>Sphaeralcea coccinea</i>	8	4	4	3	2	2	.01	.01
F	<i>Taraxacum officinale</i>	_b 6	_{ab} 1	_a -	4	1	-	.03	-
F	<i>Tragopogon dubius</i>	8	2	7	5	1	3	.00	.04
F	<i>Trifolium</i> spp.	_a 16	_b 42	_b 43	7	21	19	.15	.31
F	<i>Zigadenus paniculatus</i>	_a 7	_b 38	_a 5	4	19	3	.82	.04

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
	Total Annual Forbs	0	112	327	0	44	109	0.44	2.52
	Total Perennial Forbs	517	623	358	271	282	162	5.93	6.03

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

BROWSE TRENDS --

Herd unit 28 , Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Artemisia tridentata vaseyana	98	94	24.29	24.87
B	Cercocarpus ledifolius	0	0	-	-
B	Chrysothamnus depressus	1	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	2	0	-	-
B	Juniperus scopulorum	1	1	-	.03
B	Opuntia spp.	44	28	1.29	1.03
B	Purshia tridentata	79	65	5.57	8.25
B	Quercus gambelii	2	3	1.62	.56
B	Symphoricarpos oreophilus	17	17	.77	3.24
	Total for Browse	244	208	33.56	38.00

BASIC COVER --

Herd unit 28 , Study no: 4

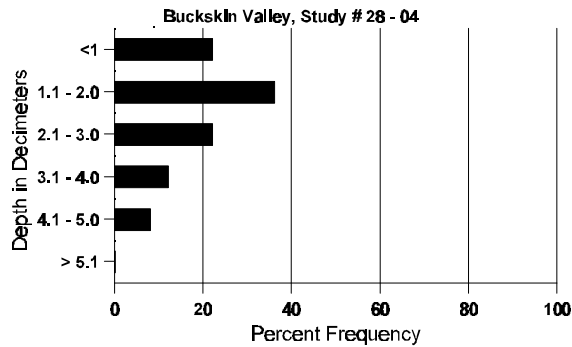
Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	352	355	7.50	42.98	50.00
Rock	227	120	5.50	5.53	4.95
Pavement	34	114	1.00	1.26	1.68
Litter	265	395	74.50	59.12	66.59
Cryptogams	74	40	2.25	1.64	.98
Bare Ground	276	200	9.25	14.50	16.27

SOIL ANALYSIS DATA --

Herd Unit 28, Study # 04, Study Name: Buckskin Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.3	50.4 (15.7)	5.9	44.2	30.0	25.8	3.8	22.7	236.8	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 28, Study no: 4

Type	Quadrat Frequency	
	'92	'98
Sheep	-	1
Rabbit	44	22
Elk	-	1
Deer	28	37
Cattle	-	2

BROWSE CHARACTERISTICS --

Herd unit 28, 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				
<i>Artemisia tridentata vaseyana</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	1	-	-	6	-	-	1	-	-	8	-	-	-	160		8	
	98	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
Y	87	7	6	1	-	-	-	-	-	-	14	-	-	-	933		14	
	92	3	10	-	-	-	-	1	-	-	14	-	-	-	300		15	
	98	9	1	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	87	15	42	13	-	-	-	-	-	-	70	-	-	-	4666	26	28	70
	92	34	101	43	-	5	-	-	-	-	183	-	-	-	3660	-	-	183
	98	93	83	6	-	-	-	-	-	-	176	4	2	-	3640	29	37	182
D	87	14	21	12	-	-	-	-	-	-	38	-	-	9	3133		47	
	92	42	96	99	4	8	-	1	-	-	171	8	31	40	5020		251	
	98	42	18	6	-	-	-	-	-	-	48	-	2	16	1320		66	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1160		58	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		53%			20%			07%			+ 3%							
'92		49%			32%			16%			-43%							
'98		40%			05%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	8732	Dec:	36%			
												'92	8980		56%			
												'98	5160		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			
Cercocarpus ledifolius																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	0		-		
												'98	0		-		
Chrysothamnus depressus																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	28
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	20		-		
												'98	0		-		
Chrysothamnus viscidiflorus viscidiflorus																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	40		-		
												'98	0		-		
Juniperus scopulorum																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		100%			00%			00%			+ 0%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	20		-		
												'98	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								
Opuntia spp.																
S	87	3	-	-	-	-	-	-	2	-	-	1	200		3	
	92	5	-	-	-	-	-	-	5	-	-	-	100		5	
	98	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	7	-	-	-	-	-	-	2	-	2	3	466		7	
	92	19	-	-	4	-	-	18	39	-	2	-	820		41	
	98	4	-	1	1	-	-	-	6	-	-	-	120		6	
M	87	7	3	-	-	-	-	-	6	-	2	2	666	3	4	10
	92	43	-	2	6	-	-	5	47	-	9	-	1120	-	-	56
	98	24	-	-	4	-	-	-	28	-	-	-	560	6	13	28
D	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	10	-	-	-	-	-	-	-	-	6	4	200		10	
	98	3	-	-	-	-	-	-	1	-	-	2	60		3	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		18%		00%		53%		+47%								
'92		00%		02%		20%		-65%								
'98		00%		03%		05%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	1132	Dec:	0%			
										'92	2140		9%			
										'98	740		8%			
Purshia tridentata																
S	87	6	5	2	-	-	-	-	13	-	-	-	866		13	
	92	3	-	-	-	-	-	4	7	-	-	-	140		7	
	98	9	-	-	-	-	-	-	9	-	-	-	180		9	
Y	87	2	4	7	-	-	-	-	13	-	-	-	866		13	
	92	4	10	10	7	15	1	6	53	-	-	-	1060		53	
	98	6	5	-	3	-	-	-	14	-	-	-	280		14	
M	87	-	1	12	-	-	-	-	13	-	-	-	866	22	31	13
	92	-	12	54	-	11	7	1	84	-	1	-	1700	-	-	85
	98	6	20	27	-	7	18	-	77	-	-	1	1560	22	35	78
D	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	9	1	5	-	-	12	-	4	-	320		16	
	98	1	1	-	-	1	-	-	2	-	-	1	60		3	
X	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		19%		73%		00%		+44%								
'92		34%		53%		03%		-38%								
'98		36%		47%		02%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	1732	Dec:	0%			
										'92	3080		10%			
										'98	1900		3%			

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				
Quercus gambelii																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	-	-	-	6	-	-	-	-	-	6	-	-	-	120		6
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
Y	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2
	92	-	-	-	2	-	-	3	-	-	5	-	-	-	100		5
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	8	-	8	-	-	16	-	-	-	320	-	16
	98	18	-	-	-	-	-	-	-	-	18	-	-	-	360	75 39	18
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	2	-	-	-	-	-	-	-	-	-	-	2	40		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		50%			00%			00%			+71%						
'92		43%			00%			09%			-13%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	0%		
												'92	460		9%		
												'98	400		0%		
Symphoricarpos oreophilus																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	2	-	-	-	-	-	3	-	-	5	-	-	-	100		5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	6	1	-	-	-	-	-	-	-	7	-	-	-	466		7
	92	5	4	-	1	-	-	-	-	-	10	-	-	-	200		10
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
M	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133	20 19	2
	92	1	3	3	2	13	-	2	-	-	21	-	3	-	480	-	24
	98	4	11	-	14	1	-	-	-	-	30	-	-	-	600	14 25	30
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		22%			00%			00%			+14%						
'92		57%			11%			09%			+ 3%						
'98		33%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	599	Dec:	0%		
												'92	700		3%		
												'98	720		0%		

Trend Study 28-5-98

Study site name: Swayback Knoll .

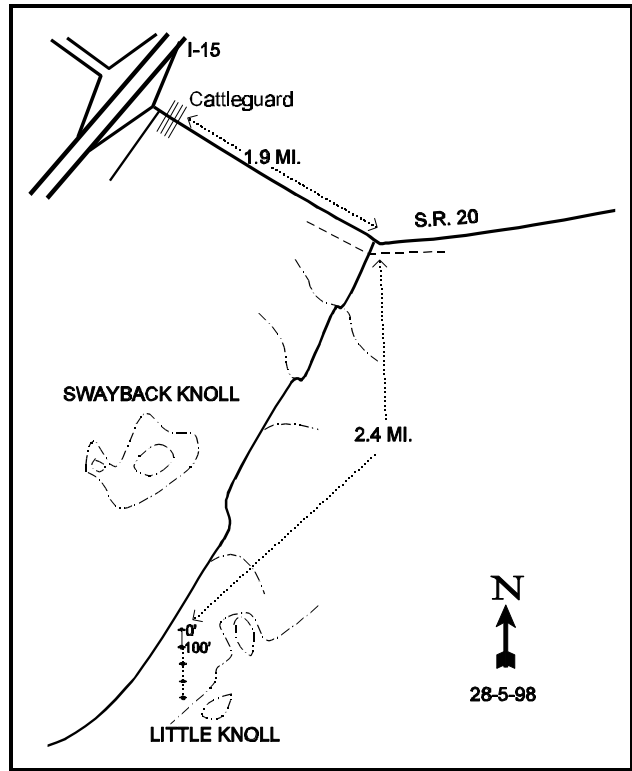
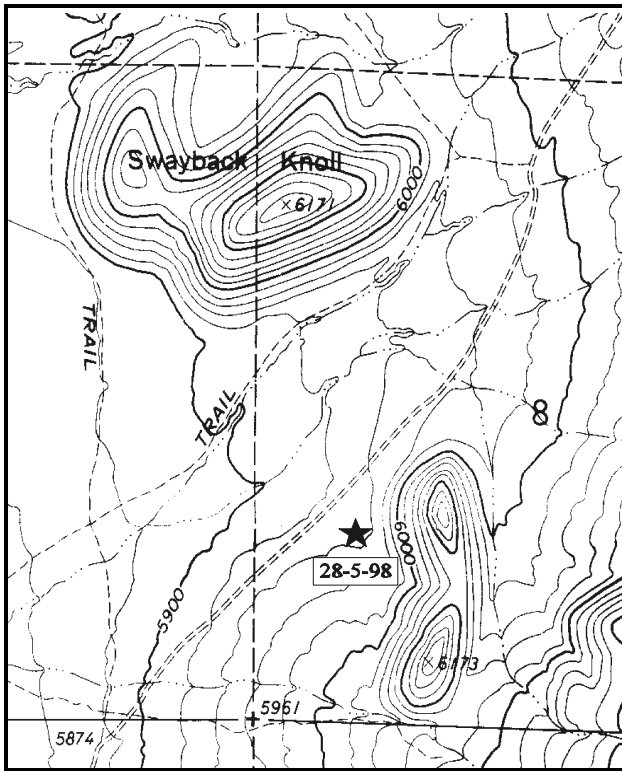
Range type: Big Sagebrush .

Compass bearing: frequency baseline 179 degrees

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

LOCATION DESCRIPTION

From the cattleguard of SR 20 and I-15, travel 1.9 miles on SR 20 to a dirt road on the right. Travel south for 2.4 miles to a sage flat west of rocky knolls. There is a witness post on the right side of the road. The 0-foot baseline stake is 200 feet away from the witness post, on a bearing 130 degrees. The 0-foot stake is marked by browse tag #477.



Map Name: Buckhorn Flat

Diagrammatic Sketch

Township 32S, Range 7W, Section 8

UTM 4210615.888 N, 352661.787 E

DISCUSSION

Trend Study No. 28-5 (47-5)

The Swayback Knoll trend study samples critical deer winter range below the Hurricane Cliff in the northwest corner of the Panguitch Lake management unit. Elevation is 6,100 feet with a gentle (5%) northwest slope. The range for many miles around is dominated by a depleted Wyoming big sagebrush type near some pinyon-juniper covered hills, which would be the nearest protective cover available. Very little other forage is available. The acreage of range available to deer is limited by the deer-proof fence along I-15 and predominance of agricultural land which is also being fenced to prevent deer depredation. The area is administered by the BLM. A pellet group transect read in 1998 determined that there was an estimated 82 deers days use/acre. Some dead deer and a 4-point deer antler drop were found near the site in 1998.

Soil textural analysis indicates a loam soil with a neutral pH (6.7). The average effective rooting depth (see methods) was almost 12 inches with rock and pavement scattered throughout the soil profile. Some soil loss occurs from the bare interspaces, but erosion currently appears minimal. The shrub interspaces have a continuous, unbroken surface of rocks and erosion pavement. Rocks are of igneous origin (basalt), which causes higher soil temperatures (66°F at 13 inches) during the summer months. Two small active gullies are located near the study site. Both phosphorus and potassium may limit vegetative growth with estimates of 9.7 ppm and 67.2 ppm respectively in the soil. Values of 10 ppm and 70 ppm respectively are thought to be minimal for normal plant development.

The only browse species encountered on the site consists of a moderately dense stand of Wyoming big sagebrush and a small amount of prickly-pear cactus. Wyoming big sagebrush density was estimated at 4,866 plants/acre in 1987 and 5,900 plants/acre in 1992. In 1998, density was estimated to be 4,240 plants/acre. Age structure continues to indicate a stable population with an adequate number of seedlings and young establishing to replace decadent and dying plants. Utilization of sagebrush was heavy in 1987, moderate to heavy in 1992, and currently it is mostly moderate. Vigor is generally good and percent decadency has dropped from 29% in 1987 and 1992 to 22% in 1998. Cover is currently estimated to be just over 12%.

Desirable herbaceous vegetation is very limited and diversity is low, even for a Wyoming big sagebrush type. Only three perennial grasses were encountered in 1987, the most common being bottlebrush squirreltail. No perennial forbs were found. During the 1992 reading, five perennial grasses were sampled, with bottlebrush squirreltail, galleta, and purple three-awn being the most numerous. Two annual grasses, cheatgrass and six weeks fescue, contributed 15% of the herbaceous understory cover in 1992. In 1998, cheatgrass now dominates the site by providing 81% of the herbaceous understory cover and 53% of the total vegetative cover. Due to the fine fuels provided by dried cheatgrass, the site is now primed for a major wildfire and the total loss of the browse if a fire event occurs.

1987 APPARENT TREND ASSESSMENT

An almost complete ground covering of rock and erosion pavement is interrupted only by litter under the shrubs and occasional bare patches. This amounts to an estimated 50% ground cover from rock and pavement and 18% exposed soil. Basal vegetative cover is low due to the lack of herbaceous vegetation. Sagebrush is heavily hedged, but has good vigor and an adequate number of seedlings and young. Herbaceous vegetation is deficient. Only three perennial grasses and no perennial forbs were encountered. High surface temperatures and dry conditions are likely responsible for the lack of herbaceous plants. This trend will likely reverse itself with increased precipitation.

1992 TREND ASSESSMENT

Soil conditions are similar to those of 1987. Litter and bare ground have increased. The soil is adequately protected by the vegetation canopy and a continuous layer of rock and pavement. Some soil movement was

evident this year, likely due to recent high intensity thunder storms, but erosion on the site is minimal. Trend for sagebrush is stable due to decreased heavy utilization and a stable decadency rate. Vigor, however has declined slightly with 10% of the shrubs sampled displaying poor vigor compared to 4% in 1987. The herbaceous understory has improved considerably since the last reading but composition is poor, especially for forbs.

TREND ASSESSMENT

soil - down, with a large increase in bare soil, poor condition

browse - stable

herbaceous understory - up, but poor grass and forb composition with very few perennial forbs

1998 TREND ASSESSMENT

The soil trend is slightly upward. Although percent bare ground cover has decreased by nearly 50%, and percent vegetative cover has more than doubled, the cover is mostly provided by cheatgrass. Although cheatgrass does provide some soil protection, it is not as effective at protecting the soil from overland flow as perennial grasses or forbs. The browse trend is slightly down, with continued losses to the population which appeared to have peaked in 1992. The Wyoming big sagebrush population appears more healthy with a fairly good biotic potential. As cheatgrass density and cover increases in the future, there may be a decrease in the number of seedling and young plants encountered due to early spring drying soils from competition with cheatgrass. Also, as cheatgrass density and cover increases in the future, there is a risk of losing the Wyoming big sagebrush population due to a catastrophic fire. The herbaceous trend is downward. Cheatgrass now dominates the site. While individual perennial species nested frequency has not significantly declined since 1992, overall perennial grass sum of nested frequency has declined. Forbs are currently almost non-existent and provide little cover or forage to this site.

TREND ASSESSMENT

soil - slightly upward

browse - slightly down, dense understory of fine fuels which could eventually be catastrophic to the browse population

herbaceous understory - downward

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Aristida purpurea	a13	b41	ab28	7	19	14	1.31	.94
G	Bouteloua gracilis	-	-	3	-	-	1	-	.15
G	Bromus tectorum (a)	-	a168	b357	-	70	99	.68	19.37
G	Hilaria jamesii	a-	b48	b32	-	20	13	.90	.39
G	Oryzopsis hymenoides	2	5	6	1	3	3	.09	.23
G	Sitanion hystrix	b127	a86	a60	53	35	32	3.43	1.41
G	Stipa comata	a-	b11	b15	-	5	6	.15	.25
G	Vulpia octoflora (a)	-	b135	a59	-	53	27	.51	.16
Total Annual Grasses		0	303	416	0	123	126	1.19	19.53
Total Perennial Grasses		142	191	144	61	82	69	5.90	3.39

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
F	Allium spp.	-	1	-	-	1	-	.00	-
F	Calochortus nuttallii	a-	b8	ab2	-	5	2	.02	.01
F	Descurainia spp. (a)	-	b16	a2	-	9	2	.04	.03
F	Draba spp. (a)	-	-	3	-	-	1	-	.00
F	Eriogonum cernuum (a)	-	b24	a-	-	13	-	.06	-
F	Gilia spp. (a)	-	b160	a-	-	72	-	.38	-
F	Hackelia patens	-	4	-	-	2	-	.01	-
F	Lappula occidentalis (a)	-	-	1	-	-	1	-	.00
F	Microsteris gracilis (a)	-	b12	a-	-	4	-	.02	-
F	Orobancha fasciculata	-	-	1	-	-	1	-	.00
F	Phlox longifolia	-	5	5	-	3	3	.01	.01
F	Plantago patagonica (a)	-	a13	b52	-	8	18	.04	.38
F	Ranunculus testiculatus (a)	-	a12	b45	-	8	16	.04	.35
F	Sphaeralcea coccinea	-	6	3	-	2	1	.01	.06
Total Annual Forbs		0	237	103	0	114	38	0.58	0.76
Total Perennial Forbs		0	24	11	0	13	7	0.08	0.11

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

BROWSE TRENDS --

Herd unit 28 , Study no: 5

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Artemisia tridentata wyomingensis	92	92	11.11	12.46
B	Opuntia spp.	16	14	1.25	.59
Total for Browse		108	106	12.36	13.06

BASIC COVER --

Herd unit 28 , Study no: 5

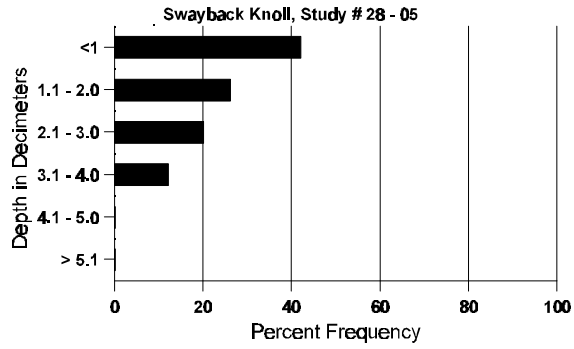
Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	110	365	5.00	15.86	34.86
Rock	180	199	9.50	17.97	8.12
Pavement	252	255	39.75	9.97	21.18
Litter	238	380	27.75	22.08	34.52
Cryptogams	8	43	.25	.22	.51
Bare Ground	228	253	17.75	31.76	16.11

SOIL ANALYSIS DATA --

Herd Unit 28, Study # 05, Study Name: Swayback Knoll

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.9	66.0 (12.7)	6.7	49.8	30.4	19.8	1.1	9.7	67.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 28 , Study no: 5

Type	Quadrat Frequency	
	'92	'98
Rabbit	68	18
Elk	-	1
Deer	59	32

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 5

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total						
		1	2	3	4		1	2							
<i>Artemisia tridentata wyomingensis</i>															
S	87	6	1	-	-	-	-	-	-	7	-	-	466		7
	92	24	-	-	-	-	-	-	-	24	-	-	480		24
	98	27	-	-	-	-	-	-	-	27	-	-	540		27
Y	87	-	5	8	-	-	-	-	-	13	-	-	866		13
	92	17	8	7	13	1	-	1	-	47	-	-	940		47
	98	21	-	3	1	-	-	-	-	25	-	-	500		25
M	87	1	8	30	-	-	-	-	-	36	3	-	2600	21 20	39
	92	29	95	36	1	1	-	-	-	162	-	-	3240	- -	162
	98	67	61	11	1	-	-	-	-	137	2	-	2800	21 27	140
D	87	-	4	17	-	-	-	-	-	17	1	-	1400		21
	92	17	47	20	-	1	1	-	-	59	-	13	1720		86
	98	14	28	3	-	-	-	-	-	38	-	-	940		47
X	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	2	-	-	780		39
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'87		23%		75%		04%		+18%							
'92		52%		22%		10%		-28%							
'98		42%		08%		03%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	4866	Dec:	29%		
										'92	5900		29%		
										'98	4240		22%		
<i>Opuntia spp.</i>															
S	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	5	-	-	-	-	5	-	-	100		5
	98	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	4	-	-	-	-	-	-	-	4	-	-	266		4
	92	1	-	-	-	-	-	-	-	1	-	-	20		1
	98	1	-	-	-	-	-	-	-	1	-	-	20		1
M	87	2	-	-	-	-	-	-	-	1	1	-	133	6 13	2
	92	23	-	-	6	-	-	-	-	29	-	-	580	- -	29
	98	15	1	-	-	-	-	-	-	16	-	-	320	13 34	16
D	87	2	-	-	-	-	-	-	-	1	-	-	133		2
	92	-	-	-	3	-	-	-	-	3	-	-	60		3
	98	1	-	-	-	-	-	-	-	-	-	-	20		1
X	87	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'87		00%		00%		13%		+19%							
'92		00%		00%		00%		-45%							
'98		06%		00%		06%									
Total Plants/Acre (excluding Dead & Seedlings)										'87	532	Dec:	25%		
										'92	660		9%		
										'98	360		6%		

Trend Study 28-6-98

Study site name: Cottonwood .

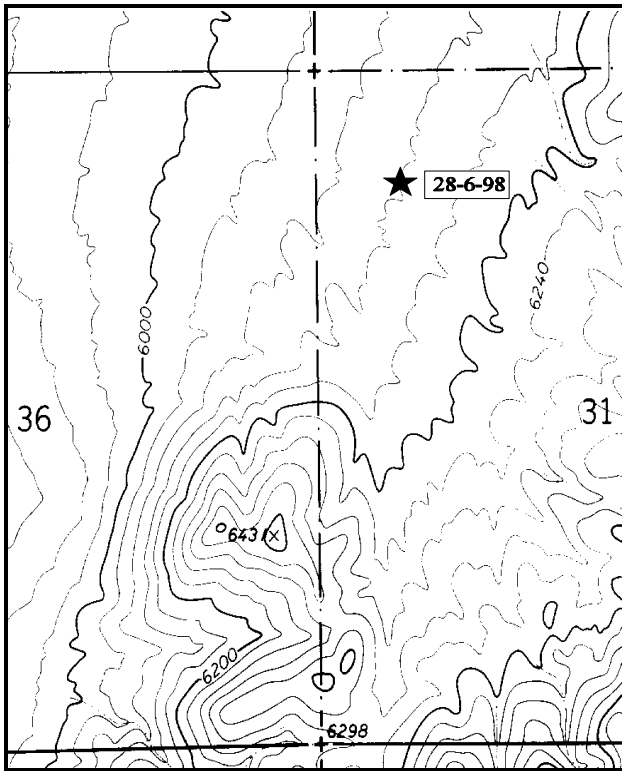
Range type: Chained, Seeded Pinyon-Juniper.

Compass bearing: frequency baseline 180 degrees.

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

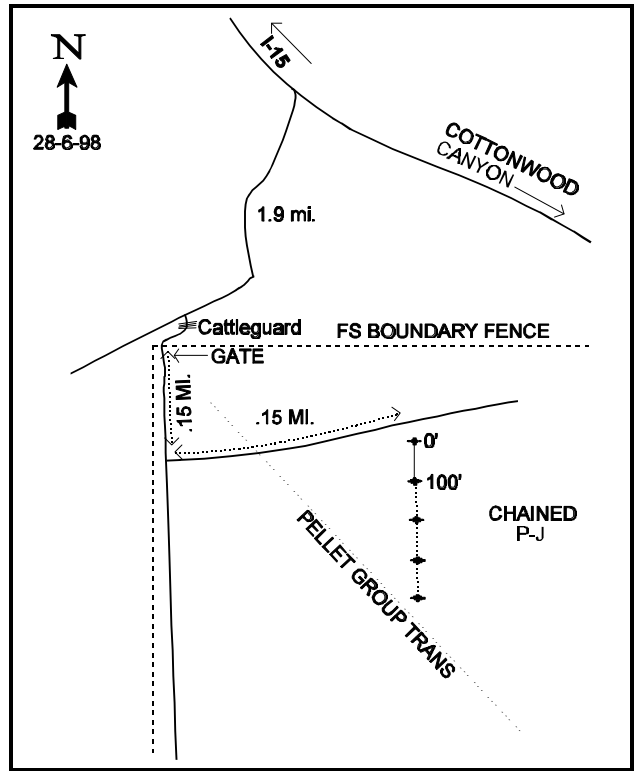
LOCATION DESCRIPTION

From the intersection of SR 20 and the frontage road along the east side of I-15, travel south down the frontage road 6.6 miles to a gate on the left. Go through the gate and travel east for 1.9 miles to a cattleguard on the right. From the cattleguard, go 0.15 miles south along the fence. Turn left on an old road going up into the chaining. Continue 0.15 miles to the study site on the south side of the road. The 0-foot baseline stake is 10 paces south of the road. This 2-foot tall fencepost is marked with a browse tag, #9006.



Map Name: Cottonwood Mountain

Township 32S, Range 7W, Section 31



Diagrammatic Sketch

UTM 4187912.078 N, 344155.448 E

DISCUSSION

Trend Study No. 28-6 (47-6)

The Cottonwood trend study is located on the critical winter range west of the Hurricane Cliffs and samples a sagebrush area at the mouth of Cottonwood Canyon. The site is just above the Forest Service boundary fence at an elevation of 6,100 feet. Slope is 2-3% with a westerly aspect. The area is part of a large chaining project completed in 1970. The site is now dominated by Wyoming big sagebrush, annual grasses, and annual forbs with few pinyon or juniper trees present on the treatment. In 1992, deer sign was abundant including antler drops, pellet groups, and a carcass. A pellet group transect read in 1998 showed 41 deer days use/acre, 7 elk days use/acre, and 2 cow days use/acre.

The soil is light brown in color with an average effective rooting depth (see methods) of almost 15 inches. Soil textural analysis indicates it to be a sandy loam with a slightly alkaline pH (7.5). Several gullies are found crossing the site, but do not appear to be very active. Erosion currently does not appear to be a problem. Most of the bare ground occurs in the shrub interspaces. Chemical analysis of the soils measured phosphorus at 7.8 ppm, where 10 ppm is considered minimal for normal plant development.

Wyoming big sagebrush is the only browse species of worth on the site. Sagebrush densities have slowly declined from an estimated density of 2,466 plants/acre in 1987, to 1,920 in 1992, and finally 1,560 plants/acre in 1998. Utilization was very high in 1987 when 89% of the sagebrush displayed heavy hedging (>60% of twigs browsed). Although heavily browsed, it appeared vigorous and there was a fair amount of seed production. This heavy use coincides with the high deer populations the unit experienced in the late 1980's. By 1992, utilization was mostly moderate with only 14% of the sagebrush inventoried displaying heavy hedging. Currently, utilization is still moderate with 6% of the plants inventoried displaying heavy utilization. Vigor declined between 1987 and 1992, but is currently similar to that of 1992 at 13%. Percent decadency has slowly increased since 1987 from 8% to 16% in 1992, and to 29% in 1998. Biotic potential is currently fairly good with 140 seedling plants/acre estimated. The only other browse encountered on the site included a few prickly phlox and prickly-pear cactus. Mature stands of pinyon-juniper to the north provide thermal cover. On the site itself, there are only scattered mature trees and a few young ones.

Perennial herbaceous vegetation is limited, but sum of nested frequency is slowly increasing. In 1987, crested wheatgrass was the most frequently encountered perennial grass, with bottlebrush squirreltail also fairly prevalent. By 1992, crested wheatgrass declined in nested frequency while purple three-awn and bottlebrush squirreltail increased significantly. Perennial grass sum of nested frequency has increased from 74 in 1987, to 133 in 1992, and finally 175 in 1998. The dominant grass on the site is cheatgrass. Although annual species were not sampled in 1987, photographs from that year show that cheatgrass was moderately abundant. Since 1992, cheatgrass has significantly increased in nested frequency. Cheatgrass currently provides 66% of the herbaceous understory cover and 52% of the total vegetative cover. This is an increase from the 1992 estimates of providing 45% of the herbaceous understory cover and 29% of the total cover. In the past, forbs consisted primarily of annual species. The only common perennial forb is scarlet globemallow.

1987 APPARENT TREND ASSESSMENT

A concentration of rocks and pavement occurs on the soil surface constituting 23% of the ground cover for the area. Vegetative cover is low and litter cover quite high (64%), most of which is provided by the annual cheatgrass. Although of rather poor quality, ground cover of some kind occurs on all but 9% of the surface. Browse trend is slightly down due to the degree of heavy hedging and lack of seedlings for sagebrush. The herbaceous understory is dominated by ephemeral plants. Perennial forbs are lacking.

1992 TREND ASSESSMENT

Soil conditions appear similar to those of 1987. Using the new cover estimation procedure, rock and pavement cover increased to 31%, litter declined to 26%, while percent bare ground cover increased to 21%. Some of these changes are the result of the new, much larger sampling design. Little erosion occurs on this site due to the nearly continuous cover of rock and pavement. In addition, dead cheatgrass plants provide abundant cover. Trend for soil is stable to slightly down. Wyoming big sagebrush, the only abundant browse species on the site, declined in density since 1987, but this is more reflective of the larger sampling design than any real change in its density. Percent decadency doubled but is still relatively low at only 16%. The proportion of plants heavily hedged declined from 89% to 14%. Plants were very vigorous this year, producing abundant seed. Overall trend for browse is stable. Nested frequencies for perennial grasses increased while those for forbs declined. Nested frequencies for perennial grasses and forbs combined, remained basically unchanged. Annual grasses and forbs dominate the herbaceous understory. Cheatgrass accounts for 45% of the herbaceous understory cover. Trend for herbaceous understory is stable.

TREND ASSESSMENT

soil - stable to slightly down

browse - stable

herbaceous understory - stable, but dominated by annuals

1998 TREND ASSESSMENT

The soil trend is slightly upward. Even though percent vegetative cover increased, most of the increase is due to the cheatgrass. Although cheatgrass does provide some soil protection, it is not as effective at protecting the soil from overland flow as perennial grasses or forbs. Percent bare ground cover increased slightly while percent rock and pavement cover combined decreased. Erosion is currently minimal, although there are several gullies crossing the site. The browse trend is stable. Although percent decadency for Wyoming big sagebrush has increased since 1987 and 1992, there are currently enough seedling plants in 1998 to make up for the losses. It is a little surprising that any seedling plants were encountered in 1998 at all considering the abundance of cheatgrass. If cheatgrass abundance continues to increase, it will be difficult for seedlings to establish and the possibility of losing the browse population due to a fire event increases. The herbaceous understory is slightly downward. Perennial grasses, although sparse, are still present throughout the site with a slight increase in sum of nested frequency since 1992. The problem lies with cheatgrass. Nested frequency has significantly increased since 1992. The wet spring of 1998 produced high cheatgrass cover values and ample seed for future years.

TREND ASSESSMENT

soil - slightly upward

browse - slightly down with continuing losses to sagebrush, dense understory of fine fuels could eventually be catastrophic resulting in loss of the sagebrush population

herbaceous understory - slightly downward, poor diversity and very abundant cheatgrass

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	<i>Agropyron cristatum</i>	35	22	25	18	11	11	.88	.97
G	<i>Aristida purpurea</i>	_a 8	_b 53	75	3	20	31	3.02	4.52
G	<i>Bouteloua gracilis</i>	3	-	-	1	-	-	-	-
G	<i>Bromus tectorum</i> (a)	-	_a 302	_b 367	-	98	100	8.19	17.91
G	<i>Oryzopsis hymenoides</i>	8	6	8	3	3	4	.07	.10
G	<i>Poa secunda</i>	-	-	1	-	-	1	-	.03
G	<i>Sitanion hystrix</i>	_a 11	_b 46	_b 44	8	20	18	.93	.86
G	<i>Sporobolus cryptandrus</i>	3	-	3	1	-	1	-	.00
G	<i>Stipa comata</i>	_{ab} 6	_a 6	_b 19	4	3	7	.21	.43
Total Annual Grasses		0	302	367	0	98	100	8.19	17.91
Total Perennial Grasses		74	133	175	38	57	73	5.13	6.93
F	<i>Ambrosia</i> spp.	-	5	-	-	3	-	.01	-
F	<i>Astragalus panguicensis</i>	2	-	-	1	-	-	-	-
F	<i>Chaenactis douglasii</i>	-	-	1	-	-	1	-	.00
F	<i>Chenopodium</i> spp. (a)	-	3	-	-	1	-	.00	-
F	<i>Descurainia</i> spp. (a)	-	_b 42	_a -	-	25	-	1.47	-
F	<i>Eriogonum cernuum</i> (a)	-	6	-	-	3	-	.04	-
F	<i>Erigeron</i> spp.	-	-	2	-	-	2	-	.01
F	<i>Euphorbia fendleri</i>	90	-	-	36	-	-	-	-
F	<i>Gilia</i> spp. (a)	-	_b 112	_a -	-	47	-	.66	-
F	<i>Ipomopsis aggregata</i>	-	3	-	-	1	-	.00	-
F	<i>Leptodactylon pungens</i>	-	2	-	-	1	-	.15	-
F	<i>Polygonum</i> spp.	-	3	-	-	2	-	.01	-
F	<i>Senecio multilobatus</i>	-	2	-	-	1	-	.00	-
F	<i>Sphaeralcea coccinea</i>	_a 71	_b 103	_b 125	26	39	47	2.59	2.29
Total Annual Forbs		0	163	0	0	76	0	2.17	0
Total Perennial Forbs		163	118	128	63	47	50	2.80	2.31

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

BROWSE TRENDS --
Herd unit 28 , Study no: 6

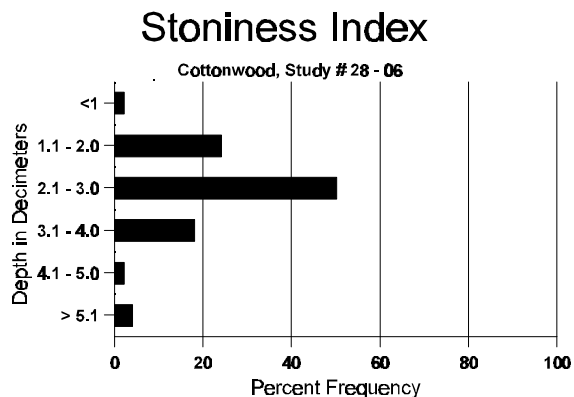
Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Artemisia tridentata wyomingensis	50	46	9.88	7.56
B	Juniperus osteosperma	0	0	-	-
B	Leptodactylon pungens	3	1	-	.03
B	Opuntia spp.	2	1	.00	-
Total for Browse		55	48	9.88	7.59

BASIC COVER --
Herd unit 28 , Study no: 6

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	45	373	3.25	24.97	34.35
Rock	93	167	12.75	5.65	4.45
Pavement	233	296	10.50	24.90	16.75
Litter	217	387	64.25	25.82	38.24
Cryptogams	-	16	0	.01	.24
Bare Ground	151	288	9.25	21.09	23.68

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 06, Study Name: Cottonwood

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.8	60.0 (15.6)	7.5	61.4	20.4	18.2	1.3	7.8	147.2	.5



PELLET GROUP FREQUENCY --

Herd unit 28 , Study no: 6

Type	Quadrat Frequency	
	'92	'98
Rabbit	61	38
Elk	-	1
Deer	57	47
Cattle	2	-

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 6

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht. Cr.		
<i>Artemisia tridentata wyomingensis</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	6	-	-	-	-	-	1	-	-	7	-	-	-	140		7	
Y	87	-	1	6	-	-	-	-	-	-	7	-	-	-	466		7	
	92	1	3	-	1	-	-	-	-	-	5	-	-	-	120		6	
	98	2	2	-	1	-	-	-	-	-	5	-	-	-	100		5	
M	87	-	3	24	-	-	-	-	-	-	27	-	-	-	1800	23 29	27	
	92	19	41	13	1	1	-	-	-	-	72	-	3	-	1500	- -	75	
	98	16	33	-	1	-	-	-	-	-	47	-	3	-	1000	26 37	50	
D	87	-	-	3	-	-	-	-	-	-	2	-	-	1	200		3	
	92	3	10	-	2	-	-	-	-	-	5	-	4	6	300		15	
	98	3	15	5	-	-	-	-	-	-	15	1	2	5	460		23	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	340		17	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		11%			89%			03%			-22%							
'92		57%			14%			14%			-19%							
'98		64%			06%			13%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	2466	Dec:	8%			
												'92	1920		16%			
												'98	1560		29%			
<i>Juniperus osteosperma</i>																		
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	0		-			
												'98	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Leptodactylon pungens																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	10	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%			-67%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	60		-			
												'98	20		-			
Opuntia spp.																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	9	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%			-50%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	40		-			
												'98	20		-			

Trend Study 28-7-98

Study site name: Paragonah .

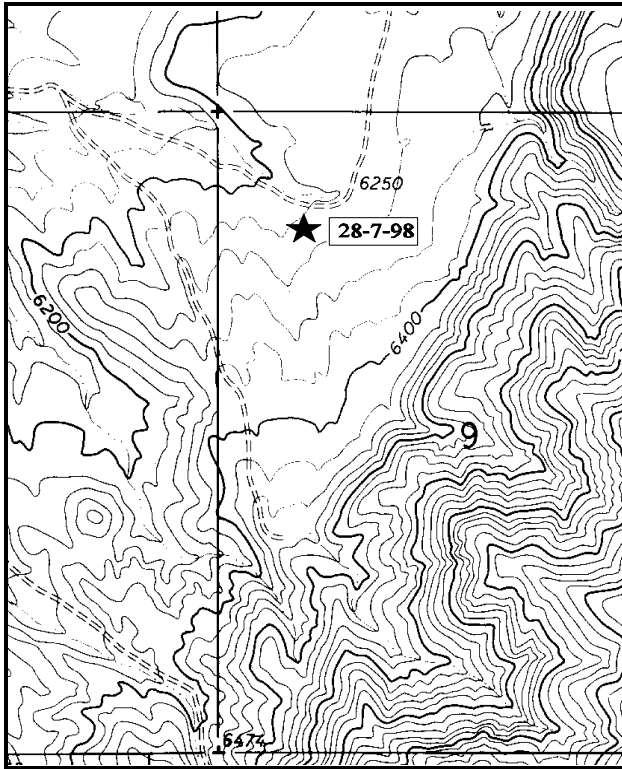
Range type: Chained, Seeded P-J .

Compass bearing: frequency baseline 147 degrees.

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

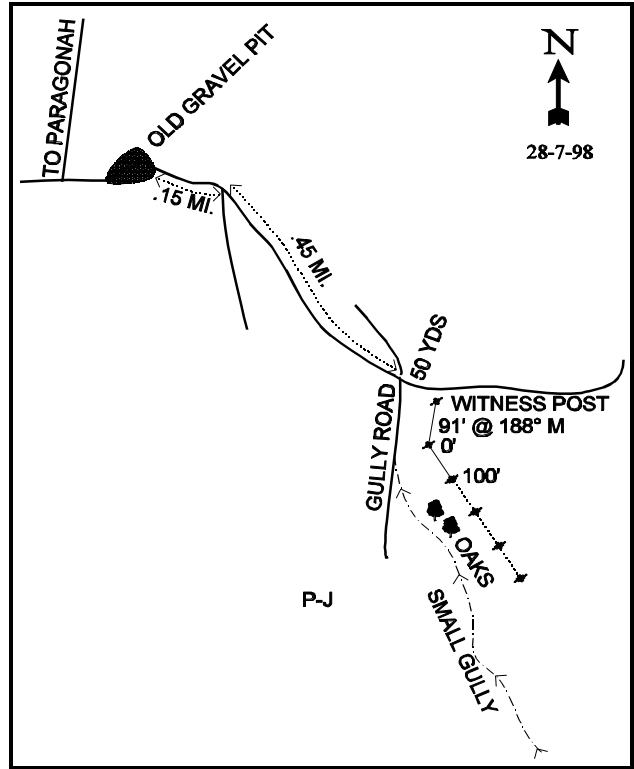
LOCATION DESCRIPTION

From Center Street in Paragonah, follow Main Street south for 0.45 miles to an intersection. Turn left and go 0.30 miles to a gate and fork. Turn left and proceed 0.65 miles. Turn left and go to the top of an old gravel pit. From the top east edge of the gravel pit, go 0.15 miles to a fork. Take the left fork, and go 0.45 miles to a large gully where there used to be a road. Continue on the road across the gully for approximately 50 yards to a witness post (4' fencepost) on the right side of the road. The baseline starts 92 feet at 188°M from the witness post. The study is marked by short fenceposts. * *NOTE-Witness post was missing in 1992.



Map Name: Parowan

Township 34S, Range 8W, Section 9



Diagrammatic Sketch

UTM 4192157.719 N, 344155.448 E

DISCUSSION

Trend Study No. 28-7 (47-7)

The Paragonah trend study is located in an old chained and seeded pinyon-juniper area on critical winter range for deer. Elevation is 6,200 feet with northwest aspect. The site slopes away from the cliffs and towards the fields at the base of the bench. Aspect is northwest with a gradual (5-10%) slope. There continues to be considerable regrowth of the pinyon and juniper on this site. A pellet group transect read in 1998 shows 23 deer days use/acre on the site.

Soil textural analysis indicates a sandy loam with a slightly acidic pH (6.3). Rock and pavement are scattered throughout the site on the soil surface and throughout the soil profile. The average effective rooting depth (see methods) is almost 11 inches with a rocky horizon encountered at a depth of 6 to 8 inches. Chemical analysis measured phosphorus at 6.0 and potassium at 3.2 ppm, both of which could limit plant development. Bare areas continue to be subjected to sheet erosion and runoff has formed various size gullies throughout the site. During the 1992 and 1998 surveys, some soil movement was noticeable and several old gullies were noted. Vegetation and litter cover left from the chaining process helps to stabilize the soil.

Nine species of shrubs occur on the site, but only black sagebrush, broom snakeweed, and Gambel oak are abundant. Black sagebrush had a density of 3,665 plants/acre in 1987, increasing to 4,300 in 1992 and then dropping to 2,540 plants/acre in 1998. Utilization was heavy in 1987 when 76% of the shrubs displayed heavy use. In 1992, only 22% of the sagebrush was heavily hedged, and in 1998 the population exhibited light utilization. Vigor has been good over all years. Age class analysis would indicate a slightly decreasing population. The biotic potential has declined since 1992, and will not replace plants that are being lost. Percent decadency was 7% in 1987, increasing to 29% in 1992, and then declined to 20% in 1998. Small numbers of mountain big sagebrush also occur on the site. In 1998, mountain big sagebrush density was estimated to be 240 plants/acre.

Broom snakeweed was the most abundant shrub in the past with an estimated density of 7,932 plants/acre in 1987, yet down to 4,320 in 1992. Currently, the density is estimated to be 1,320 plants/acre. Even with this decline, a large portion of the population (30%) is made up of young plants. Gambel oak was found in increasing numbers in 1992, but has since dropped to 1,020 plants/acre in 1998. Canopy cover for oak in 1998 is estimated to be 6%. The increased sample size, which was used beginning in 1992, picked up additional shrub species which now includes: brickellbush, rubber rabbitbrush, and slenderbush eriogonum.

Pinyon and juniper, although not numerous, figure prominently in the vegetative structure of this site. Density plots estimated 199 trees per acre in 1987. During the 1992 reading, point quarter data estimated 241 pinyon trees/acre and 35 juniper for a total of 276 trees/acre. Most of the trees were in the 4 to 8 foot category. Currently, point-centered quarter data indicates 49 Utah juniper trees/acre and 71 pinyon pine trees/acre for a total of 120 trees/acre. Canopy cover in 1998 is estimated to be 4% for Utah juniper and 19% for pinyon pine. Together, 23% canopy cover by the pinyon and juniper trees would depress the understory production by at least 50%.

The herbaceous understory is dominated by a patchy stand of crested wheatgrass and intermediate wheatgrass. Nested frequency for both grasses declined significantly in 1992. Intermediate wheatgrass nested frequency has significantly increased since 1992 and is now similar to that recorded in 1987. Cheatgrass nested frequency has also significantly increased since 1992 and currently accounts for 27% of the herbaceous understory cover. Perennial grass sum of nested frequency has increased from 189 in 1992 to 263 in 1998, but this is still lower than the initial reading of 294 in 1987. Perennial forbs are diverse but are rarely encountered. The only common forb encountered during any year was the prostrate fendler spurge. Perennial forb sum of nested frequency has decreased since 1992.

1987 APPARENT TREND ASSESSMENT

The percentage of erosion pavement covering the ground surface is very high (27%). Rocks are also common. Where shrubs and grasses occur, litter has accumulated providing excellent soil protection. However, plants are scattered; and consequently, the percent cover provided by vegetation and litter is only 44%. Bare soil is exposed on 15% of the ground surface and there is plenty of evidence of soil loss. Most erosion took place gradually over time and likely prior to the chaining treatment. The preferred browse species, black sagebrush, and mountain big sagebrush, have been heavily hedged but display good vigor with an adequate amount of seedlings and young. The abundance of broom snakeweed is a negative factor that should be closely monitored.

1992 TREND ASSESSMENT

Looking at the data and photos, it appears that herbaceous ground cover has declined slightly while bare ground has increased. Most open areas are still covered by a nearly continuous layer of rock and pavement. Even though some soil movement is detectable, erosion is not presently a problem on this site, but the potential is still present especially if there is further loss of the herbaceous understory. Trend for soil is down slightly. The key browse on the site consist of black sagebrush, mountain big sagebrush, and oak. Trend for all these species is stable with increased densities, good vigor, and less heavy hedging, but increased decadence for black sagebrush which makes up the majority of the preferred browse. Broom snakeweed also declined significantly. The only negative factor is the increase in pinyon and juniper trees which are regaining dominance of the site. With that in mind, the overall browse trend is slightly up. The herbaceous component consists primarily of two seeded grasses which declined in nested and quadrat frequencies since the last reading. The increase in the summed nested frequencies of forbs is likely the result of the increased sample size which picked up an additional six perennial forbs. Grass and forb summed nested frequencies combined declined since 1987 indicating a downward trend.

TREND ASSESSMENT

soil - slightly down

browse - stable, dominant browse has increased density, but also four times higher rate of decadency

herbaceous understory - down

1998 TREND ASSESSMENT

The soil trend is upward with an increase in percent vegetation and litter cover and a decrease in percent bare ground. Erosion potential has decreased with an increase in protective ground cover. Some slight soil erosion is apparent, but not excessive. The browse trend is down. Utilization is currently light with the percentage of plants in poor vigor remaining low over all years. However, the population of black sagebrush has decreased by 40% and the number of seedling and young plants are not adequate to replace the lost plants in the population. The herbaceous understory trend is stable with a slight increase in perennial herbaceous understory sum of nested frequency. Cheatgrass sum of nested frequency increased significantly since 1992 and currently accounts for 27% of the total herbaceous understory cover. Crested wheatgrass and intermediate wheatgrass are the dominate perennial species contributing 55% of the herbaceous understory cover combined.

TREND ASSESSMENT

soil - upward

browse - down

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	_b 211	_a 146	_{ab} 154	79	59	55	3.39	4.71
G	Agropyron intermedium	_b 58	_a 27	_b 59	23	12	29	.49	2.13
G	Agropyron smithii	-	-	3	-	-	1	-	.00
G	Agropyron trachycaulum	-	-	8	-	-	3	-	.02
G	Bromus tectorum (a)	-	45	219	-	22	71	.33	3.40
G	Oryzopsis hymenoides	10	8	5	6	4	3	.07	.18
G	Poa secunda	_a 2	_a 3	_b 24	1	1	9	.00	.19
G	Sitanion hystrix	_b 13	_a -	_{ab} 7	7	-	5	.00	.19
G	Stipa comata	-	-	3	-	-	1	-	.00
Total Annual Grasses		0	45	219	0	22	71	0.33	3.4
Total Perennial Grasses		294	229	482	116	98	177	4.30	10.87
F	Alyssum alyssoides (a)	-	_a -	_b 7	-	-	4	-	.02
F	Arabis spp.	-	3	-	-	1	-	.00	-
F	Artemisia dracunculus	-	-	4	-	-	2	-	.03
F	Astragalus lentiginosus	-	2	-	-	2	-	.01	-
F	Astragalus newberryi	1	4	3	1	2	2	.01	.01
F	Eriogonum cernuum (a)	-	2	-	-	1	-	.00	-
F	Erigeron pumilus	10	10	4	7	4	2	.04	.01
F	Eriogonum racemosum	-	1	-	-	1	-	.00	-
F	Eriogonum umbellatum	5	1	3	2	1	2	.03	.01
F	Euphorbia fendleri	_b 80	_{ab} 75	_a 55	39	32	24	1.12	.88
F	Lactuca serriola	-	1	6	-	1	4	.00	.02
F	Leucelene ericoides	-	12	8	-	5	3	.22	.30
F	Lepidium spp. (a)	-	3	-	-	1	-	.00	-
F	Lithospermum ruderales	-	13	-	-	8	-	.06	-
F	Lithophragma	-	-	2	-	-	1	-	.15
F	Machaeranthera canescens	3	3	-	1	1	-	.03	-
F	Penstemon eatoni	-	-	-	-	-	-	-	.00
F	Petradoria pumila	1	-	-	1	-	-	-	-
F	Phlox longifolia	-	-	7	-	-	3	-	.01
F	Ranunculus testiculatus (a)	-	18	7	-	8	5	.09	.02
F	Senecio douglasii	2	-	-	2	-	-	-	-
F	Sphaeralcea coccinea	_a -	_b 10	_{ab} 2	-	5	1	.19	.03
F	Streptanthus cordatus	3	9	10	2	4	4	.31	.09
F	Tragopogon dubius	1	-	-	1	-	-	-	-
F	Unknown forb-perennial	24	-	-	11	-	-	-	-
Total Annual Forbs		0	23	14	0	10	9	0.09	0.04
Total Perennial Forbs		130	144	104	67	67	48	2.06	1.57

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

BROWSE TRENDS --
Herd unit 28 , Study no: 7

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Artemisia nova	59	50	4.31	5.88
B	Artemisia tridentata vaseyana	7	8	.03	.15
B	Brickellia spp.	1	0	-	-
B	Chrysothamnus nauseosus	1	2	.00	-
B	Eriogonum microthecum	12	4	1.05	.07
B	Gutierrezia sarothrae	49	30	1.46	.79
B	Juniperus osteosperma	4	2	1.92	1.25
B	Leptodactylon pungens	11	7	.27	.39
B	Opuntia spp.	2	2	.03	.04
B	Pinus edulis	13	14	8.71	9.66
B	Pinus edulis chained	0	0	-	-
B	Quercus gambelii	8	7	4.50	4.65
Total for Browse		167	126	22.31	22.91

CANOPY COVER --
Herd unit 28 , Study no: 7

Species	Percent Cover '98
Juniperus osteosperma	4
Pinus edulis	19
Quercus gambelii	6

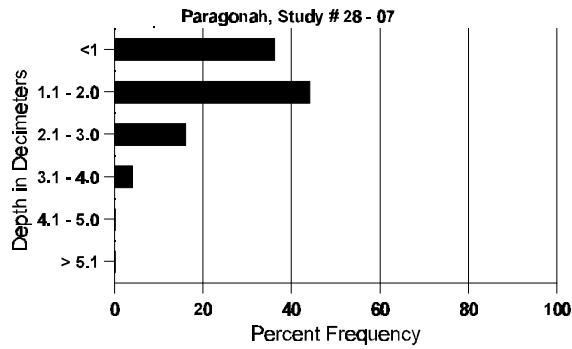
BASIC COVER --
Herd unit 28 , Study no: 7

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	52	328	2.75	25.71	35.17
Rock	142	204	12.25	29.99	9.75
Pavement	190	275	27.00	0	18.49
Litter	228	391	43.50	34.60	47.87
Cryptogams	54	119	0	2.03	2.18
Bare Ground	148	230	14.50	24.43	17.53

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 07, Study Name: Paragonah

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.9	62.4 (15.1)	6.3	65.4	20.4	14.2	2.2	6.0	3.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 28 , Study no: 7

Type	Quadrat Frequency	
	'92	'98
Sheep	2	-
Rabbit	84	56
Elk	-	1
Deer	26	28

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 7

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia nova																		
S	87	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	92	19	-	-	3	-	-	-	-	-	22	-	-	-	440			22
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	87	4	2	1	-	-	-	-	-	-	7	-	-	-	466			7
	92	15	21	6	-	-	-	-	-	-	42	-	-	-	840			42
	98	19	5	-	-	-	-	-	-	-	24	-	-	-	480			24
M	87	-	4	40	-	-	-	-	-	-	44	-	-	-	2933	10	18	44
	92	21	58	30	-	1	-	-	-	-	110	-	-	-	2200	-	-	110
	98	67	6	-	5	-	-	-	-	-	78	-	-	-	1560	11	21	78
D	87	3	-	1	-	-	-	-	-	-	3	-	-	1	266			4
	92	15	34	12	1	1	-	-	-	-	60	-	3	-	1260			63
	98	20	5	-	-	-	-	-	-	-	21	-	-	4	500			25
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		11%			76%			02%			+15%							
'92		53%			22%			01%			-41%							
'98		13%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	3665	Dec:	7%				
											'92	4300		29%				
											'98	2540		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	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	-	-	2	-	-	-	-	-	-	2	-	-	-	133		2	
	92	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	1	3	1	-	-	-	-	-	-	5	-	-	-	100	-	5	
	98	5	1	-	-	-	-	-	-	-	6	-	-	-	120	14	26	
D	87	-	-	1	-	-	-	-	-	-	-	1	-	-	66		1	
	92	2	-	1	-	-	-	-	-	-	3	-	-	-	60		3	
	98	1	2	-	-	-	-	-	-	-	3	-	-	-	60		3	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%			+29%							
'92		21%			14%			00%			-14%							
'98		25%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	199	Dec:	33%				
											'92	280		21%				
											'98	240		25%				
<i>Brickellia spp.</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'92	20		-				
											'98	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																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	8	12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%			+50%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	20		-			
												'98	40		-			
Eriogonum microthecum																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	5	1	-	-	-	-	-	-	-	6	-	-	-	120		6	
	98	2	-	2	-	-	-	-	-	-	2	-	-	2	80		4	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	18	-	2	-	-	-	-	-	-	20	-	-	-	400	-	-	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	11	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		04%			08%			00%			-73%							
'98		00%			29%			29%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	520		0%			
												'98	140		14%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4			
<i>Gutierrezia sarothrae</i>								
S	87	7	-	-	-	-	-	7
	92	6	-	-	-	-	-	6
	98	1	-	-	-	-	-	1
Y	87	6	-	-	-	-	-	6
	92	80	-	2	-	-	-	82
	98	20	-	-	-	-	-	20
M	87	109	-	-	-	-	-	109
	92	131	-	2	-	-	-	133
	98	45	-	-	-	-	1	45
D	87	4	-	-	-	-	-	4
	92	1	-	-	-	-	-	1
	98	1	-	-	-	-	-	1
X	87	-	-	-	-	-	-	0
	92	-	-	-	-	-	-	0
	98	-	-	-	-	-	-	40
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'87		00%	00%	03%	-46%			
'92		00%	00%	00%	-69%			
'98		00%	00%	02%				
Total Plants/Acre (excluding Dead & Seedlings)					'87	7932	Dec:	3%
					'92	4320		0%
					'98	1320		2%
<i>Juniperus osteosperma</i>								
S	87	1	-	-	-	-	-	1
	92	-	-	-	-	-	1	1
	98	-	-	-	-	-	-	0
M	87	-	-	-	-	-	-	0
	92	-	-	3	-	-	1	4
	98	2	-	-	-	-	-	40
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'87		00%	00%	00%				
'92		00%	00%	00%	-50%			
'98		00%	00%	00%				
Total Plants/Acre (excluding Dead & Seedlings)					'87	0	Dec:	-
					'92	80		-
					'98	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				
Leptodactylon pungens																		
Y	87	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	92	4	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	98	2	-	-	-	-	-	-	-	-	-	-	-	-	40			2
M	87	13	-	-	-	-	-	-	-	-	-	1	-	12	866	3	5	13
	92	18	1	-	7	-	-	-	-	-	-	26	-	-	520	-	-	26
	98	15	-	-	-	-	-	-	-	-	-	15	-	-	300	7	12	15
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			93%			-36%							
'92		03%			00%			00%			-40%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	932	Dec:	0%			
												'92	600		0%			
												'98	360		6%			
Opuntia spp.																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
M	87	1	-	-	-	-	-	-	-	-	-	-	-	1	66	2	8	1
	92	3	-	-	-	-	-	-	-	-	-	3	-	-	60	-	-	3
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20	5	9	1
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	98	1	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			100%			+34%							
'92		00%			00%			20%			-40%							
'98		00%			00%			67%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%			
												'92	100		20%			
												'98	60		33%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	11	-	-	-	-	-	1	-	-	12	-	-	-	240		12	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133	98	57	2
	92	8	-	-	-	-	-	-	-	-	8	-	-	-	160	-	-	8
	98	10	-	-	1	-	-	-	-	-	11	-	-	-	220	-	-	11
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+67%							
'92		00%			00%			00%			-25%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	-			
												'92	400		-			
												'98	300		-			
Pinus edulis chained																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	59	26	1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'92	0		-			
												'98	0		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Quercus gambelii																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	19	-	-	1	-	-	-	-	-	20	-	-	-	400		20
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	92	36	6	18	33	-	-	-	-	-	93	-	-	-	1860		93
	98	27	-	-	-	-	-	5	-	-	32	-	-	-	640		32
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	1	-	-	-	9	16	-	18	-	8	-	520	-	26
	98	-	-	-	1	-	-	-	18	-	19	-	-	-	380	87	19
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	2	6	4	-	-	-	-	-	-	9	3	-	-	240		12
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+92%						
'92		09%			18%			06%			-61%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	200	Dec:	0%		
												'92	2620		9%		
												'98	1020		0%		

Trend Study 28-8-98

Study site name: Grass Valley .

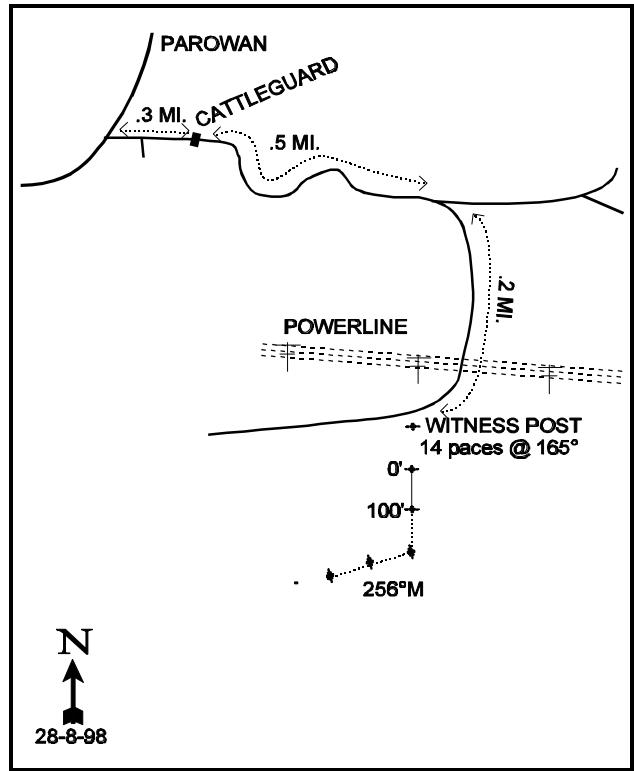
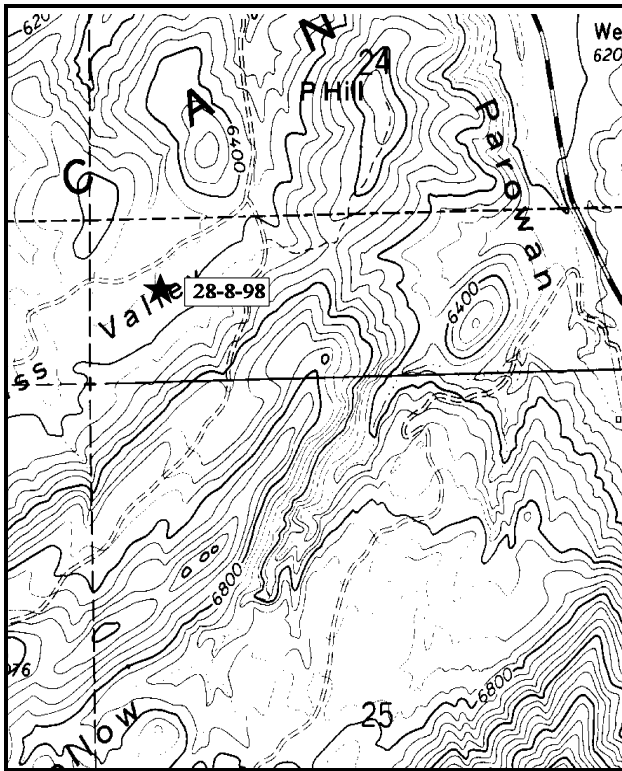
Range type: Big Sagebrush .

Compass bearing: frequency baseline 165 M degrees, lines 3-4, 256 M degrees.

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

LOCATION DESCRIPTION

From I-15 take the north Parowan exit south into town. Continue down Main Street to a big gradual curve on south end of town. Turn east off the highway across from a log house onto a dirt road, go past other houses staying on the main road 0.3 miles to cattleguard. From the cattleguard, continue 0.5 miles to a fork. Bear right. Proceed 0.2 miles, under powerlines to a witness post on left side of the road. The baseline starts 68 feet at a bearing of 165° M, and is marked by 2-foot tall fenceposts with no browse tag. Line-intercept transect 57B-1-78 is located 0.4 miles further down the road.



Map Name: Parowan

Diagrammatic Sketch

Township 34S, Range 9W, Section 24

UTM 4187912.078 N, 339118.518 E

DISCUSSION

Trend Study No. 28-8 (47-8)

The Grass Valley trend study is located in the foothills south of Parowan. Elevation is approximately 6,400 feet with a northeast aspect and gentle 5% slope. The site is surrounded by pinyon-juniper covered hills. Most of the valley was chained and seeded in the mid-1960's by the BLM. The site itself is dominated by Wyoming big sagebrush and seeded grasses and is considered critical deer winter range. A pellet group transect read in conjunction with the vegetative baseline in 1998 showed 61 deer days use/acre, almost 1 elk days use/acre, and 9 cow days use/acre. Approximately three-tenths of a mile west of the site is a three-way exclosure which was built in the late 1970's.

Soil textural analysis indicates a sandy loam with a slightly acidic pH (6.4). The average effective rooting depth (see methods) is almost 16 inches with a layer of rocks encountered between 4 and 8 inches below the soil surface. Chemical analysis measured phosphorus at 9.4 ppm; this low of a value may be limiting to plant development. The soil surface in the shrub interspaces is characterized by bare patches with concentrations of small rocks and pavement that appear to be of volcanic origin. Further erosion does not appear to be a problem on this site for most of the surface soils have been lost many years ago, although some seasonal disturbance is evident.

Wyoming big sagebrush is the dominant browse which had an average cover of nearly 17% in 1992. In 1987, density was estimated to be 5,533 plants/acre with 51% of the sagebrush classified as decadent. Utilization was heavy with 80% of the shrubs displaying heavy hedging. By 1992 with the enlarged sampling design, the sagebrush density was estimated at 4,480 plants/acre. A more critical aspect of the population is that percent decadency increased to 60% with 18% of the decadent shrubs classified as dying. Utilization in 1992 was lighter however, with only 40% of the shrubs being heavily hedged. In 1998, the estimated density declined further down to 3,460 plants/acre. Although percent decadency has improved since 1992, it is still high and data would indicate that plants will continue to die. Currently, 24% of the population is dead.

Pinyon and juniper trees are more prominent as you move south toward the hills. Point-centered quarter data indicates 20 pinyon pine trees/acre and 40 Utah juniper trees/acre in 1998. The only other browse species consisted of a few individuals of threadleaf low rabbitbrush, prickly phlox, and prickly-pear cactus. Bitterbrush and squaw-apple are scattered throughout the site.

Perennial grasses are relatively abundant. Two seeded species, crested wheatgrass and slender wheatgrass, are the most common grasses. Cheatgrass nested frequency has significantly increased since 1992, but cover values have changed very little. Perennial forbs are nearly nonexistent. Total cover contributed by forbs is <1%.

1987 APPARENT TREND ASSESSMENT

Ground cover percentages are typical for this type of site. Litter cover is good and combined with basal vegetation provides almost 60% of the total cover. Pavement and small rocks contribute prominently in the open areas. Exposed soil accounts for 17% of the ground surface and presents an erosion problem only in some of the larger bare areas. Heavy use, high decadency, and low biotic and reproductive potentials are a concern for Wyoming big sagebrush. This population will continue to decline. Grasses are adequately established but forbs are basically absent.

1992 TREND ASSESSMENT

Soil conditions appear stable. Some seasonal erosion is still occurring but it is not serious. Wyoming big sagebrush has declined in density by 19%. It is also showing increased percent decadency. On the positive side, the proportion of plants displaying heavy hedging declined from 80% in 1987 to 40% in 1992. The population appears to be slowly declining with a low biotic and reproductive potential of 12%. Overall browse trend is slightly down. The herbaceous understory consists almost entirely of grasses. Perennial forbs are nearly absent. Combined summed nested frequencies of grasses and forbs (excluding the annuals which were not counted in 1987) have remained basically unchanged since the last reading indicating a stable trend.

TREND ASSESSMENT

soil - stable

browse - slightly down

herbaceous understory - stable, but lacking perennial forbs

1998 TREND ASSESSMENT

The soil trend is slightly up with an increase in vegetation and litter cover. Although percent bare ground cover has slightly increased, the vegetative and litter cover are still adequate to protect the area from extensive runoff. The browse trend is continuing downward, but slower at this time. The population has declined by 23% since 1992. It appears that the population may not be able to sustain itself at current levels. The herbaceous understory trend is slightly upward. Perennial herbaceous species sum of nested frequency has increased slightly since 1992 from 403 to 443. One positive aspect is continued high cover values for crested wheatgrass and slender wheatgrass. These relatively higher cover values will help keep cheatgrass in check. Although cheatgrass nested frequency significantly increased, the cover values stayed nearly the same.

TREND ASSESSMENT

soil - slightly upward

browse - down slightly, the Wyoming big sagebrush population continues to decline, but more slowly at this time

herbaceous understory - slightly upward

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 8

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	_b 144	_a 111	_{ab} 130	62	43	44	6.79	10.10
G	Agropyron intermedium	_a -	_b .25	_b .11	-	10	6	1.83	.25
G	Agropyron trachycaulum	133	143	111	51	47	39	6.19	4.85
G	Aristida purpurea	-	-	-	-	-	-	-	.15
G	Bromus inermis	21	16	18	10	6	7	.25	.21
G	Bromus tectorum (a)	-	_a 124	_b 194	-	45	72	2.26	2.14
G	Oryzopsis hymenoides	6	9	5	2	3	2	.21	.04
G	Poa bulbosa	_a -	_b .7	_c .77	-	5	29	.10	1.10
G	Poa secunda	-	4	12	-	3	4	.02	.07
G	Sitanion hystrix	29	46	56	14	22	26	1.90	2.02

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	<i>Stipa comata</i>	_b 53	_{ab} 30	_a 13	24	13	6	.69	.72
	Total Annual Grasses	0	124	194	0	45	72	2.26	2.14
	Total Perennial Grasses	386	515	627	163	197	235	20.27	21.69
F	<i>Alyssum alyssoides</i> (a)	-	-	1	-	-	1	-	.00
F	<i>Astragalus</i> spp.	-	-	4	-	-	2	-	.06
F	<i>Chaenactis douglasii</i>	1	-	2	1	-	2	-	.01
F	Cruciferae	-	9	4	-	3	2	.04	.01
F	<i>Draba</i> spp. (a)	-	-	1	-	-	1	-	.00
F	<i>Eriogonum cernuum</i> (a)	-	6	-	-	3	-	.39	-
F	<i>Microsteris gracilis</i> (a)	-	_a -	_b 8	-	-	4	-	.02
F	<i>Orobanche fasciculata</i>	-	-	2	-	-	1	-	.00
F	<i>Polygonum douglasii</i> (a)	-	1	4	-	1	2	.00	.01
F	<i>Ranunculus testiculatus</i> (a)	-	_a -	_b 12	-	-	6	-	.03
F	<i>Taraxacum officinale</i>	-	3	1	-	1	1	.00	.00
F	Unknown forb-annual	-	_b 40	_a -	-	17	-	.11	-
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
	Total Annual Forbs	0	7	26	0	4	14	0.39	0.06
	Total Perennial Forbs	2	52	13	2	21	8	0.16	0.09

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

BROWSE TRENDS --

Herd unit 28 , Study no: 8

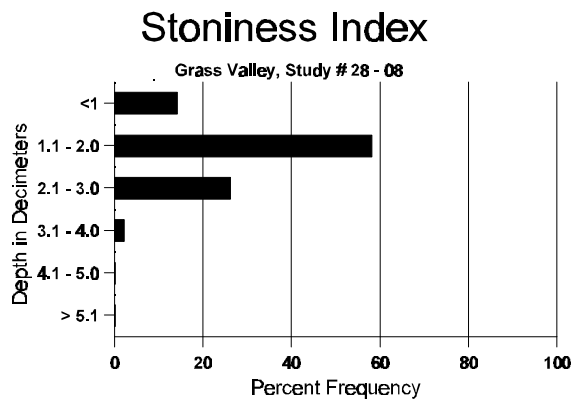
Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	<i>Artemisia tridentata wyomingensis</i>	90	85	16.55	13.69
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	1	0	.00	-
B	<i>Juniperus osteosperma</i>	0	2	.03	.93
B	<i>Leptodactylon pungens</i>	11	7	.25	.27
B	<i>Opuntia</i> spp.	3	0	-	-
B	<i>Peraphyllum ramosissimum</i>	0	1	-	-
	Total for Browse	105	95	16.84	14.90

BASIC COVER --
Herd unit 28 , Study no: 8

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	114	326	4.75	32.46	37.59
Rock	23	130	3.00	1.86	3.20
Pavement	166	285	21.25	23.52	20.40
Litter	257	380	54.25	31.47	48.00
Cryptogams	-	40	0	.16	.47
Bare Ground	154	249	16.75	16.85	21.84

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 08, Study Name: Grass Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.9	58.6 (15.6)	6.4	60.7	20.7	18.6	1.7	9.4	192.0	.4



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 8

Type	Quadrat Frequency	
	'92	'98
Sheep	-	1
Rabbit	-	48
Deer	-	46
Cattle	-	3

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 8

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	10	-	-	1	-	-	1	-	-	8	-	4	-	240		12	
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	87	-	2	1	-	-	-	-	-	-	3	-	-	-	200		3	
	92	6	3	-	6	-	-	-	-	-	14	-	1	-	300		15	
	98	9	5	1	1	-	-	-	-	-	16	-	-	-	320		16	
M	87	-	10	28	-	-	-	-	-	-	38	-	-	-	2533	20 20	38	
	92	11	42	19	2	-	-	-	-	-	74	-	-	-	1480	- -	74	
	98	50	44	4	-	-	-	-	-	-	98	-	-	-	1960	25 35	98	
D	87	-	5	37	-	-	-	-	-	-	33	-	3	6	2800		42	
	92	16	40	69	2	6	2	-	-	-	97	3	11	24	2700		135	
	98	24	32	-	3	-	-	-	-	-	49	-	-	8	1180		59	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1080		54	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		20%			80%			11%			-19%							
'92		41%			40%			16%			-23%							
'98		47%			03%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	5533	Dec:	51%				
											'92	4480		60%				
											'98	3460		34%				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'92	20		-				
											'98	0		-				

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	1	-	-	2	-	-	-	40		2	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	57 39	1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	2	-	-	-	-	-	-	-	-	1	-	-	-	40	- -	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'92	0		-			
												'98	40		-			
Leptodactylon pungens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	92	28	5	4	1	-	-	-	-	-	36	-	2	-	760	- -	38	
	98	15	-	-	1	-	-	-	-	-	16	-	-	-	320	6 9	16	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		11%			09%			04%			-65%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	920		-			
												'98	320		-			
Opuntia spp.																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	- -	3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	60		-			
												'98	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				
Peraphyllum ramosissimum																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	1	-	-	-	-	-	-	1	-	-	-	20	25	22	1
D	'87	-	-	2	-	-	-	-	-	-	2	-	-	-	133			2
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%										
'92		00%			00%			00%										
'98		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	100%			
												'92	0		0%			
												'98	20		0%			

Trend Study 28-9-98

Study site name: Little Valley .

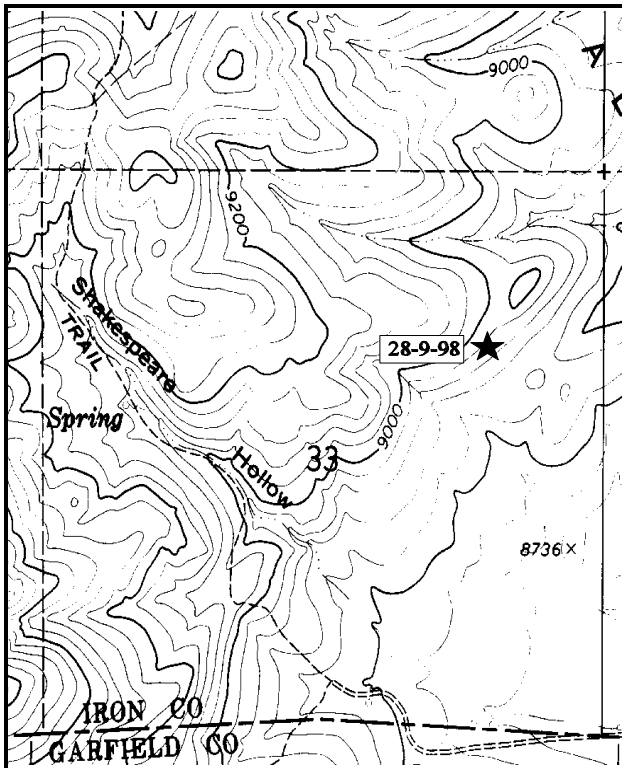
Range type: Quaking Aspen .

Compass bearing: frequency baseline 195 M degrees.

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

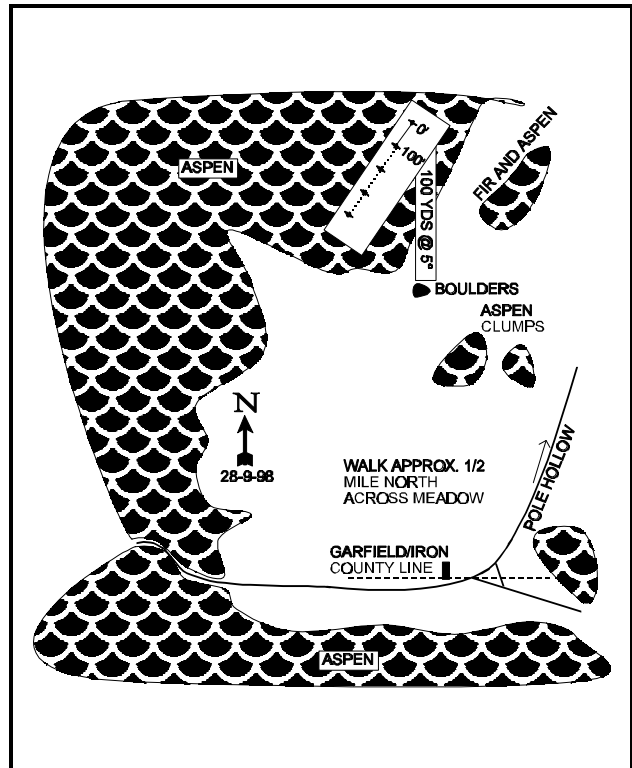
LOCATION DESCRIPTION

From Panguitch, go south towards Panguitch Lake. At mile marker 41, turn right onto a dirt road. Proceed up Pole Hollow 4.3 miles to the Five Mile Ridge Road. Continue straight 1.9 miles to a cattleguard. Continue 0.5 miles to a cattleguard and stockpond. Continue 1 mile to another cattleguard. Go 0.4 miles to a fork at the Iron County-Garfield County line. Bear right, go 50 yards, and park. The study is located on the hill to the northwest, so you must hike about 3/4 mile across the meadow, then up towards the aspens. Take a bearing from the large boulders in the meadow just below the large aspen stand. From here, walk north about 100 yards to 1st baseline stake, a short fencepost tagged #7845. The study runs basically southwest from here.



Map Name: Red Creek Reservoir

Township 34S, Range 7W, Section 33



Diagrammatic Sketch

UTM 4186455.134 N, 355973.166 E

DISCUSSION

Trend Study No. 28-9 (47-9)

The Little Valley study was established to monitor use and trends in the aspen type. Elevation is 9,000 feet. Aspect is southeast with a slope of 5%. Scattered aspen clumps are found on the hillsides and in drainages above the large open meadows in the valleys. The stands are in differing stages of succession; from dense aspen regeneration in young stands, to decadent clumps with a grass understory and conifer invasion. The particular stand selected for the study is representative of the typical mixed browse-aspen stands in the area. At the time of study establishment, when cows were still on the allotment, cattle grazing had not impacted this stand as severely as the lower, more open stands closer to water. There were some signs of recent deer and elk use in 1992 and 1998.

This aspen grove is on a small bench surrounded by moderately steep and rocky slopes. Soil textural analysis indicates a sandy loam with a strongly acidic pH (5.3). The soil is deep with an average effective rooting depth (see methods) of almost 20 inches. Soil temperature was 42.4°F measured at nearly 18 inches. Percent organic matter content was high at an estimated 5.7%. Due to the high elevation and good precipitation, there is an abundance of vegetative cover. There is no evidence of erosion in the aspen, although surrounding areas showed signs of surface erosion and active gullies during the 1987 reading.

The key browse species in this type are aspen and snowberry. Aspen forms the dominant overstory with an estimated density of 5,798 plants/acre in 1987. During the 1987 reading, the density plots sampled two localized areas with particularly dense aspen regeneration. Consequently, the data showed 87% of the plants classified as young and a high percentage of seedlings. The young plants varied greatly in size, forage availability, and vigor. The average plants were 7-8 feet tall with available twigs being utilized. Most of the plants classified as decadent were suppressed seedlings or young trees. With the new larger sample size used in 1992, estimated density of aspen was lower at 3,200 plants/acre. Overall utilization was lighter and vigor and percent decadency improved. In 1998, aspen estimated density was 3,580 plants/acre. Utilization continues to be light and the sampled plants exhibit good vigor. The dead to live ratio is 1:4, with many of the tall aspen dead. The line intercept method indicates 39% aspen canopy cover, 10% white fir cover, and 3% Douglas fir cover in 1998.

Snowberry forms dense patches and had an overall density of 6,467 plants/acre in 1987. With the increased sample size used in 1992, the estimated density increased to 12,100 plants/acre with utilization considered light to moderate. In 1998, snowberry density decreased to an estimated 8,380 plants/acre. As in the past, these plants show light utilization and excellent vigor. Wood's rose density increased in 1992 with the increased sample size to an estimated density of 3,980 plants/acre. Over 75% of the plants encountered in 1992 were classified as seedling or young plants, indicating an increasing population. In 1998, density decreased to 1,380 plants/acre, nearly all of which were classified as mature. Other notable species are the preferred serviceberry and curleaf mountain mahogany. Both of these species are relative uncommon in the aspen, but mature plants are dominant on the nearby rocky slopes above the site, along with big sagebrush, bitterbrush, and currant.

Grasses, along with the other herbaceous vegetation, form a lush and diverse understory and excellent ground cover. Ten grass species and one sedge were identified under the dense aspen canopy. The most common species are mountain brome, muttongrass, Carex, Kentucky bluegrass, and needlegrass, all of which are valuable, palatable forage plants. Fringed brome currently provides the most grass cover. A good diversity of forbs also occur on the site with 26 species encountered on the frequency belts in 1992 and 28 species encountered in 1998. Common plants that provide forage throughout the area are dandelion, yarrow, and salsify. Perennial herbaceous understory sum of nested frequency shows a steadily decline from 1987 to 1998.

1987 APPARENT TREND ASSESSMENT

The combination of a dense herbaceous understory and a fairly complete overstory of shrubs and aspen trees allows the buildup of an almost complete ground covering of litter. The percentage of vegetative cover is also high, leaving only 1% bare soil. Key browse species consisting of aspen and snowberry appear to have increasing populations. Herbaceous plants are abundant and diverse providing good forage for livestock and wildlife.

1992 TREND ASSESSMENT

Ground cover estimates show increased bare ground and rock cover and significantly less litter cover. Much of these differences are due to the increased sample size which distributed the frequency belts over a much larger area. All soil evaluations still point to a stable trend with no erosion occurring. Browse is diverse and abundant. Key species have increased with the exception of aspen. The decline in aspen is most likely due to the larger sample size and not a real decline in population density. Overall, trend for browse is up. The herbaceous understory is also diverse and abundant. Sum of nested frequency for grasses have increased slightly while those of forbs have declined. This would be expected, for forbs are usually the group of plants that are the first effected most by prolonged drought. Combined sum nested frequencies of grasses and forbs have declined slightly but the trend is stable.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - stable

1998 TREND ASSESSMENT

The soil trend is stable with abundant ground cover to protect against any erosion. The browse trend is stable with little change in the key species. The browse species appear to be excluding herbaceous understory species at this time. The herbaceous understory trend is downward. It was noted that this is a poor aspen site for a big game range trend study. The site should be moved to the edge of the aspen where more grasses and forbs are found. It appears that the overstory of browse and trees are suppressing the herbaceous understory species. Although the herbaceous understory is still diverse and provides abundant cover, there is an overall downward trend with a decrease in perennial herbaceous sum of nested frequency values.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - downward

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron trachycaulum	a10	b75	a27	5	33	14	1.12	.53
G	Bromus carinatus	124	95	99	47	39	38	1.99	2.40
G	Bromus ciliatus	b92	a25	a14	36	11	5	.52	7.81
G	Carex spp.	a33	b87	a42	14	37	18	1.52	2.05
G	Oryzopsis hymenoides	a-	b2	ab2	-	1	1	.15	.06

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	<i>Poa fendleriana</i>	a ₂₃	b ₅₀	50	10	22	21	1.42	1.80
G	<i>Poa pratensis</i>	b ₆₃	a ₁₉	ab ₃₂	24	12	13	.62	.26
G	<i>Sitanion hystrix</i>	19	31	14	7	14	7	.59	.11
G	<i>Stipa columbiana</i>	b ₃₇	b ₄₇	a ₁₀	18	20	4	1.09	.09
G	<i>Stipa comata</i>	c ₄₉	b ₂₇	a ₈	20	11	4	1.48	.19
G	<i>Stipa lettermani</i>	a ₋	b ₁₁	b ₂₁	-	5	7	.10	.40
G	Unknown grass - perennial	5	3	-	2	1	-	.00	-
Total Annual Grasses		0	124	194	0	45	72	2.26	2.14
Total Perennial Grasses		455	348	125	183	161	60	8.39	13.60
F	<i>Achillea millefolium</i>	b ₆₃	ab ₄₈	a ₃₆	25	19	13	1.64	1.30
F	<i>Agoseris glauca</i>	13	19	23	7	9	9	.31	.16
F	<i>Antennaria rosea</i>	-	-	3	-	-	2	-	.18
F	<i>Androsace septentrionalis</i> (a)	-	-	3	-	-	1	-	.00
F	<i>Antennaria</i> spp.	3	-	-	2	-	-	-	-
F	<i>Artemisia biennis</i>	-	-	2	-	-	1	-	.03
F	<i>Artemisia dracunculus</i>	a ₋	ab ₄	b ₉	-	2	4	.01	.02
F	<i>Artemisia ludoviciana</i>	21	38	34	9	14	15	.19	.79
F	<i>Aster chilensis</i>	b ₃₄	b ₅₅	a ₃	14	18	1	1.31	.18
F	<i>Astragalus miser</i>	b ₇₈	a ₄₁	a ₂₂	36	19	11	1.00	.90
F	<i>Castilleja linariaefolia</i>	-	3	2	-	2	1	.03	.03
F	<i>Cirsium wheeleri</i>	a ₋	b ₂₀	c ₄₂	-	9	21	.84	1.31
F	<i>Collomia linearis</i> (a)	-	a ₁	b ₄₃	-	1	19	.00	.64
F	<i>Collinsia parviflora</i> (a)	-	-	2	-	-	1	-	.00
F	<i>Crepis</i> spp.	a ₋	b ₁₃	a ₋	-	7	-	.53	-
F	<i>Cymopterus</i> spp.	b ₁₇	a ₋	a ₋	9	-	-	-	-
F	<i>Eriogonum cernuum</i> (a)	-	-	1	-	-	1	-	.15
F	<i>Eriogonum elatum</i>	a ₋	b ₁₉	a ₋	-	7	-	.28	-
F	<i>Erigeron flagellaris</i>	b ₅₉	a ₁₂	a ₁₉	26	6	8	.57	.14
F	<i>Erigeron</i> spp.	-	-	11	-	-	5	-	.10
F	<i>Fragaria virginiana</i>	b ₃₆	a ₆	b ₂₀	13	2	11	.18	1.99
F	<i>Gentianella heterosepala</i>	a ₋	b ₂₄	ab ₃	-	9	1	.69	.03
F	<i>Geranium</i> spp.	13	5	2	6	3	1	.18	.03
F	<i>Ligusticum porteri</i>	a ₋	b ₉	b ₁₆	-	5	8	.37	.95
F	<i>Lupinus argenteus</i>	-	-	5	-	-	2	-	.03
F	<i>Lychnis drummondii</i>	-	3	3	-	1	1	.00	.03
F	<i>Penstemon</i> spp.	2	-	1	2	-	1	-	.03
F	<i>Potentilla gracilis</i>	-	3	-	-	1	-	.03	-
F	<i>Polygonum</i> spp.	-	4	-	-	2	-	.01	-
F	<i>Smilacina racemosa</i> <i>amplexicaulis</i>	-	-	-	-	-	-	-	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
F	Taraxacum officinale	_b 171	_a 93	_a 61	63	37	29	1.95	2.18
F	Thalictrum fendleri	32	26	21	15	14	9	1.09	2.54
F	Tragopogon dubius	28	19	22	12	8	12	.28	.39
F	Trifolium longipes	40	32	21	17	13	9	.36	.24
F	Verbascum thapsus	-	3	-	-	2	-	.06	-
F	Viguiera multiflora	_a -	_b 8	_b 8	-	5	5	.34	.12
Total Annual Forbs		0	1	49	0	1	22	0	0.79
Total Perennial Forbs		610	507	389	256	214	180	12.31	13.76

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

BROWSE TRENDS --

Herd unit 28 , Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Abies concolor	2	2	1.00	.63
B	Amelanchier utahensis	14	11	.34	.66
B	Artemisia tridentata wyomingensis	0	0	-	-
B	Cercocarpus ledifolius	4	5	.63	.04
B	Chrysothamnus nauseosus	0	5	-	.30
B	Chrysothamnus viscidiflorus	8	7	.45	.71
B	Juniperus communis	18	22	12.09	6.53
B	Mahonia repens	17	10	1.61	1.55
B	Pachistima myrsinites	6	3	.63	1.27
B	Pinus edulis	1	1	.78	.15
B	Populus tremuloides	62	68	38.28	5.55
B	Prunus virginiana	0	2	-	-
B	Pseudotsuga menziesii	3	0	4.63	-
B	Quercus gambelii	0	0	-	-
B	Ribes spp.	3	5	-	.21
B	Rosa woodsii	30	21	4.44	2.13
B	Symphoricarpos oreophilus	87	79	15.53	21.54
Total for Browse		255	241	80.44	41.31

CANOPY COVER --

Herd unit 28 , Study no: 9

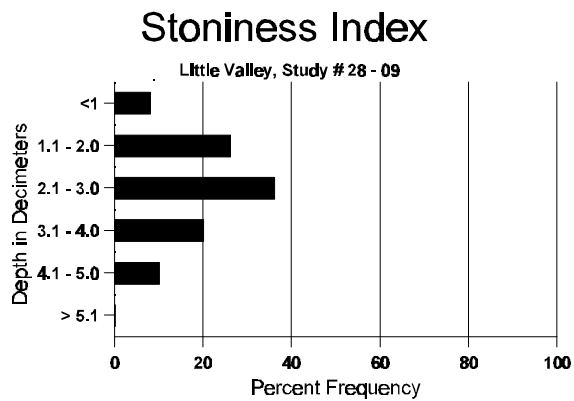
Species	Percent Cover 08
Abies concolor	10
Populus tremuloides	39
Pseudotsuga menziesii	3

BASIC COVER --
Herd unit 28 , Study no: 9

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	274	330	7.25	76.78	62.60
Rock	23	36	0	2.66	1.11
Pavement	20	20	0	0	1.00
Litter	232	399	91.50	82.80	90.13
Cryptogams	-	-	0	0	0
Bare Ground	32	42	1.25	3.47	4.39

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 09, Study Name: Little Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.8	42.4 (17.7)	5.3	58.7	23.4	17.8	5.7	28.8	291.2	.5



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 9

Type	Quadrat Frequency	
	'92	'98
Rabbit	6	-
Elk	5	-
Deer	6	-
Cattle	1	-

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 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				
Abies concolor																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%			+ 0%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	40		-			
												'98	40		-			
Amelanchier utahensis																		
S	87	5	1	-	-	-	-	-	-	-	6	-	-	-	400			6
	92	2	-	-	3	-	-	-	-	-	5	-	-	-	100			5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	14	2	1	-	-	-	-	-	-	16	1	-	-	1133			17
	92	12	15	-	15	3	-	-	-	-	38	3	4	-	900			45
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66	63	28	1
	92	1	5	-	-	-	-	1	-	-	7	-	-	-	140	-	-	7
	98	17	1	-	1	-	-	-	-	-	19	-	-	-	380	35	19	19
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		17%			06%			00%			-13%							
'92		44%			00%			08%			-58%							
'98		05%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1199	Dec:	-			
												'92	1040		-			
												'98	440		-			
Artemisia tridentata wyomingensis																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	15	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	0		-			
												'98	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				
Cercocarpus ledifolius																	
Y	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	-	2	2	1	-	-	-	-	-	5	-	-	-	100		5
	98	1	-	-	-	-	-	-	1	-	2	-	-	-	40		2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	6	1	-	-	-	-	-	-	-	7	-	-	-	140	55	27
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		100%			00%			00%			+34%						
'92		40%			40%			00%			+44%						
'98		11%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-			
											'92	100		-			
											'98	180		-			
Chrysothamnus nauseosus																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	4	-	-	-	-	-	6	-	-	-	120	19	18
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'92	0		-			
											'98	120		-			
Chrysothamnus viscidiflorus																	
S	87	3	-	-	-	-	-	-	-	3	-	-	-	200			3
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	5	-	-	-	-	-	-	-	5	-	-	-	333			5
	92	2	-	-	-	-	-	-	-	2	-	-	-	40			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	7	-	-	-	-	-	-	-	7	-	-	-	466	17	5	7
	92	6	-	-	4	-	-	-	-	10	-	-	-	200	-	-	10
	98	7	-	-	1	-	-	-	-	8	-	-	-	160	13	18	8
D	87	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-72%						
'92		00%			00%			00%			-33%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	865	Dec:	8%			
											'92	240		0%			
											'98	160		0%			

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Juniperus communis</i>																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	3	-	-	3	-	-	1	-	-	7	-	-	-	140		7
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4
M	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200	27 105	3
	92	7	-	-	20	-	-	7	-	-	34	-	-	-	680	- -	34
	98	23	-	-	4	-	-	-	1	-	28	-	-	-	560	23 53	28
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+71%						
'92		00%			00%			00%			- 6%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	200	Dec:	-			
											'92	680		-			
											'98	640		-			
<i>Mahonia repens</i>																	
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	92	51	-	-	80	-	-	24	-	-	134	-	21	-	3100		155
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	195	-	-	-	-	-	-	-	-	195	-	-	-	13000	6 16	195
	92	67	-	-	26	-	-	-	-	-	93	-	-	-	1860	- -	93
	98	66	-	-	13	-	-	-	-	-	79	-	-	-	1580	4 22	79
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-62%						
'92		00%			00%			08%			-68%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	13133	Dec:	-			
											'92	4960		-			
											'98	1580		-			
<i>Pachistima myrsinites</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	20	-	-	4	-	-	25	-	-	-	500		25
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	92	27	43	-	-	-	-	57	-	-	127	-	-	-	2540	- -	127
	98	150	-	-	-	-	-	-	-	-	150	-	-	-	3000	6 10	150
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		28%			00%			00%			- 1%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'92	3040		-			
											'98	3000		-			

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				
Pinus edulis																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	1	-	-	-	-	-	-	-	-	-	-	20	-	-	1
	98	1	-	-	-	-	-	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		100%			00%			00%			+ 0%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	20		-		
												'98	20		-		
Populus tremuloides																	
S	87	33	9	-	-	-	-	-	-	-	39	-	3	-	2800		42
	92	38	7	-	41	-	-	-	-	-	84	2	-	-	1720		86
	98	17	-	-	1	-	-	-	-	-	18	-	-	-	360		18
Y	87	6	17	15	1	-	-	-	37	-	73	-	2	1	5066		76
	92	61	16	2	11	-	-	3	42	-	119	8	8	-	2700		135
	98	102	-	-	15	-	-	1	-	-	118	-	-	-	2360		118
M	87	-	-	-	-	-	-	-	1	-	1	-	-	-	66	393 157	1
	92	1	-	-	-	-	-	1	15	-	17	-	-	-	340	-	17
	98	6	-	-	-	-	-	-	54	-	60	-	-	-	1200	-	60
D	87	5	4	1	-	-	-	-	-	-	7	-	2	1	666		10
	92	4	1	-	2	-	-	1	-	-	6	-	2	-	160		8
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1020		51
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		24%			18%			07%			-45%						
'92		11%			01%			06%			+11%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	5798	Dec:	11%		
												'92	3200		5%		
												'98	3580		1%		
Prunus virginiana																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	2	-	-	-	-	-	3	-	-	-	60	25 11	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	0		-		
												'98	60		-		

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Pseudotsuga menziesii</i>																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	2	-	-	-	-	-	40	-	-	2
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	60		-		
												'98	0		-		
<i>Quercus gambelii</i>																	
Y	87	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	61	17	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		100%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-		
												'92	0		-		
												'98	0		-		
<i>Ribes spp.</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
	92	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3
	98	4	-	-	1	-	-	-	-	-	-	-	5	-	-	-	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+18%						
'92		00%			00%			00%			+20%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-		
												'92	80		-		
												'98	100		-		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Rosa woodsii																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	93	21	-	28	-	-	11	-	-	153	-	-	-	3060		153	
	98	7	-	-	4	-	-	-	-	-	11	-	-	-	220		11	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	18	19	-	7	-	-	2	-	-	46	-	-	-	920	-	46	
	98	44	-	-	14	-	-	-	-	-	55	3	-	-	1160	19	58	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		100%			00%			00%			+97%							
'92		20%			00%			00%			-65%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	-			
												'92	3980		-			
												'98	1380		-			
Symphoricarpos oreophilus																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	92	9	-	-	10	-	-	6	-	-	25	-	-	-	500		25	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	23	4	-	-	-	-	-	-	-	26	1	-	-	1800		27	
	92	78	14	-	111	-	-	11	-	-	214	-	-	-	4280		214	
	98	22	5	-	12	-	-	-	-	-	39	-	-	-	780		39	
M	87	53	14	-	-	-	-	-	-	-	67	-	-	-	4466	24	67	
	92	247	15	-	124	-	-	5	-	-	391	-	-	-	7820	-	391	
	98	282	1	-	97	-	-	-	-	-	380	-	-	-	7600	21	380	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		19%			00%			00%			+48%							
'92		05%			00%			00%			-31%							
'98		01%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	6266	Dec:	-			
												'92	12100		-			
												'98	8380		-			

Trend Study 28-10-98

Study site name: Red Desert .

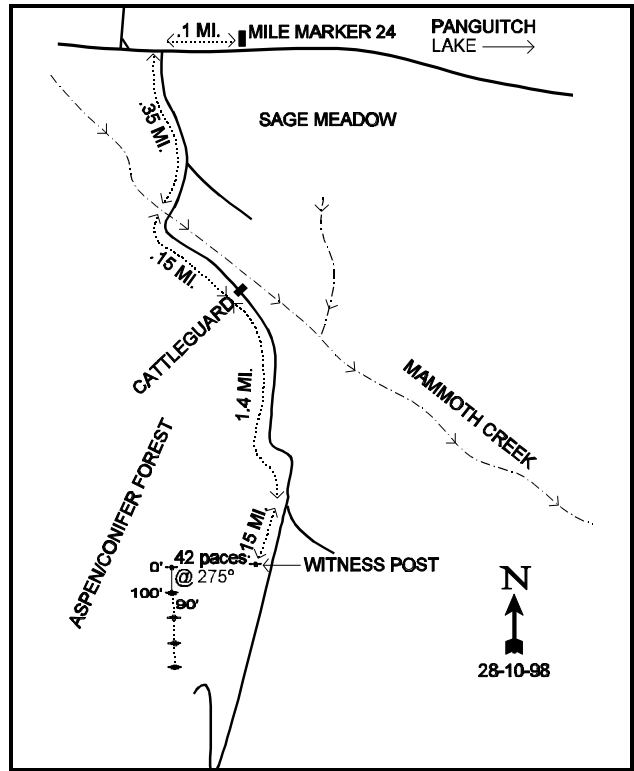
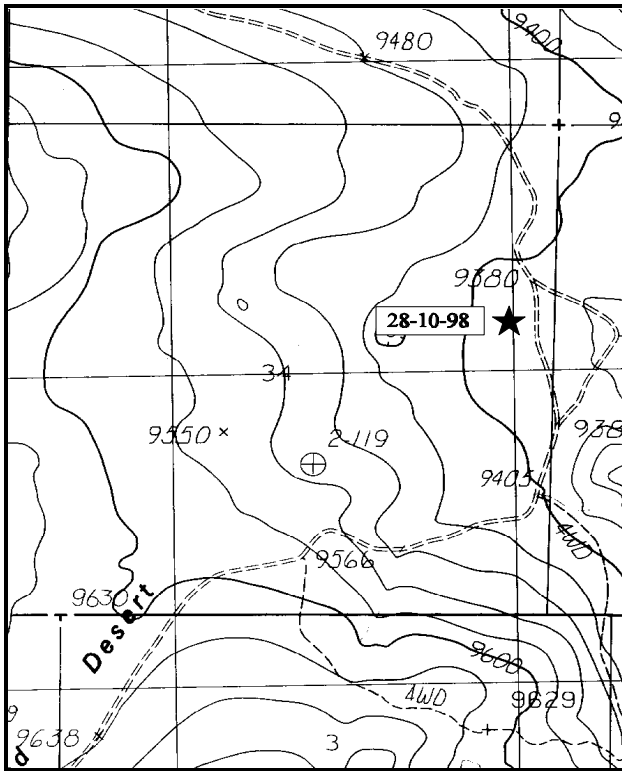
Range type: Quaking Aspen .

Compass bearing: frequency baseline 182 degrees.

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

LOCATION DESCRIPTION

From Panguitch Lake, travel southwest on the highway to mile marker 24 and continue 0.1 mile. Turn left (south) onto a dirt road. Proceed 0.25 miles to a fork, bear right. Go 0.1 mile to Mammoth Creek. Cross and continue for 0.15 miles to a cattleguard. Continue 1.4 miles to a fork, bear right. Proceed south 0.15 miles to the study area. There is a witness post (a 2-foot tall fencepost) on the right side of the road. The transect starts off in the forest, 242 feet (42 paces) southwest (275°) of the witness post. The 0-foot baseline stake, another 2-foot fencepost, is marked by a browse tag #9007. The study runs south from here (180°).



Map Name: Panguitch Lake

Diagrammatic Sketch

Township 36S, Range 8W, Section 34

UTM 4167159.509 N, 348000.173 E

DISCUSSION

Trend Study No. 28-10 (47-10)

The Red Desert trend study is in the Mammoth Creek drainage on top of the Markagunt Plateau. Elevation is 9,400 feet and the area provides summer range for deer and elk. The site is almost level with a slightly east aspect. The range type consists of aspen with increasing numbers of subalpine fir and spruce as succession progresses toward a climax coniferous forest. Wildlife use is light to moderate and is likely exclusively summer use. In 1998, a pellet group transect parallel to the baseline indicated 25 deer days use/acre, 9 elk days use/acre, 7 sheep days use/acre, and 2 cow days use/acre. Thinning of some of the competing trees appears to have taken place within the past 10 years. In 1992, it appeared that some logging may take place as many of the trees were marked with blue spray paint. In 1998, it was apparent that logging did not occur in the study area.

The dark brown loam soil is moderately deep with an average effective rooting depth (see methods) of almost 16 inches. Soil textural analysis indicates a clay loam with a slightly acidic pH (6.1). There are some exposed rocky, bare areas but overall vegetative cover is good, especially in the openings where grasses and small forbs predominate. Erosion is minimal over all years.

The overstory of this open forest is mainly mature aspen trees. Most of the mature aspen are unavailable, as the trees average 80 feet in height. An uneven mix of age classes are present, from large decadent trees to clumps of young and scattered sprouts and seedlings. The density plot data from 1987 show that 15% of the population were mature trees (233 per acre). The 72% classified as decadent were all young sprouts about three feet tall, but the tops were dead due to a combination of competition, hedging, and insect damage. However, the plants were still alive as evidenced by sprouting from the base; and this is the growth that was measured. A few vigorous, unutilized young plants were found. Seedlings or small sprouts were common on two of the density plots. During the 1992 reading, aspen density was estimated at 1,320 plants/acre with a much larger sampling design. Percent decadency declined to 18% and biotic and reproductive potentials increased. Utilization was slightly heavier with 21% of the aspen displaying heavy hedging compared to 15% in 1987. In 1998, the estimated density was 1,020 plants/acre, most of which were classified as young plants. Many seedlings were also encountered (1,160 plants/acre). Percent decadency has declined and utilization is now mostly light. Line intercept data from 1998 indicated 11% canopy cover for aspen.

In 1987, it appeared that aspen were losing out to the subalpine fir. There were an estimated 1,599 subalpine fir trees per acre, 83% of which were classified as young. Seedling trees numbered 366 trees/acre. In 1992 and 1998, there were an estimated 1,040 subalpine fir. Age structure shows that the subalpine fir community is still comprised of mostly young trees. Engelmann spruce density is estimated to be 520 plants/acre in 1998, a great deal short of the 2,860 plants/acre estimated in 1992. As with the subalpine fir community, most of the Engelmann spruce trees were classified as young. It appears that these populations will increase due to the abundant numbers of seedling and young trees. Line intercept data from 1998 indicates 11% cover for Engelmann spruce and 13% cover for subalpine fir.

The open aspect of the understory provides a good site for herbaceous vegetation. Six species of rather short, tufted grasses and one sedge were encountered in 1987, nine during the 1992 reading, and eight in 1998. The sedge continues to be the most common species but has significantly declined since 1987. Other common species include mountain muhly and muttongrass. Forbs are also common but most are low-growing and unutilized. Weedy milkvetch, lobeleaf groundsel, pussytoes, and spring parsley are the most abundant species. Perennial herbaceous understory sum of nested frequency has declined from 1,226 in 1992 to 995 in 1998.

1987 APPARENT TREND ASSESSMENT

Ground cover is generally excellent due to the quantity of herbaceous vegetation which provides good ground cover in the openings. There is a buildup of litter, which constitutes 83% of the ground cover. Bare soil has a value of 8%. Aspen appears to be losing out to subalpine fir and spruce. The herbaceous understory is diverse and abundant, but grasses and forbs are low growing and provide limited forage.

1992 TREND ASSESSMENT

Soil erosion is not a problem on this site due to the lack of slope and the abundant vegetation and litter cover. With the new larger sample size, more bare ground and less litter were estimated, but the soil trend is still stable. Aspen, the key browse species, has increased slightly in density and has good biotic and reproductive potentials. Percent decadence has decreased significantly while utilization is slightly higher. The trend is stable to slightly up for the moment, but the trend will decline with the fir and spruce trees becoming larger. Continued logging would improve the forage production of this site. Sum of nested frequencies for grasses have declined slightly while forb frequencies have increased. Forbs make up 66% of the herbaceous understory cover. Trend for herbaceous understory is up slightly.

TREND ASSESSMENT

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

1998 TREND ASSESSMENT

The soil trend is stable with no current erosion apparent on the site. Percent vegetation and litter cover are high enough to keep accelerated erosion from occurring. The browse trend is stable. The densities for aspen, subalpine fir and Engelmann spruce appear to be stable at this time. There are many young and seedling plants in the populations which would indicate increases in density in the future. As the fir and spruce continue to increase in density, the aspen will decrease. The herbaceous understory trend is slightly downward with a decrease in perennial herbaceous understory sum of nested frequency.

TREND ASSESSMENT

- soil - stable
- browse - stable
- herbaceous understory - slightly downward

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Bromus ciliatus	44	38	25	17	16	11	.35	1.76
G	Carex spp.	_b 151	_b 142	_a 104	66	65	48	1.91	1.87
G	Festuca ovina	_b 81	_a 44	_a 28	31	22	12	.26	.18
G	Muhlenbergia montana	99	75	79	41	31	33	1.49	1.67
G	Poa fendleriana	_b 57	_{ab} 50	_a 31	31	26	16	.51	.81
G	Poa pratensis	_a -	_b 30	_b 28	-	11	10	.78	.46
G	Sitanion hystrix	56	53	44	27	22	19	.84	.62

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	<i>Stipa comata</i>	-	1	4	-	1	2	.00	.16
G	<i>Stipa lettermani</i>	_{ab} 2	_b 7	_a -	1	3	-	.16	.00
Total Annual Grasses		0	0	0	0	0	0	0	0
Total Perennial Grasses		490	440	343	214	197	151	6.32	7.56
F	<i>Achillea millefolium</i>	_a 12	_b 36	_b 36	5	14	14	.58	.81
F	<i>Agoseris glauca</i>	-	14	11	-	5	6	.19	.08
F	<i>Antennaria rosea</i>	109	113	105	40	39	41	2.55	4.18
F	<i>Androsace septentrionalis</i> (a)	-	20	24	-	9	10	.04	.10
F	<i>Arabis</i> spp.	-	3	-	-	2	-	.01	-
F	<i>Astragalus miser</i>	_a 39	_b 142	_a 85	20	58	41	4.95	1.93
F	<i>Aster</i> spp.	-	1	1	-	1	1	.03	.03
F	<i>Cirsium foliosum</i>	35	28	23	16	13	10	.28	.74
F	Cruciferae	_b 17	_b 23	_a 3	9	10	1	.12	.00
F	<i>Erigeron</i> spp.	_b 13	_a -	_a -	6	-	-	-	-
F	<i>Frasera speciosa</i>	-	1	-	-	1	-	.00	-
F	<i>Fragaria virginiana</i>	31	33	24	12	14	10	.78	1.61
F	<i>Gentianella heterosepala</i>	_a 45	_a 31	_b 70	19	15	34	.39	.57
F	<i>Lomatium</i> spp.	54	78	65	21	33	29	1.04	1.06
F	<i>Lychnis drummondii</i>	_a -	_b 25	_b 18	-	12	8	.06	.06
F	<i>Penstemon leiophyllus</i>	22	22	7	11	10	4	.10	.02
F	<i>Potentilla gracilis</i>	24	6	12	10	4	6	.04	.08
F	<i>Senecio multilobatus</i>	_c 156	_b 121	_a 86	60	51	38	.60	1.06
F	<i>Senecio</i> spp.	_a -	_b 7	_a -	-	4	-	.09	-
F	<i>Smilacina racemosa</i> <i>amplexicaulis</i>	2	-	-	1	-	-	-	-
F	<i>Taraxacum officinale</i>	_b 60	_{ab} 41	_a 35	34	23	19	.49	.27
F	<i>Tragopogon dubius</i>	_b 20	_a 5	_a -	9	3	-	.04	-
F	<i>Trifolium longipes</i>	_a 60	_{ab} 56	_b 71	19	22	25	.82	2.16
Total Annual Forbs		0	20	24	0	9	10	0.04	0.10
Total Perennial Forbs		699	806	676	292	343	297	13.27	14.81

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

BROWSE TRENDS --
Herd unit 28 , Study no: 10

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Abies lasiocarpa	17	20	11.45	7.39
B	Juniperus communis	3	0	.95	-
B	Picea engelmannii	20	13	8.56	7.48
B	Populus tremuloides	30	26	10.86	2.15
Total for Browse		70	59	31.83	17.03

CANOPY COVER --
Herd unit 28 , Study no: 10

Species	Percent Cover '98
Abies lasiocarpa	13
Populus tremuloides	11
Pseudotsuga menziesii	11

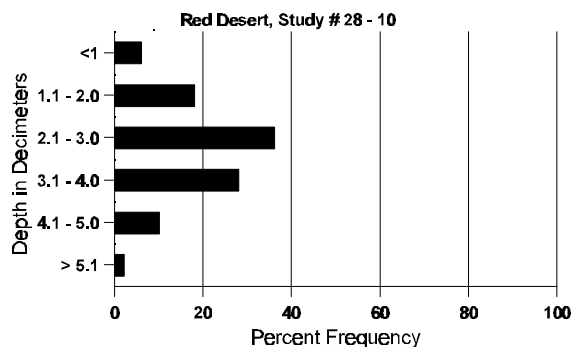
BASIC COVER --
Herd unit 28 , Study no: 10

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	295	292	6.25	47.14	45.03
Rock	24	42	2.00	1.68	1.36
Pavement	-	38	0	0	.69
Litter	248	395	83.25	74.00	80.59
Cryptogams	33	46	1.00	2.88	.57
Bare Ground	51	96	7.50	5.78	5.45

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 10, Study Name: Red Desert

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	39.4 (16.7)	6.1	38.7	29.4	21.8	3.2	27.6	118.4	.3

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 28 , Study no: 10

Type	Quadrat Frequency	
	'92	'98
Sheep	2	-
Elk	-	2
Deer	5	5

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 10

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
<i>Abies lasiocarpa</i>																	
S	87	11	-	-	-	-	-	-	-	-	11	-	-	-	366		11
	92	21	3	-	3	-	-	4	-	-	31	-	-	-	620		31
	98	8	-	-	2	-	-	-	-	-	10	-	-	-	200		10
Y	87	40	-	-	-	-	-	-	-	-	40	-	-	-	1333		40
	92	24	2	-	5	6	-	1	-	-	37	-	-	-	760		38
	98	10	-	-	23	-	-	-	-	-	33	-	-	-	660		33
M	87	7	-	1	-	-	-	-	-	-	8	-	-	-	266		8
	92	2	-	-	-	-	-	2	8	-	12	-	-	-	240		12
	98	8	-	-	-	-	-	-	11	-	19	-	-	-	380		19
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	1	-	-	1	-	-	2	-	-	-	40		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
'87		00%			02%			00%			-35%						
'92		15%			00%			00%			+ 0%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	1599	Dec:	0%			
											'92	1040		4%			
											'98	1040		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			
Juniperus communis																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'92	80		-			
											'98	0		-			
Picea engelmannii																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	21	3	-	1	-	-	-	-	-	25	-	-	-	2720		136
	98	16	-	-	-	-	-	-	1	-	17	-	-	-	340		17
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	1	-	-	1	-	-	2	3	-	7	-	-	-	140	-	7
	98	4	-	-	-	-	-	-	5	-	5	-	-	-	180	-	9
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		02%			00%			00%			-82%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'92	2860		-			
											'98	520		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Populus tremuloides																		
S	87	7	3	3	-	-	-	-	-	-	11	-	2	-	433		13	
	92	56	15	5	-	-	-	-	-	-	76	-	-	-	1520		76	
	98	58	-	-	-	-	-	-	-	-	58	-	-	-	1160		58	
Y	87	1	-	-	1	-	-	-	-	-	2	-	-	-	66		2	
	92	1	30	9	-	-	-	2	2	-	44	-	-	-	880		44	
	98	32	4	1	-	-	-	-	-	-	37	-	-	-	760		38	
M	87	-	-	-	-	-	-	-	4	3	7	-	-	-	233	393	74	
	92	-	-	3	-	-	-	-	7	-	10	-	-	-	200	-	-	
	98	1	-	-	-	-	-	-	12	-	13	-	-	-	260	-	-	
D	87	7	15	2	-	-	-	-	-	-	22	-	2	-	800		24	
	92	1	9	2	-	-	-	-	-	-	10	-	1	1	240		12	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		45%			15%			06%			+17%							
'92		59%			21%			03%			-23%							
'98		08%			02%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1099	Dec:	73%			
												'92	1320		18%			
												'98	1020		0%			

Trend Study 28-11-98

Study site name: Elliker Basin .

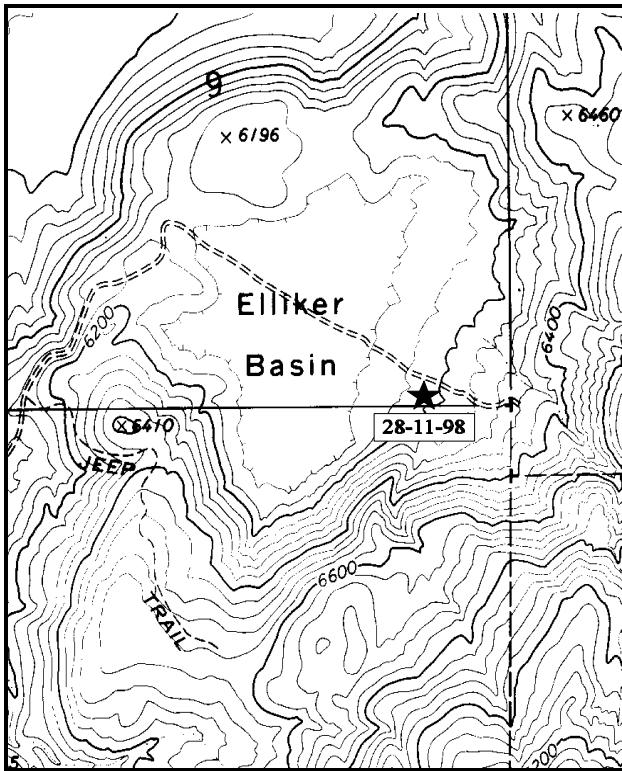
Range type: Big Sagebrush .

Compass bearing: frequency baseline 247 degrees.

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

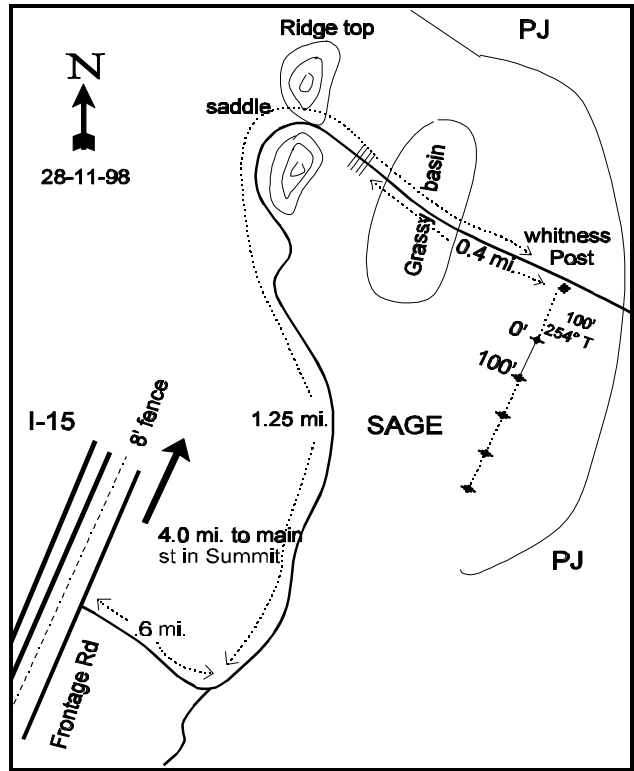
LOCATION DESCRIPTION

From Summit, at the I-15 interchange (exit 71), go south on the frontage road (Summer Tree Dr.) on the east side of the freeway for 4.0 miles. Turn left on to a dirt road, proceed through a gate and go east for 0.6 miles. Bear left at the fork and continue 1.25 miles to Elliker Basin and up to a witness post in the sagebrush on the right. The transect starts 12 paces away bearing 221 degrees magnetic, at the 2-foot tall fencepost tagged #495 which marks the 0-foot end of the baseline.



Map Name: Summit

Township 35S, Range 10W, Section 9



Diagrammatic Sketch

UTM 4181553.186 N, 325672.095 E

DISCUSSION

Trend Study No. 28-11 (47-11)

Elliker Basin is a small sagebrush valley at the base of the Hurricane Cliffs, about 8 miles northeast of Cedar City. The transect itself is located on the southeastern slope of the basin at an elevation of 6,160 feet, just below the line of pinyon-juniper which continue up the cliffs. Slope is 10-15% with a west aspect. The area is very important deer winter range, which was acquired by the DWR in a trade with the BLM. Pinyon and juniper dominate the slopes bordering the valley. The area was apparently seeded years ago. Additionally, a hand chainsaw treatment was done during the spring of 1992 to eliminate encroaching juniper trees. Many of these trees seen in 1992 were reported to be still alive and growing below the cut, however they were dead in 1998. Deer pellet groups are fairly abundant. A pellet group transect read in 1998 indicates 44 deer days use/acre and 1 elk day use/acre.

Soil textural analysis indicates a loam soil with a moderately acidic pH (5.8). The average effective rooting depth (see methods) was just over 14 inches with an average temperature of 52°F measured at a depth of 16 inches. The soil surface and the soil profile are rocky throughout. Soil movement is a problem on roads up to the basin, and there is some slight sign of current overland water flow in some areas across the flat.

The key browse species is mountain big sagebrush. In 1987, mountain big sagebrush had an estimated density of 2,466 plants/acre. Twenty-seven percent of the population was decadent and overall use was moderate to heavy with 30% of the sagebrush displaying heavy use. Utilization varied between individuals and location in the basin. Plants in the lowest area appeared heavily hedged and have comparatively poor growth and vigor, although this condition could also be related to soil type and/or water table conditions which caused problems during the exceptionally wet years of 1982-85 for many low lying areas throughout the state. In 1992, the estimated density was 3,400 plants/acre. Percent decadence increased to 50% while the proportion of heavily hedged plants declined to 16%. Twenty-eight percent of the mature and decadent sagebrush displayed poor vigor, up from 5% in 1987. Comparing the photographs and written observations from 1987 and 1992, it is most likely that the increase in decadency in 1992 is not due to heavy use. Drought, competition with winter annuals, root fungus, shoot fungus, winter injury, or a combination of these factors can cause the increased decadency. Some sagebrush crowns were only partially dead and these plants still contained abundant annual growth from the previous growing season. In 1998, the estimated density was 3,120 plants/acre. Percent decadency has declined to 25% of the population and the percentage of plants classified as exhibiting poor vigor has declined to 5%. Also in 1998, many seedling plants were encountered (3,480 plants/acre). It is likely that most of these plants will not survive the 1998 summer. The small percentage of the plants that do survive will help improve the condition of the population.

Pinyon and juniper dominate the surrounding slopes and have invaded into the upper part of the sagebrush valley. The juniper trees to the west and on the slope below the basin were severely highlined in 1987. The chainsaw treatment cut down all the juniper on the study site, but some trees were still alive at the time of the 1992 reading. In 1998, the pinyon and juniper trees that were cut down, but reported to be alive on the site in 1992, were dead. The only other browse species encountered on the site include small numbers of rubber rabbitbrush, low rabbitbrush, broom snakeweed, and prickly-pear cactus.

The herbaceous understory continues to be dominated by cheatgrass, although its sum of nested frequency has significantly decreased since 1992 from 369 to 330. Sixweeks fescue is also abundant. One seeded grass, intermediate wheatgrass, is still found on the site in small numbers. Crested wheatgrass, which occurred in 1987, has not been sampled since. Purple three-awn and bottlebrush squirreltail have shown a significant decrease in nested frequency over all years. Conversely, sand dropseed and galleta have shown a steady increase since 1987. Forbs are rare on the site. Five perennial and four annual species were encountered in 1998. Forbs offer little cover or forage and account for only 2% of the total vegetative cover.

1987 APPARENT TREND ASSESSMENT

Litter greatly contributes to the ground cover beneath sagebrush plants, but in the shrub interspaces the vegetative and litter cover are limited. The very high concentration of pavement and rocks on the surface in the exposed areas made up 58% of the ground cover. Therefore, the soil itself is fairly well protected and only 2% of the surface was identified as bare soil. The key browse consisting of mountain big sagebrush is mostly mature, 30% of which is heavily hedged. Vigor is generally good and percent decadency is average for a site like this (27%). Sagebrush recruitment is very low however, with only a few seedlings and no young encountered. The abundance of grasses is fair and dominated by warm season species. Cheatgrass is prevalent in the understory. Forbs are rare.

1992 TREND ASSESSMENT

Soil conditions are similar to the 1987 reading. Some of the differences in bare soil and rock cover are likely due to the new and larger sample size. Litter increased due to downed juniper trees from the chain saw treatment. Some soil movement is still detectable, but the nearly continuous cover of rock, pavement and cheatgrass adequately protects what is left of the soil. Trend for soil is stable. Sagebrush, the key browse species, has an increased estimated density, but decadency has increased from 27% to 51% due to factors other than heavy utilization. Along with increased decadency, vigor is also reduced with 28% of the mature and decadent shrubs displaying poor vigor. These factors, combined with a poor biotic and reproductive potential indicate a continuing downward browse trend. The herbaceous understory is dominated by cheatgrass, sixweeks fescue, and a few annual forbs which make up 55% of the herbaceous understory cover. Perennial grasses consist primarily of three warm season grasses. Perennial forbs are rare. Sum of nested frequencies for perennial grasses and forbs combined, have remained stable since 1987.

TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - stable, but dominated by cheatgrass

1998 TREND ASSESSMENT

The soil trend is stable. Percent vegetation cover has declined while percent litter cover increased. The browse trend is slightly down. Both percent decadency and the percentage of plants classified as dying have decreased since 1992, but are still relatively high. Biotic potential is extremely high this season, but it is unlikely that many of the seedling plants will survive through the summer. Utilization has shifted from moderate to heavy use in 1987 to light to moderate use in 1998. The herbaceous understory is stable. Cheatgrass still dominates the herbaceous understory, but has significantly declined in nested frequency since 1992.

TREND ASSESSMENT

soil - stable

browse - slightly down, continuing downward, but at a much slower rate of decline

herbaceous understory - stable, but still dominated by cheatgrass

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 11

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	7	-	-	3	-	-	-	-
G	Agropyron intermedium	25	17	38	11	8	13	.89	2.65
G	Agropyron smithii	3	-	-	2	-	-	-	-
G	Aristida purpurea	_c 77	_b 34	_a 9	31	15	5	.42	.19
G	Bromus tectorum (a)	-	_b 369	_a 330	-	100	95	32.16	7.40
G	Hilaria jamesii	_a -	_b 21	_c 30	-	9	11	1.70	1.88
G	Oryzopsis hymenoides	-	1	-	-	1	-	.03	-
G	Poa secunda	-	-	6	-	-	2	-	.18
G	Sitanion hystrix	_b 18	_{ab} 12	_a 8	11	6	3	.49	.09
G	Sporobolus cryptandrus	_a 6	_b 32	_b 43	2	15	15	1.23	2.52
G	Stipa comata	-	3	1	-	1	1	.15	.15
G	Vulpia octoflora (a)	-	145	146	-	51	58	.77	.58
Total Annual Grasses		0	514	476	0	151	153	32.93	7.98
Total Perennial Grasses		136	120	135	60	55	50	4.92	7.70
F	Agoseris glauca	-	-	15	-	-	8	-	.14
F	Artemisia ludoviciana	-	1	6	-	1	2	.01	.18
F	Astragalus spp.	-	2	-	-	1	-	.03	-
F	Calochortus nuttallii	-	-	6	-	-	3	-	.04
F	Chenopodium spp. (a)	-	1	-	-	1	-	.00	-
F	Draba spp. (a)	-	_a -	_b 50	-	-	18	-	.09
F	Microsteris gracilis (a)	-	_b 81	_a 37	-	37	17	.23	.13
F	Orobancha fasciculata	-	1	3	-	1	1	.00	.00
F	Plantago patagonica (a)	-	8	4	-	3	2	.01	.01
F	Ranunculus testiculatus (a)	-	-	22	-	-	11	-	.10
F	Tragopogon dubius	-	-	4	-	-	2	-	.01
Total Annual Forbs		0	90	113	0	41	48	0.24	0.33
Total Perennial Forbs		0	4	34	0	3	16	0.05	0.38

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

BROWSE TRENDS --
Herd unit 28 , Study no: 11

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Artemisia tridentata vaseyana	73	76	23.90	23.32
B	Chrysothamnus nauseosus albicaulis	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	-	.15
B	Gutierrezia sarothrae	7	4	.15	.03
B	Opuntia spp.	2	2	.15	.15
B	Purshia tridentata	0	0	-	-
Total for Browse		82	84	24.20	23.65

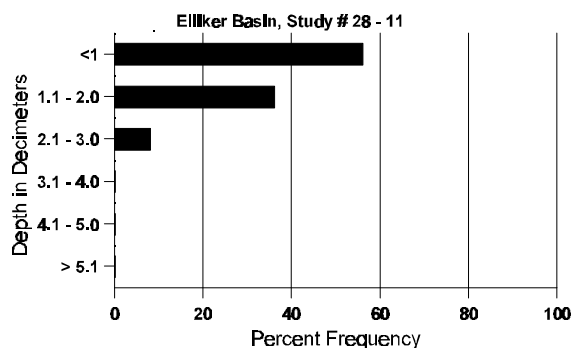
BASIC COVER --
Herd unit 28 , Study no: 11

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	375	363	3.75	47.87	38.06
Rock	130	209	19.75	48.12	11.02
Pavement	234	310	37.75	0	27.36
Litter	267	384	37.25	23.97	41.11
Cryptogams	8	20	0	.04	.12
Bare Ground	80	170	1.50	4.53	9.89

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 11, Study Name: Elliker Basin

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.2	52.0 (16.0)	5.8	50.7	31.4	17.8	2.8	10.6	99.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 28 , Study no: 11

Type	Quadrat Frequency	
	'92	'98
Rabbit	26	19
Elk	-	1
Deer	27	47

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 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				
<i>Artemisia tridentata vaseyana</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	174	-	-	-	-	-	-	-	-	174	-	-	-	3480			174
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	4	4	-	1	1	-	-	-	-	10	-	-	-	200			10
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	87	4	17	6	-	-	-	-	-	-	27	-	-	-	1800	27	33	27
	92	26	38	9	1	-	-	-	-	-	69	3	-	2	1480	-	-	74
	98	74	36	-	-	1	-	-	-	-	111	-	-	-	2220	23	39	111
D	87	1	4	5	-	-	-	-	-	-	8	-	1	1	666			10
	92	37	31	18	-	-	-	-	-	-	39	2	5	40	1720			86
	98	27	11	-	1	-	-	-	-	-	31	-	-	8	780			39
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	540			27
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		57%			30%			05%			+27%							
'92		44%			16%			28%			- 8%							
'98		31%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	2466	Dec:	27%				
											'92	3400		51%				
											'98	3120		25%				
<i>Chrysothamnus nauseosus albicaulis</i>																		
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	3	-	-	-	-	-	-	-	3	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%				
											'92	0		0%				
											'98	60		100%				

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	6	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'92	0		-		
												'98	60		-		
<i>Gutierrezia sarothrae</i>																	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
M	87	2	-	-	-	-	-	-	-	2	-	-	-	133	10	4	2
	92	8	-	-	-	-	-	-	-	8	-	-	-	160	-	-	8
	98	5	-	-	-	-	-	-	-	5	-	-	-	100	8	9	5
D	87	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			-32%						
'92		00%			00%			00%			-11%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	265	Dec:	25%		
												'92	180		11%		
												'98	160		0%		
<i>Opuntia spp.</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	-	-	-	1	-	-	-	-	1	-	-	-	20	5	12	1
D	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	1	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%									
'92		00%			00%			00%			+ 0%						
'98		00%			00%			50%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%		
												'92	40		0%		
												'98	40		50%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	27	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	0		-			
												'98	0		-			

Trend Study 28-13-98

Study site name: Asay Knoll .

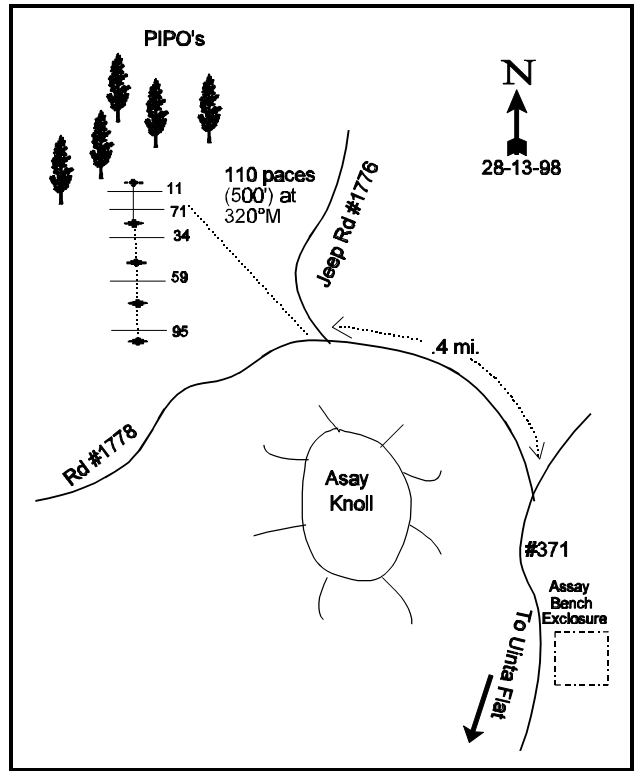
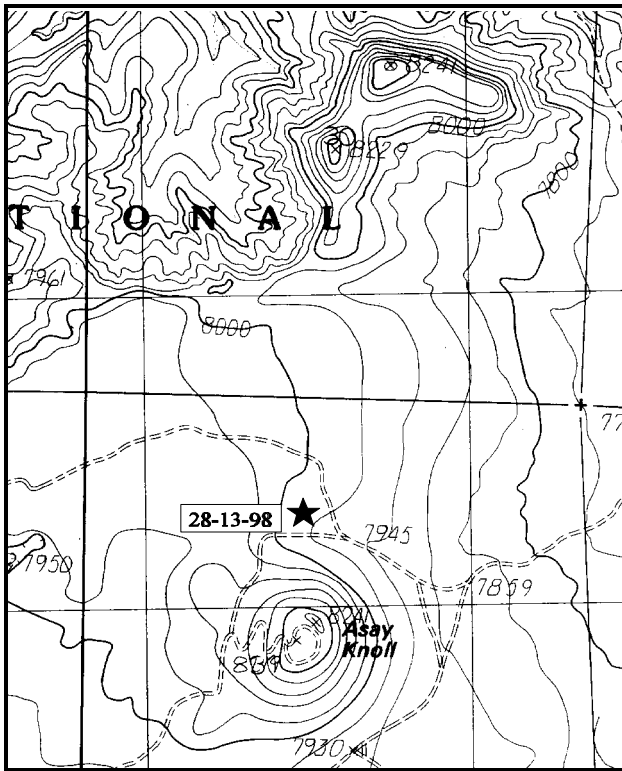
Range type: Sagebrush-Grass Burn .

Compass bearing: frequency baseline 195 degrees.

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

LOCATION DESCRIPTION

Turn off highway 143 onto Mammoth Creek Rd. Drive 3.5 miles, turn right across Mammoth Creek, staying on Road #68. Continue 0.5 miles to a "T" and turn right. Drive another 4.6 miles and turn left onto the Uintah Flat Road. Follow this road for 3.0 miles and turn left onto Road # 371 toward Asay Bench. Go 1.4 miles until you just pass the Asay Bench Exlosure where a faint dirt road circumventing the knoll is visible on the left. Follow this road 0.4 miles to the fork of Road # 1778 and #1776. Stop here then walk NW to the study site 110 paces at a bearing of 320° M. The site is marked with half high fenceposts.



Map Name: Asay Bench

Diagrammatic Sketch

Township 37S, Range 6W, Section 31

UTM 4157389.478 N, 361502.099 E

DISCUSSION

Trend Study No. 28-13 (47-13)

The Asay Knoll trend study was established in 1992. It is located in an 8,000 acre burn in the Asay Bench, Little Mountain, and Uintah Flat area which burned in July of 1989. The elevation at the site is 7,920 feet with a gentle 8% slope and a southeast aspect. The area originally consisted of open sagebrush meadows and Ponderosa pine forests with a fairly dense understory of mountain big sagebrush, bitterbrush, snowberry, serviceberry, and currant. The study site occurs on an open park area with a few burned Ponderosa trees. In 1992, the burned trees were still standing, while in 1998, the burned trees were on the ground. Surrounding the site on the northeast side of Asay Knoll are patches of burned and unburned Ponderosa pine, aspen, and sagebrush-grass meadows. A stock pond is found 1/4 mile away. In 1992, some cattle sign was noted along with some older elk and deer sign. In 1998, a pellet group transect indicated 20 elk days use/acre, 6 deer days use/acre, and 1 cow day use/acre.

Soil textural analysis indicated a sandy loam soil with a neutral pH (7.1). The soil is shallow and rocky with an average effective rooting depth (see methods) of almost 12 inches and a soil temperature of 64.4°F measured at a depth of 12 inches. In the more open areas, the soil is slightly deeper but still rocky on the surface. Erosion is not a problem due to the abundant vegetation, rock, gently slope, and litter cover.

Shrubs are diverse with 13 species encountered in 1998. Shrubs made up 15% of the vegetation cover in 1992 and now make up 51% vegetative cover in 1998. Not all the sagebrush was eliminated by the fire and the surviving plants are vigorous and producing seed. Mountain big sagebrush is the most abundant with an estimated density of 2,340 plants/acre in 1992 and 4,760 plants/acre in 1998. Age structure indicates a healthy population with many seedling and young plants encountered in both years. Utilization is light and vigor is good. Oregon grape density has declined from 6,670 plants/acre in 1992 to 3,900 plants/acre in 1998. These are small stature plants averaging only 5 inches in height. Some bitterbrush are present with an estimated density of 260 plants/acre in 1998. Other shrubs include: several subspecies of rubber rabbitbrush, fendler ceanothus, chokecherry, currant, Wood's rose, and elderberry. Browse on the site is mostly lightly hedged.

The herbaceous understory is diverse and abundant. Perennial grasses currently account for 23% of the total vegetation cover. Muttongrass is the most abundant grass and provides 15% of the herbaceous understory cover. Other grasses include: bottlebrush squirreltail, slender wheatgrass, a sedge, and Letterman's needlegrass. Perennial grass sum of nested frequency has increased from 365 in 1992 to 411 in 1998. In 1992, most of the species were early seral, annual weeds or weedy increaser perennials. This is still the case although some of the early seral species were not encountered in 1998. Forb cover provided 58% of the vegetation cover in 1992. This has decreased to 26% in 1998.

1992 APPARENT TREND ASSESSMENT

Soil conditions are stable with adequate vegetation, litter, and rock cover to help prevent erosion. Browse is diverse with 15 species encountered. Total browse density is 11,760 plants/acre of which 4,040 plants/acre are desirable browse species. Mountain big sagebrush is the key species with an estimated density of 2,340 plants/acre, which are mostly young plants. Apparent trend for sagebrush is up. Other browse species also appear to be slowly increasing in density. The herbaceous understory is also diverse and abundant with nine species of grass and 23 species of forbs encountered during the 1992 reading. Forbs consist primarily of perennial weedy increasers and annual weeds. Nested frequencies of grasses and forbs will likely decline somewhat in the future as succession, natural thinning, and species competition occurs.

TREND ASSESSMENT

soil - stable

browse - improving

herbaceous understory - stable with poor forb composition

1998 TREND ASSESSMENT

The soil trend is stable with an increase in percent vegetation and litter cover. There is no apparent erosion on the site at this time. The browse trend is stable with many species encountered in 1998. The mountain big sagebrush population is healthy with increasing density. The herbaceous understory is slightly upward. Both grass and forb sum of nested frequency has increased since 1992. Several of the early seral annual species encountered in 1992 were not present in 1998.

TREND ASSESSMENT

soil - stable

browse - stable with healthy browse populations

herbaceous understory - slightly upward with an increase in perennial nested frequency

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 13

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'92	'98	'92	'98	'92	'98
G	Agropyron smithii	34	*12	14	4	.75	.09
G	Agropyron trachycaulum	18	*46	6	20	.27	.93
G	Bouteloua gracilis	30	22	9	9	.85	.43
G	Bromus japonicus (a)	-	7	-	2	-	.01
G	Bromus tectorum (a)	-	5	-	1	-	.00
G	Carex spp.	54	38	22	21	2.22	1.31
G	Koeleria cristata	14	15	7	6	.18	.41
G	Poa fendleriana	75	95	26	33	2.07	3.38
G	Poa pratensis	16	25	5	10	.94	.65
G	Poa secunda	-	*24	-	11	-	.73
G	Sitanion hystrix	73	64	31	32	2.17	1.02
G	Stipa columbiana	-	*11	-	5	-	.24
G	Stipa comata	17	*27	6	13	.57	1.01
G	Stipa lettermani	34	32	11	11	2.23	.48
Total Annual Grasses		0	12	0	3	0	0.01
Total Perennial Grasses		365	411	137	175	12.28	10.74
F	Agoseris glauca	-	1	-	1	-	.00
F	Antennaria rosea	6	7	2	3	.30	.30
F	Arabis spp.	36	*6	13	2	.23	.04
F	Artemisia ludoviciana	120	*187	42	55	5.11	5.98
F	Aster spp.	10	*-	4	-	.33	-

Type	Species	Nestled Frequency		Quadrat Frequency		Average Cover %	
		'92	'98	'92	'98	'92	'98
F	Astragalus spp.	-	-	-	-	.00	-
F	Chenopodium album (a)	251	*-	74	-	2.67	-
F	Corydalis aurea	40	*-	17	-	1.66	-
F	Collinsia parviflora (a)	-	*139	-	52	-	.98
F	Crepis acuminata	-	3	-	2	-	.03
F	Descurainia pinnata (a)	34	15	14	8	1.25	.06
F	Epilobium paniculatum (a)	51	44	21	17	.22	1.27
F	Erigeron caespitosus	53	55	20	18	1.65	.46
F	Erigeron divergens	55	*192	22	63	1.22	2.51
F	Erigeron flagellaris	9	*14	4	6	.12	.18
F	Eriogonum racemosum	9	14	4	6	.22	.28
F	Lappula occidentalis (a)	75	*26	31	10	2.00	.05
F	Lepidium spp. (a)	219	*7	67	4	4.82	.07
F	Machaeranthera canescens	1	-	1	-	.00	-
F	Microsteris gracilis (a)	6	5	2	2	.01	.03
F	Phlox longifolia	3	3	2	1	.01	.00
F	Polygonum douglasii (a)	2	1	2	1	.01	.00
F	Potentilla pennsylvanica	1	3	1	1	.18	.01
F	Taraxacum officinale	1	-	1	-	.01	-
F	Tragopogon dubius	6	1	3	1	.01	.03
F	Trifolium spp.	4	5	2	2	.01	.01
F	Verbascum thapsus	-	1	-	1	-	.03
F	Viguiera multiflora	52	*-	24	-	3.88	-
Total Annual Forbs		638	237	211	94	10.98	2.46
Total Perennial Forbs		406	492	162	162	15.02	9.92

* Indicates significant difference at % = 0.10

BROWSE TRENDS --

Herd unit 28 , Study no: 13

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Amelanchier utahensis	1	2	-	.00
B	Artemisia tridentata vaseyana	46	74	1.98	15.49
B	Ceanothus fendleri	7	7	.30	.07
B	Chrysothamnus nauseosus	9	26	.73	.70
B	Haplopappus scopulorum	28	37	.24	1.90
B	Mahonia repens	26	24	1.64	1.81
B	Opuntia spp.	4	7	.03	.36
B	Pinus ponderosa	0	0	.00	-

Type	Species	Strip Frequency		Average Cover %	
		'92	'98	'92	'98
B	Prunus virginiana	4	4	.63	1.06
B	Purshia tridentata	7	12	.14	1.03
B	Ribes cereum cereum	1	2	.03	.03
B	Rosa woodsii	3	5	-	.03
B	Sambucus cerulea	2	2	-	.66
B	Symphoricarpos oreophilus	13	13	.93	.47
Total for Browse		151	215	6.68	23.66

BASIC COVER --

Herd unit 28 , Study no: 13

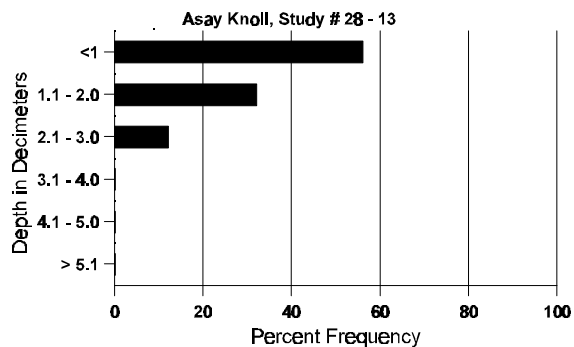
Cover Type	Nested Frequency		Average Cover %	
	'92	'98	'92	'98
Vegetation	429	395	37.31	44.15
Rock	279	392	45.18	39.32
Pavement	20	188	0	2.92
Litter	325	442	23.51	30.92
Cryptogams	-	37	.01	.74
Bare Ground	270	321	20.10	18.57

SOIL ANALYSIS DATA --

Herd Unit 28, Study # 13, Study Name: Asay Knoll

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.0	54.2 (13.7)	6.1	38.7	37.4	23.8	3.9	16.9	160.0	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 28 , Study no: 13

Type	Quadrat Frequency	
	'92	'98
Rabbit	1	4
Elk	16	11
Deer	15	16
Cattle	-	1

BROWSE CHARACTERISTICS --

Herd unit 28 , Study no: 13

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Amelanchier utahensis</i>																		
Y	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
M	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	-	1	-	-	-	-	-	-	-	1	-	-	20	39	50	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%			+50%							
'98		50%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	20	Dec:	-			
												'98	40		-			
<i>Artemisia tridentata vaseyana</i>																		
S	92	10	-	-	4	-	-	-	-	-	14	-	-	-	280		14	
	98	22	-	-	3	-	-	-	-	-	25	-	-	-	500		25	
Y	92	77	2	-	-	-	-	-	-	-	79	-	-	-	1580		79	
	98	81	-	-	-	-	-	1	-	-	82	-	-	-	1640		82	
M	92	35	3	-	-	-	-	-	-	-	38	-	-	-	760	-	38	
	98	126	29	-	1	-	-	-	-	-	155	1	-	-	3120	22	156	
X	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	-	-	-	-	-	-	-	-	-	-	-	-	260		13		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		04%			00%			00%			+51%							
'98		12%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	2340	Dec:	-			
												'98	4760		-			

A G R E	Y R	Form Class (No. of 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 fendleri</i>																		
Y	92	6	2	-	-	-	-	-	-	-	8	-	-	-	160		8	
	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	92	1	4	-	-	-	-	-	-	-	5	-	-	-	100	-	5	
	98	2	5	-	-	-	-	-	-	-	7	-	-	-	140	12	31	7
D	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		46%			00%			00%			-23%							
'98		70%			00%			10%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	260	Dec:	0%			
												'98	200		10%			
<i>Chrysothamnus nauseosus</i>																		
S	92	56	-	-	-	-	-	-	-	-	56	-	-	-	1120		56	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	92	7	-	-	-	-	-	-	-	-	7	-	-	-	140	-	7	
	98	18	-	1	2	-	-	-	-	-	21	-	-	-	420	17	25	21
D	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	7	-	-	1	-	-	-	-	-	6	-	-	2	160		8	
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%			+69%							
'98		00%			03%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	220	Dec:	0%			
												'98	720		22%			
<i>Haplopappus scopulorum</i>																		
S	92	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	92	5	2	-	-	-	-	-	-	-	7	-	-	-	140		7	
	98	8	-	-	1	-	-	-	-	-	9	-	-	-	180		9	
M	92	27	2	-	-	-	-	-	-	-	29	-	-	-	580	-	29	
	98	55	2	-	6	-	-	-	-	-	63	-	-	-	1260	9	10	63
D	92	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		11%			00%			03%			+49%							
'98		03%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	740	Dec:	3%			
												'98	1460		1%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Mahonia repens																		
S	92	22	-	-	-	-	-	6	-	-	28	-	-	-	560		28	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	92	83	-	-	18	-	-	-	-	-	101	-	-	-	2020		101	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	92	221	-	-	16	-	-	-	-	-	237	-	-	-	4740	-	237	
	98	193	-	-	-	-	-	-	-	-	193	-	-	-	3860	5 7	193	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%			-42%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	6760	Dec:	-			
												'98	3900		-			
Opuntia spp.																		
S	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	92	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	3	
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	5 12	5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%			-22%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	180	Dec:	-			
												'98	140		-			
Pinus ponderosa																		
S	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	0	Dec:	-			
												'98	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>Prunus virginiana</i>																		
S	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	92	5	8	-	1	-	-	-	-	-	14	-	-	-	280		14	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	8	-	6	-	-	-	-	-	14	-	-	-	280	33	12	
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		57%			00%			00%			+13%							
'98		50%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	280	Dec:	-			
												'98	320		-			
<i>Purshia tridentata</i>																		
S	92	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	92	5	1	-	1	-	-	-	-	-	7	-	-	-	140		7	
	98	2	1	-	2	-	-	-	-	-	5	-	-	-	100		5	
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	6	-	2	-	-	-	-	-	8	-	-	-	160	13	18	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		14%			00%			00%			+46%							
'98		54%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	140	Dec:	-			
												'98	260		-			
<i>Ribes cereum cereum</i>																		
Y	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40	27	38	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'92		00%			00%			00%			+50%							
'98		50%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'92	20	Dec:	-			
												'98	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			
<i>Rosa woodsii</i>																	
S	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	92	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	4
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	19 12	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			00%			-58%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	240	Dec:	-		
												'98	100		-		
<i>Sambucus cerulea</i>																	
S	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40	37 29	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		00%			00%			00%			+ 0%						
'98		50%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	40	Dec:	-		
												'98	40		-		
<i>Symphoricarpos oreophilus</i>																	
S	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	92	8	8	2	-	-	-	-	-	-	18	-	-	-	360		18
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	92	-	7	1	-	-	-	-	-	-	8	-	-	-	160	-	8
	98	16	1	-	1	-	-	-	-	-	18	-	-	-	360	13 27	18
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'92		58%			12%			00%			-31%						
'98		06%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'92	520	Dec:	-		
												'98	360		-		

Trend Study 28-14-98

Study site name: Sheep Hollow West .

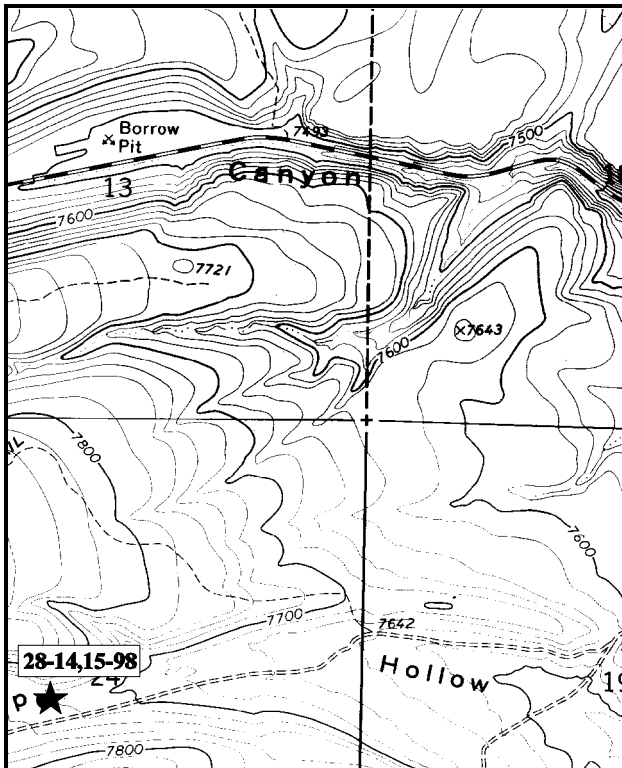
Range type: Black Sagebrush .

Compass bearing: frequency baseline 246 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

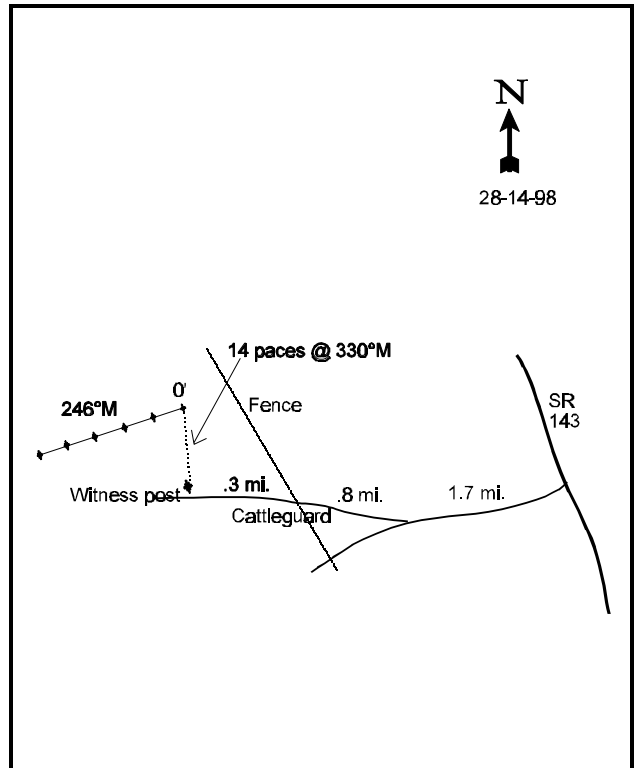
LOCATION DESCRIPTION

From Panguitch, head south on SR 143 to mile marker 47. Go 0.1 mile west of mile marker 47 and turn south onto a dirt road heading towards Sheep Hollow. Drive 1.7 miles to a fork. Stay right and continue 0.8 miles to a fence and cattleguard. Cross the cattleguard and go 0.3 miles to a witness post on the right side of the road. The 0-foot baseline stake is 14 paces from the witness post at 330° magnetic. The 0-foot stake has browse tag #500 attached.



Map Name: Panguitch

Township 35S, Range 6W, Section 24



Diagrammatic Sketch

UTM 4179100.580 N, 369558.828 E

DISCUSSION

Study Site No. 28-14

This new site, Sheep Hollow West, was established in 1998 to monitor important winter range on the west side of the unit. Much of the winter range on this side of unit 28 is being affected by the encroachment of pinyon and juniper trees. An example of this is found in the Panguitch trend study site (# 28-2). Much of the important winter range on this side of the unit consists of black sagebrush ridges with bitterbrush and big sagebrush subspecies in the deeper soils of the drainage bottoms. Big game animals utilize these areas during most of the year and especially during the winter when deep snow pushes them to lower elevations. This site samples a wide drainage bottom which supports a dense population of black sagebrush with a good bitterbrush component. Slope is only 2% with a slight north aspect and an elevation of approximately 7,800 feet. The area is used by a variety of wildlife and livestock. Pellet group data from 1998 estimate 15 deer, 7 elk and 12 cow use days/acre. Some of these groups are old and likely from last winter. A few antelope pellet groups were also identified. Two dozen antelope were seen west of the site during study site establishment. Deer were also seen in the area. This area was historically a sheep range but use has been switched to cattle. The west side of the fence is permitted to be grazed by 296 AUM's from June to October, but has received little use during the past 3 years (1996-98). Cattle are currently utilizing the adjacent pasture to the east where trend study # 28-15 was placed.

Soil on the site is moderately deep with an effective rooting depth (see methods) of 15 inches. Texture is a clay loam with a slightly acid pH (6.3). Parent material is basalt. The soil profile is moderately rocky and rock and pavement cover approximately 13% of the ground surface. Bare soil has a relatively high cover value of 18%, yet erosion is minimal due to the relatively high vegetation and litter cover combined with the gentle terrain.

The site supports a dense stand of black sagebrush at an estimated density of 8,560 plants/acre. Mature plants are large, averaging 16 inches in height. Black sagebrush provides 64% of the browse cover with a cover value of 14%. There are some Wyoming big sagebrush plants on the site and there is some hybridizing between the two species. The black sagebrush shows mostly moderate to heavy use with good vigor, however it has a relatively high percent decadence of 39%. Currently, 15% of the population has died in the last 5-10 years. This period of thinning appears to have slowed down and stabilized for now. Within the next five years, the percent dead in the population would not be expected to exceed 17-18%. Recruitment is good and mature plants had abundant seed heads. Age class distribution would indicate a stable population. Bitterbrush also provides important forage as it provides 20% of the browse cover. Density is estimated at 540 mostly mature plants/acre. These plants show mostly moderate use, good vigor and low percent decadence at only 4%. Black sagebrush and bitterbrush together contribute 84% of the browse cover on this site.

Other browse encountered on the site consist of low rabbitbrush, stickleaf low rabbitbrush, and isolated patches of Wyoming big sagebrush. Pinyon and juniper tree density was estimated at 10 to 15 trees/acre. These were hand cut here and around the surrounding area earlier this season as part of a tree thinning treatment. Only a few scattered young trees were left.

The herbaceous understory is diverse and abundant considering the high amount of shrub cover (22%). Grasses dominate the herbaceous cover by providing 77% of the herbaceous cover. Twelve species of perennial grass and one sedge were encountered in 1998. The most common species included mutton bluegrass and Letterman needlegrass which together produce 84% of the grass cover.

Forbs are also diverse with 18 perennial and 2 annual species found in 1998. Common species include: Indian paintbrush, Eaton fleabane, sulfur and redroot eriogonum, Lewis flax, and Utah deervetch. These species provide important succulent spring forage for big game animals.

1998 APPARENT TREND ASSESSMENT

Trend for soil appears stable with adequate protective ground cover to prevent erosion. Trend for browse appears stable with a relatively high turnover for black sagebrush. There is a high number of dead plants, but reproduction appears adequate to maintain the population at this time. Use is mostly moderate and vigor is good. Bitterbrush on the site also appear stable. Utilization is moderate to heavy, yet vigor is good on all plants and percent decadence is low at only 4%. The herbaceous understory is abundant and very diverse providing a total of 21% cover. Currently, mutton bluegrass and Letterman needlegrass dominate the grass component. Several preferred forbs occur and provide important spring forage for big game.

HERBACEOUS TRENDS --

Herd unit 28 , Study no: 14

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron smithii	3	1	.00
G	Agropyron spicatum	6	2	.03
G	Agropyron trachycaulum	4	1	.03
G	Bouteloua gracilis	4	1	.03
G	Bromus inermis	5	1	.03
G	Carex spp.	21	7	.63
G	Koeleria cristata	27	10	.44
G	Oryzopsis hymenoides	2	1	.03
G	Poa fendleriana	232	69	8.61
G	Sitanion hystrix	74	33	.97
G	Stipa columbiana	8	3	.19
G	Stipa comata	12	6	.10
G	Stipa lettermani	183	72	4.86
Total Annual Grasses		0	0	0
Total Perennial Grasses		581	207	15.97
F	Antennaria rosea	16	5	.36
F	Arabis spp.	1	1	.01
F	Astragalus convallarius	8	5	.21
F	Astragalus spp.	3	1	.00
F	Castilleja linariaefolia	49	25	1.24
F	Erigeron eatonii	63	29	.59
F	Erigeron flagellaris	9	4	.07
F	Erigeron pumilus	25	8	.04
F	Eriogonum racemosum	55	29	.45
F	Eriogonum umbellatum	46	21	.79
F	Hymenoxys richardsonii	1	1	.03
F	Linum lewisii	46	19	.25

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
F	Lotus utahensis	35	15	.42
F	Lupinus kingii (a)	4	2	.03
F	Lychnis drummondii	7	3	.01
F	Machaeranthera canescens	5	3	.06
F	Penstemon caespitosus	3	1	.03
F	Penstemon spp.	3	1	.00
F	Phlox longifolia	58	24	.17
F	Polygonum douglasii (a)	11	4	.02
Total Annual Forbs		15	6	0.05
Total Perennial Forbs		433	195	4.79

BROWSE TRENDS --

Herd unit 28 , Study no: 14

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	95	13.73
B	Artemisia tridentata wyomingensis	2	-
B	Chrysothamnus depressus	10	.40
B	Chrysothamnus viscidiflorus viscidiflorus	54	2.79
B	Gutierrezia sarothrae	3	.21
B	Opuntia spp.	1	-
B	Purshia tridentata	23	4.41
Total for Browse		188	21.54

BASIC COVER --

Herd unit 28 , Study no: 14

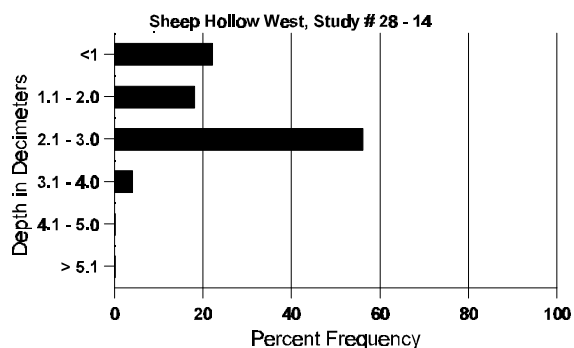
Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	411	51.18
Rock	187	5.71
Pavement	239	6.77
Litter	474	39.84
Cryptogams	100	3.50
Bare Ground	314	18.07

SOIL ANALYSIS DATA --

Herd Unit 28, Study # 14, Study Name: Sheep Hollow West

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.0	63.6 (16.0)	6.3	40.7	27.4	31.8	2.2	18.4	131.2	.3

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 28 , Study no: 14

Type	Quadrat Frequency '98
Rabbit	6
Elk	5
Deer	10
Cattle	1
Antelope	1

BROWSE CHARACTERISTICS --

Herd unit 28 , 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	98	17	-	-	2	-	-	-	-	-	19	-	-	-	380		19	
Y	98	10	9	-	10	-	-	-	-	-	29	-	-	-	580		29	
M	98	86	96	44	2	-	-	4	-	-	232	-	-	-	4680	16	22	234
D	98	65	79	13	2	-	-	6	-	-	153	-	-	12	3300		165	
X	98	3	2	-	-	-	-	-	-	-	3	-	-	-	1560		78	
% Plants Showing '98		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		43%			13%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'98	8560	Dec:	39%			

A Y G R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
	1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Artemisia tridentata wyomingensis</i>																	
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	98	1	-	1	-	-	-	-	-	-	2	-	-	-	40	-	2
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 33%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'98	60	Dec:	-			
<i>Chrysothamnus depressus</i>																	
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
M	98	10	-	-	-	-	-	-	-	-	9	-	-	-	200	7	10
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'98	240	Dec:	-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
Y	98	12	-	-	4	-	-	-	-	-	16	-	-	-	320		16
M	98	117	-	-	4	-	-	-	-	-	120	-	-	-	2420	8	12
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'98	2740	Dec:	-			
<i>Gutierrezia sarothrae</i>																	
M	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	6	8
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'98	80	Dec:	-			
<i>Opuntia spp.</i>																	
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	12
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'98	20	Dec:	-			
<i>Purshia tridentata</i>																	
Y	98	-	1	-	3	-	-	-	-	-	4	-	-	-	80		4
M	98	3	15	4	-	-	-	-	-	-	22	-	-	-	440	23	36
D	98	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing '98		<u>Moderate Use</u> 59%			<u>Heavy Use</u> 19%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)											'98	540	Dec:	4%			

Trend Study 28-15-98

Study site name: Sheep Hollow East .

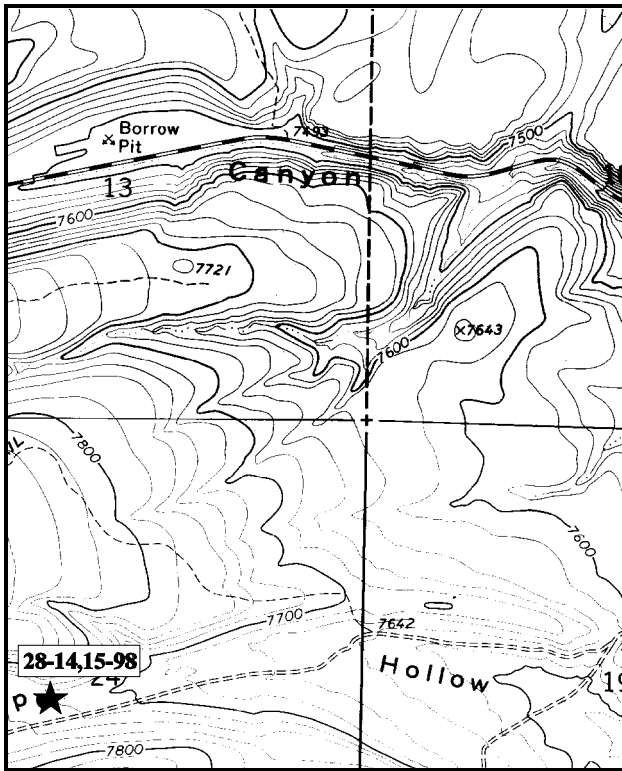
Range type: Black Sagebrush .

Compass bearing: frequency baseline 64 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

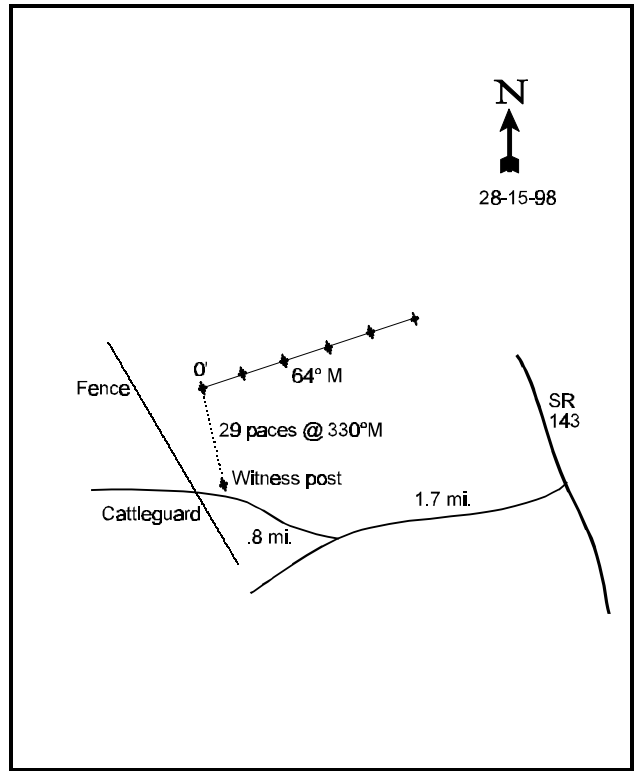
LOCATION DESCRIPTION

From Panguitch, head south on SR 143 to mile marker 47. Go 0.1 mile west of mile marker 47 and turn south onto a dirt road heading towards Sheep Hollow. Drive 1.7 miles to a fork. Stay right and continue 0.8 miles to a fence and cattleguard. The witness post is on the right side of the road just before the cattleguard. From the witness post, the 0-foot stake is 29 paces away at 330° magnetic and is marked with browse tag #496.



Map Name: Panguitch

Township 35S, Range 6W, Section 24



Diagrammatic Sketch

UTM 4179243.446 N, 370006.257 E

DISCUSSION

Trend Study No. 28-15

Sheep Hollow East, is a new site placed about ½ of a mile to the east of the Sheep Hollow West (#28-14) study. It is placed across a fence from #28-14, on a different pasture which receives heavier grazing pressure. The area was historically grazed by sheep until 1991 when use was changed to cattle. Wildlife also appear to be using this site more heavily than the #28-14 site. Pellet group data from 1998 estimate 27 deer, 15 elk and 22 antelope days use/acre. About 12 cows were utilizing the site during study site establishment. This pasture is permitted to be grazed by 800 AUM's with season long use from June to October. The cows are moved around the pasture by utilizing various water sources at different times of the year. A few antelope were seen near the site but most of the wildlife sign was old, likely from the previous winter. Slope on the site is slight (2%) with a slight east aspect. Elevation is about 7,800 feet. Escape and thermal cover are minimal on the site but some can be found about 300 yards from the site.

Ground cover characteristics are very similar to the Sheep Hollow West study site (#28-14). However, soil on this site is more shallow with more rock concentrated near the surface compared to the adjacent study. Effective rooting depth is estimated at almost 12 inches. Soil texture is a sandy loam with a neutral pH (7.1). The profile is very rocky in most places, especially at the beginning of the baseline. Parent material is a basalt. Erosion does not appear to be a serious problem on the site but some past erosion is evident in the form of severe soil pedestaling around bunch grasses and shrubs. Two gullies also border the site. It is also interesting to note that cryptogamic cover is very low on this site compared to the adjacent site where it has a 3 times higher cover value.

This site supports a similar mix of black sagebrush and bitterbrush with a grass-forb understory. Black sagebrush is the most abundant shrub providing 21% cover which accounts for 80% of the shrub cover. Estimated density is high at 7,840 plants/acre, 68% of which are mature. Mature plants are relatively large for black sagebrush, with an average height of 18 inches. Utilization is mostly light to moderate, although a few plants are heavily hedged. Vigor is good on most plants and percent decadence is lower at 28% than the neighboring site. Bitterbrush provides 16% of the browse cover with an estimated density of 600 plants/acre. These shrubs display moderate to heavy use, good vigor, and low decadence at only 3%.

The pinyon and juniper trees on this site were also hand cut this spring. Trees were scattered at only about 20 trees/acre. Currently, only a few small young trees are left. Other browse found on the site include a few basin big sagebrush which are growing on isolated areas of deep soil. Stickyleaf low rabbitbrush, broom snakeweed, Oregon grape, prickly pear, and gray horsebrush were also found on the site in small numbers.

The herbaceous understory is similarly diverse but not nearly as abundant compared to the Sheep Hollow West study site. Eleven species of perennial grasses, one annual grass and one sedge were encountered. These combined to produce only 8% cover. The only abundant species included in order of abundance: blue grama, bottlebrush squirreltail, Letterman needlegrass, and mutton bluegrass. Many of the preferred grass species were found growing under the protection of shrubs. Blue grama is found in the shrub interspaces, being a warm season species it would be less effected by livestock use than the cool season species. Twenty-three perennial and 3 annual forbs were classified on the site. Of these, only sulfur and redroot eriogonum, two fleabane species, hoary aster, and longleaf phlox are more than occasionally found.

1998 APPARENT TREND ASSESSMENT

The soil trend appears stable but erosion has occurred on this site in the past and the two gullies near the site appear to be occasionally active. Trend for key browse, black sagebrush and bitterbrush, appears stable but black sagebrush on this site has more decadent plants which were classified as dying than young plants to replace them. This may lead to a slight decline in shrub density in the future if reproduction does not

improve. This likely trend is clearly more correlated to the more shallow soils on this site causing more intraspecific competition during extended periods of drought. The herbaceous understory is similarly diverse as the adjacent site, but grass cover is one-half that of the Sheep Hollow West site and where a third of the of the grass cover comes from blue grama, a warm season increaser. The forb component is also similarly diverse but composition is lacking in preferred species. Preferred forbs, Indian paintbrush, Eaton fleabane, redroot eriogonum, sulfur eriogonum, Lewis flax, and Utah deervetch on this site has a sum of nested frequency value three and one-half times lower and provides one-fourth less cover than the adjacent Sheep Hollow West site.

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 15

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron intermedium	3	2	.01
G	Agropyron smithii	2	1	.01
G	Bouteloua gracilis	175	61	2.76
G	Bromus carinatus	23	9	.12
G	Bromus tectorum (a)	7	4	.02
G	Carex spp.	3	2	.06
G	Koeleria cristata	3	1	.03
G	Oryzopsis hymenoides	4	2	.18
G	Poa fendleriana	40	15	.76
G	Sitanion hystrix	116	42	1.57
G	Stipa columbiana	9	4	.21
G	Stipa comata	16	8	.38
G	Stipa lettermani	62	24	1.63
Total Annual Grasses		7	4	0.02
Total Perennial Grasses		456	171	7.76
F	Alyssum alyssoides (a)	6	2	.01
F	Arabis spp.	11	5	.05
F	Astragalus convallarius	11	5	.22
F	Astragalus spp.	9	3	.02
F	Castilleja linariaefolia	17	8	.16
F	Chaenactis douglasii	7	4	.02
F	Cryptantha spp.	6	3	.04
F	Descurainia spp. (a)	2	2	.01
F	Erigeron divergens	20	10	.15
F	Erigeron eatonii	7	3	.01
F	Erigeron flagellaris	8	2	.38
F	Erigeron pumilus	25	12	.11
F	Eriogonum racemosum	23	12	.21

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
F	Eriogonum umbellatum	31	18	.49
F	Euphorbia robusta	5	2	.09
F	Gilia spp. (a)	4	3	.01
F	Linum lewisii	9	5	.05
F	Lotus utahensis	4	2	.06
F	Lupinus argenteus	12	5	.25
F	Lychnis drummondii	1	1	.00
F	Lygodesmia spinosa	23	10	.18
F	Machaeranthera canescens	28	15	.15
F	Oenothera pallida	17	6	.08
F	Phlox longifolia	23	11	.08
F	Senecio multilobatus	1	1	.03
F	Trifolium spp.	2	1	.00
Total Annual Forbs		12	7	0.03
Total Perennial Forbs		300	144	2.89

BROWSE TRENDS --
Herd unit 28 , Study no: 15

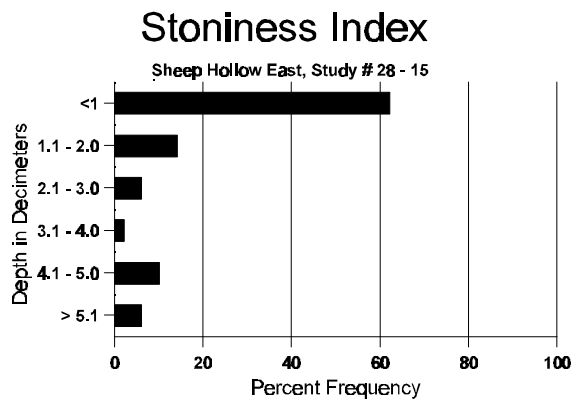
Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	96	20.73
B	Artemisia tridentata tridentata	9	.77
B	Ceanothus fendleri	1	-
B	Chrysothamnus nauseosus	0	-
B	Chrysothamnus viscidiflorus viscidiflorus	9	.24
B	Gutierrezia sarothrae	1	.03
B	Mahonia repens	9	.01
B	Opuntia spp.	3	-
B	Pinus edulis	1	.03
B	Purshia tridentata	23	4.14
B	Tetradymia canescens	1	-
Total for Browse		153	25.96

BASIC COVER --
Herd unit 28 , Study no: 15

Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	379	44.70
Rock	136	5.99
Pavement	222	6.91
Litter	493	45.79
Cryptogams	22	.04
Bare Ground	277	16.03

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 15, Study Name: Sheep Hollow East

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.5	64.4 (11.6)	7.1	62.7	21.4	15.8	2.6	24.8	262.4	.3



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 15

Type	Quadrat Frequency '98
Rabbit	3
Elk	5
Deer	26
Cattle	6
Antelope	1

BROWSE CHARACTERISTICS --

Herd unit 28 , 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	5	6	7	8	9	1	2	3	4				
<i>Artemisia nova</i>																	
S	98	10	1	-	-	-	-	-	-	-	11	-	-	-	220		11
Y	98	9	5	-	2	-	-	-	-	-	15	1	-	-	320		16
M	98	147	94	25	-	-	-	-	-	-	259	7	-	-	5320	18	28
D	98	69	35	2	-	2	-	-	-	-	90	-	-	18	2200		110
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1180		59
% Plants Showing '98		<u>Moderate Use</u> 35%			<u>Heavy Use</u> 07%			<u>Poor Vigor</u> 05%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)												'98	7840	Dec:	28%		
<i>Artemisia tridentata tridentata</i>																	
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	98	6	3	-	-	-	-	-	-	-	7	-	-	-	180	40	48
D	98	2	1	-	-	-	-	-	-	-	3	-	-	-	60		3
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4
% Plants Showing '98		<u>Moderate Use</u> 31%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)												'98	260	Dec:	23%		
<i>Ceanothus fendleri</i>																	
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)												'98	20	Dec:	-		
<i>Chrysothamnus nauseosus</i>																	
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	24
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)												'98	0	Dec:	-		
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	98	10	1	-	-	-	-	-	-	-	11	-	-	-	220	8	15
D	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing '98		<u>Moderate Use</u> 08%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)												'98	260	Dec:	8%		
<i>Gutierrezia sarothrae</i>																	
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	18
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)												'98	20	Dec:	-		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Mahonia repens</i>																		
Y	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	98	32	-	-	8	-	-	-	-	-	40	-	-	-	800	-	40	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	880	Dec:	-			
<i>Opuntia spp.</i>																		
M	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60	8	6	3
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	60	Dec:	-			
<i>Pinus edulis</i>																		
Y	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	20	Dec:	-			
<i>Purshia tridentata</i>																		
Y	98	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
M	98	2	15	10	-	-	-	-	-	-	27	-	-	-	540	31	50	27
D	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 53%			<u>Heavy Use</u> 33%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	600	Dec:	3%			
<i>Tetradymia canescens</i>																		
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	18	1
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	20	Dec:	-			

SUMMARY

WILDLIFE MANAGEMENT UNIT - 28 (47) - PANGUITCH LAKE

The severe deer winter range on this unit is restricted to the western portion of the herd unit below the Hurricane Cliffs. Five vegetation trend studies occur on this range including Swayback Knoll (#5), Cottonwood (#6), Paragonah (#7), Grass Valley (#8), and Elliker Basin (#11). Four of the five pellet group transects on this range reveal a gradual decrease in use since 1987, when buck harvests reached their highest levels since the early 1970's. However, the Elliker Basin pellet group transect has increased steadily since 1987, when 118 deer days use/ha were estimated. During the winter of 1991-1992, 178 deer days use/ha were estimated. Browse trend for the Elliker basin vegetation transect is down due to increased decadency and poor sagebrush recruitment. Heavy browsing does not seem to be the cause for this downward trend because the proportion of heavy utilized shrubs went down from 30% in 1987 to 16% in 1992. Browse trends are slightly down or down on all sites. Soil trends are stable to slightly improved on all sites. However, the herbaceous trends were stable to slightly up on sites 7, 8, and 11, the remaining two sites downward trends.

Two study sites sample normal winter range on the east side of the unit. These include Three Creeks (#1), an old chained area, and Panguitch (#2) a pinyon-juniper site south of Panguitch. The Three Creeks and Panguitch site has stable trends for browse, grasses, and soil.

The transition range study sites sample the Upper Bear Valley (#3) and Buckskin Valley (#4) areas. The seeded range in Bear Valley had been grazed recently before the 1992 reading. The soil trend is slightly down. The browse trend is slightly down as well, due to decreased sagebrush densities and increases in less desirable rabbitbrush. The herbaceous trend is up, especially for grasses. The Buckskin Valley site is located near a pellet group transect which shows the highest five-year average ddu/ha (146) for the unit during the 1987-92 period. The soil trend is slightly up and the herbaceous trend is down. Browse trend is slightly down for mountain big sagebrush, even though densities actually went up slightly. Since 1987, the proportion of heavily hedged sagebrush rose from 20% to 32%, while percent decadency increased from 36% to 56%. Vigor has also declined. Bitterbrush, another important browse on the site, nearly doubled in density but is still being heavily utilized. Overall browse trend on this site is slightly down.

Two summer range sites were reread during the 1992 reading, Little Valleys (#9) and Red Desert (#10). A new summer range study site was established on a burned Ponderosa pine/sagebrush area at Asay Knoll (#13). The aspen transects of Little Valleys and Red Desert display stable soil trends and stable to slightly improving herbaceous trends. Browse trends are up for Little Valleys and stable to slightly up for Red Desert. Apparent trends for Asay Knoll included a stable soil and herbaceous understory trend with an improving browse trend.

Herd Unit Management Strategies

The management objective for the summer range sites in Little Valleys and the Red Desert should be to maintain aspen as the dominant cover type. The site above Little Valleys samples a grove of aspen that has a fair amount of regeneration evident in the understory. This is not necessarily the case with adjacent stands which vary as to the extent of regeneration and conifer invasion. The Red Desert site is in a later stage of succession, with subalpine fir and Engelmann spruce comprising 54% of the browse/tree composition. The understory in both sites is rated as providing good ground cover and a good mixture of herbaceous species.

Given the high percentage of private ownership (41%) of the severe winter deer range, special consideration should be given to acquisition of available parcels in key areas and management of optimum habitat conditions on public lands (federal and state). Where pinyon and juniper are becoming reestablished on chained areas, maintenance projects should be designed and carried out to maintain the productivity of browse species.

Site	1992			1998		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & Forbs
28-01 Three Creeks	0	+	+	0	0	0
28-02 Panguitch	-	-	-	0	0	0
28-03 Bear Valley	-	-	0	+	0	0
28-04 Buckskin Valley	0	-	+	+	-	-
28-05 Swayback Knoll	-	0	+	+	-	-
28-06 Cottonwood	0/-	0	0	+	-	-
28-07 Paragonah	-	0	-	+	-	0
28-08 Grass Valley	0	-	0	+	-	+
28-09 Little Valley	0	+	0	0	0	-
28-10 Red Desert	0	0/+	+	0	0	-
28-11 Elliker Basin	0	-	0	0	-	0
28-13 Asay Knoll	ESTABLISHED IN 1992			0	0	+
28-14 Sheep Hollow West	ESTABLISHED IN 1998			ESTABLISHED IN 1998		
28-15 Sheep Hollow East	ESTABLISHED IN 1998			ESTABLISHED IN 1998		

(0) = stable, (+) = upward, (-) = downward, (0/-) = stable to slightly downward, (0/+) = stable to slightly upward

LEAMINGTON BURN STUDIES - SPECIAL PROJECTS

Introduction

In 1996, Utah experienced its most active, extensive, and devastating fire season. In Millard and Juab Counties alone, some 250,000 acres were burned. The Leamington Complex was the largest burned area covering approximately 138,340 acres of mostly pinyon-juniper woodland. Rehabilitation efforts began in the fall of 1996 which included drilling the more accessible low-lying areas, and then the remainder was aerially seeded and chained one-way to cover the seed. On the Leamington Complex, about 6,100 acres were treated with a rangeland drill, 10,736 acres were aerially seeded and followed by a one-way chaining with an Ely chain to help cover the seed, and 8,308 acres were aerially seeded only. Aerially seeding and then chaining is an effective method of breaking up burned trees which provide valuable surface litter to help protect the soil from erosion, as well as enhancing seedling establishment by covering the seed. This practice was stopped temporarily because of concerns voiced by environmental and Native American groups with regard to archeological resources in the burned areas even though an archeological survey had been completed. During the summer of 1997, two permanent range trend study sites were placed; one located in a burned and seeded area, and the other established in the immediate area where it had been burned, seeded, then chained one-way. The purpose of these sites was to monitor any differences in secondary succession and seedling establishment on these two treatments. Four (2 paired sites) additional trend studies were established in 1998. Data summaries from these sites are found in this section including study site maps, data tables and a text narrative.

Seed Lists

Leamington Burn (21-10) and Leamington Burn & Chain (21-21) sites occur within the Little Sage chaining treatment area which included approximately 3,765 acres. The seed mix for the area is listed below.

Aerial Mix

Species	Pounds of Seed	Pounds per acre
High Crest (<i>Agropyron cristatum</i>)	12,450	3.3
Rye (<i>Elymus junceus</i>)	12,450	3.3
Tall wheatgrass (<i>Agropyron elongatum</i>)	8,300	2.2
Great Basin Wildrye (<i>Elymus cinereus</i>)	2,000	0.53
Smooth brome (<i>Bromus inermis</i>)	600	0.16
Alfalfa (<i>Medicago sativa</i>)	1,200	0.32
Small burnet (<i>Sanguisorba minor</i>)	500	0.13

Dribbler Mix

Fourwing saltbush (<i>Atriplex canescens</i>)	3,700	1.0
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Seed list for Paul Bunyon Burn (19B-19) and Paul Bunyon Burn & Chain (19B-20). Total treatment area is approximately 3,779 acres.

Aerial Mix

Species	Pounds of Seed	Pounds per acre
High Crest (<i>Agropyron cristatum</i>)	15,100	4.0
Rye (<i>Elymus junceus</i>)	11,350	3.0
Tall wheatgrass (<i>Agropyron elongatum</i>)	7,500	2.0

Dribbler Mix

Fourwing saltbush (<i>Atriplex canescens</i>)	3,800	1.0
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Seed list for Jericho State Section 19B-21. Treatment area included approximately 1,200 acres.

Aerial Mix

Species	Pounds per acre
High Crest (<i>Agropyron cristatum</i>)	5.0
Intermediate Wheatgrass (<i>Agropyron intermedium</i>)	3.0
Alfalfa (<i>Medicago sativa</i>)	1.0
Yellow Sweet Clover (<i>Melilotus officinalis</i>)	0.5

Seed list for Jericho BLM 19B-22. Treatment area included approximately 2,131 acres.

Aerial Mix

Species	Pounds of Seed	Pounds per acre
High Crest (<i>Agropyron cristatum</i>)	6,550	3.1
Rye (<i>Elymus junceus</i>)	4,400	2.1
Tall wheatgrass (<i>Agropyron elongatum</i>)	4,250	2.0
Smooth Brome (<i>Bromus inermis</i>)	4,000	1.9

Dribbler Mix

Fourwing saltbush (<i>Atriplex canescens</i>)	2,150	1.0
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Trend Study 19B-19-98

Study site name: Paul Bunyon Burn .

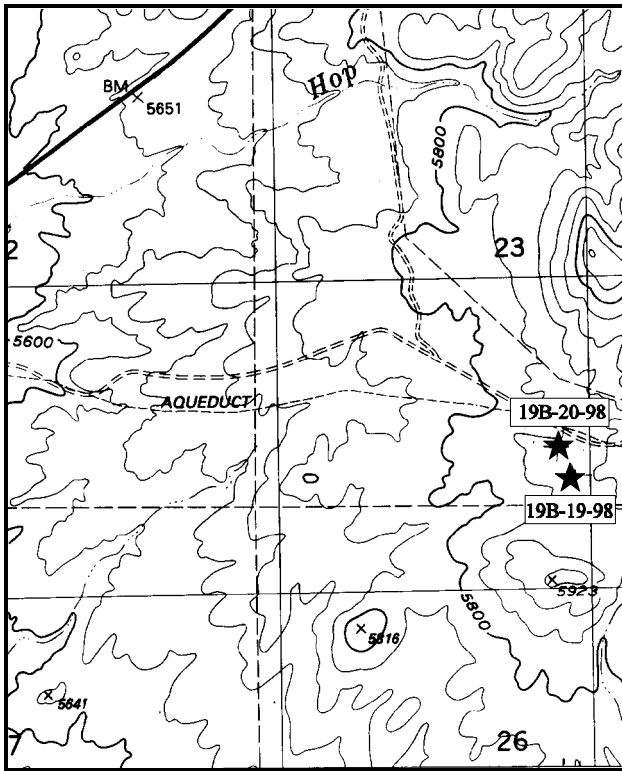
Range type: Burn and Seeded

Compass bearing: frequency baseline 68 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

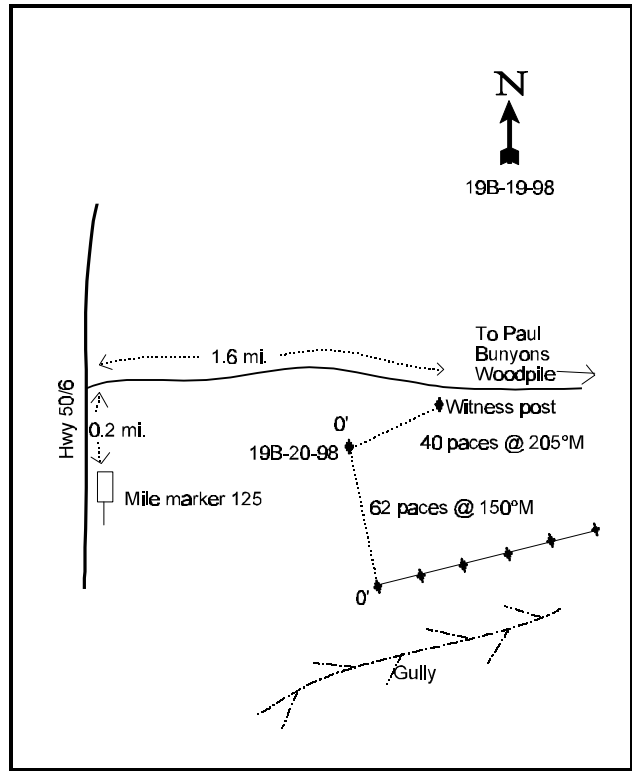
LOCATION DESCRIPTION

From Hwy 50/6 go 0.2 miles north of mile marker 125. Turn right heading toward the Paul Bunyon Woodpile. Drive 1.6 miles to a four foot tall witness post on the right side of the road. The 0-foot stake for study 19B-20 is 40 paces at 205°M. The 0-foot stake for 19B-19 is 62 paces at 150°M from the other sites 0-foot stake. The site is marked by short green fenceposts. The 0-foot stake is marked by browse tag # 66.



Map Name: McIntyre, Utah

Township 12S, Range 3W, Section 23



Diagrammatic Sketch

UTM 4401333.916 N, 401960.434 E

DISCUSSION

Trend Study No. 19B-19

This is a new trend study site established in 1998 to monitor a burned and seeded pinyon-juniper area similar to the Leamington Burn site mentioned earlier (# 21-20). This site, Paul Bunyon Burn, and the adjacent Paul Bunyon Burn and Chained site (19B-20) are also part of the extensive Leamington burn complex which burned approximately 138,340 acres of mostly pinyon-juniper rangelands. Rehabilitation efforts were started during the fall of 1996 and included drilling, chaining, and seeding. This site samples a burned site that was aerially seeded and not chained. A nearby burned area that was aerially seeded then chained is sampled by study # 19B-20 to contrast the difference between the two treatments. The Paul Bunyon Burn site has a west aspect with a gentle slope of 8 to 10%. Elevation is approximately 5,900 feet. Pellet group data indicates little use of the area by deer with only one pellet group found. Rabbit sign was fairly common.

Soil at the site is moderately deep with an effective rooting depth estimated at 14 inches. Soil texture is a sandy clay loam with a neutral pH (7.0). Rock is not abundant on the surface at only 3% cover, but pavement is common with a high cover value of 32%. Rock index data shows that most rocks are concentrated under the surface between 4 and 12 inches in depth. Due to the sandy texture of the soil, combined with high surface pavement cover, average soil temperature is high at 70°F at a depth of almost 16 inches. Bare soil is common with a cover value of 40%. It is most common under burned juniper trees where little vegetation of any kind is found. Some erosion is occurring on the site but it is localized and not severe.

Before the 1996 fire, this site was dominated by juniper trees. Point quarter data on dead trees estimated a density of 331 trees/acre. Most of these were large older trees and average trunk diameter is estimated at 7.6 inches. A few sagebrush occurred prior to the burn but density was low. The only browse found on the site after the fire is a few seeded fourwing saltbush plants.

Grasses provide most of the vegetative cover on the site, but cheatgrass is the most abundant species providing a total of almost 13% cover which equates to 76% of the grass cover. The only common perennial species are seeded crested wheatgrass and Russian wildrye which combine to produce just over 3% cover. Seeded grasses, tall wheatgrass and smooth brome, are present but rare. Native grasses are represented by small numbers of Indian ricegrass and bottlebrush squirreltail. These were likely depleted prior to the fire due to the high density of juniper trees. Grasses are vigorous with some of the seeded species growing to a height of 3 feet. Forbs are lacking and provide only 4% cover. Of the 7 annual and 6 perennial forbs encountered on the site, only prickly lettuce is abundant. No forbs were included within the aerial seed mix due to planned future spraying of the site to control noxious weeds.

1998 APPARENT TREND ASSESSMENT

There is a considerable amount of bare soil on the site, 40%, but erosion does not appear to be a problem due mostly in part to the lack of slope. The soil trend will likely improve as more herbaceous vegetation becomes established in the future. There is little browse on the site. The few fourwing saltbush encountered appear to be well established. The herbaceous understory is well established, but cheatgrass is dominant and provides 76% of the grass cover and 60% of the herbaceous cover. All of the seeded grasses contained in the seed mix are found on the site, however only crested wheatgrass and Russian wildrye occur more than occasionally. Native grasses, Indian ricegrass and bottlebrush squirreltail, are also present but rare. They were likely depleted prior to the fire due to the high juniper tree density (331 trees/acre). Forb composition is poor with weedy biennial and annual species providing most of the cover. This condition will likely improve in time.

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 19

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron cristatum	58	25	1.64
G	Agropyron elongatum	7	3	.33
G	Bromus inermis	-	-	.00
G	Bromus tectorum (a)	268	79	12.52
G	Elymus junceus	27	9	1.49
G	Oryzopsis hymenoides	4	2	.21
G	Sitanion hystrix	2	1	.38
Total for Annual Grasses		268	79	12.52
Total for Perennial Grasses		98	40	4.06
F	Alyssum alyssoides (a)	45	19	.26
F	Argemone munita	-	-	.30
F	Astragalus spp.	3	2	.01
F	Carduus nutans (a)	2	1	.00
F	Chaenactis douglasii	11	5	.24
F	Cruciferae	10	5	.24
F	Descurainia pinnata (a)	8	3	.18
F	Eriogonum cernuum (a)	16	7	.23
F	Lactuca serriola	68	36	2.51
F	Lesquerella spp.	-	-	.00
F	Nicotiana attenuata (a)	-	-	.00
F	Salsola iberica (a)	1	1	.01
F	Sisymbrium altissimum (a)	4	2	.31
Total for Annual Forbs		76	33	1.02
Total for Perennial Forbs		92	48	3.32

BROWSE TRENDS --
Herd unit 19B, Study no: 19

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	0	-
B	Atriplex canescens	2	.03
B	Juniperus osteosperma	0	-
Total for Browse		2	0.03

BASIC COVER --

Herd unit 19B, Study no: 19

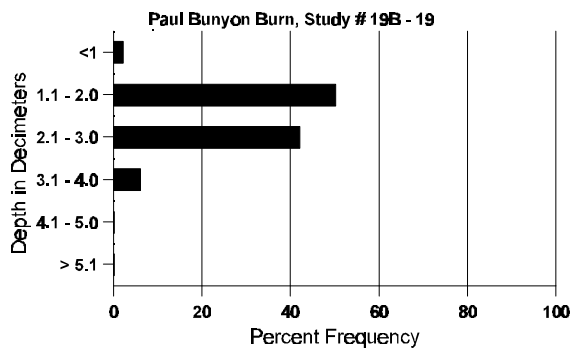
Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	312	21.67
Rock	182	3.33
Pavement	461	32.45
Litter	460	15.95
Bare Ground	415	39.84

SOIL ANALYSIS DATA --

Herd Unit 19B, Study # 19, Study Name: Paul Bunyon Burn

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.0	70.0 (15.5)	7.0	48.7	24.7	26.6	2.7	11.6	115.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 19

Type	Quadrat Frequency '98
Rabbit	11
Deer	1

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 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	5	6	7	8	9	1	2	3	4			
Artemisia tridentata wyomingensis																
X	98	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing '98		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'98	0	Dec:	-	

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4				
Atriplex canescens									
Y	98	-	-	1	-	-	-	-	1
M	98	1	-	-	-	-	-	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
'98		00%		50%		00%			
Total Plants/Acre (excluding Dead & Seedlings)							'98	40	Dec: -
Juniperus osteosperma									
X	98	-	-	-	-	-	-	-	19
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>	
'98		00%		00%		00%			
Total Plants/Acre (excluding Dead & Seedlings)							'98	0	Dec: -

Trend Study 19B-20-98

Study site name: Paul Bunyon Burn .

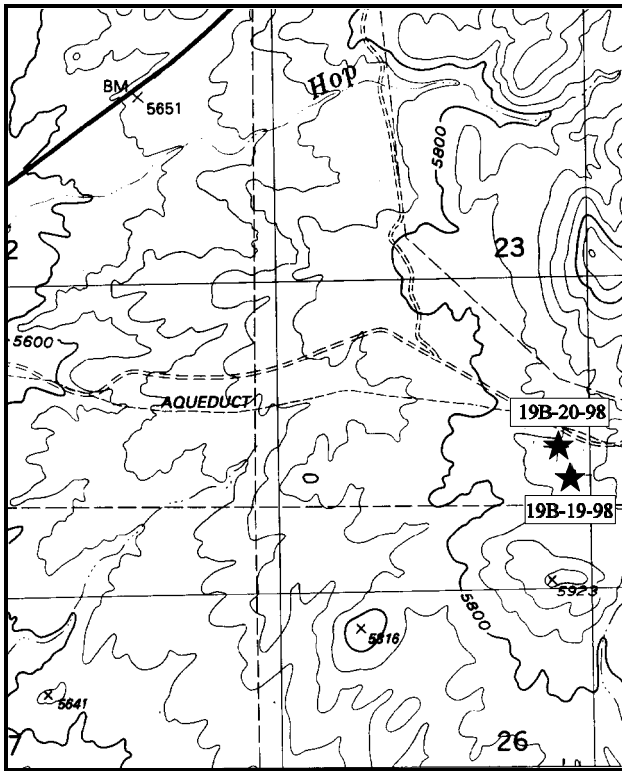
Range type: Burn and Seeded

Compass bearing: frequency baseline 268 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

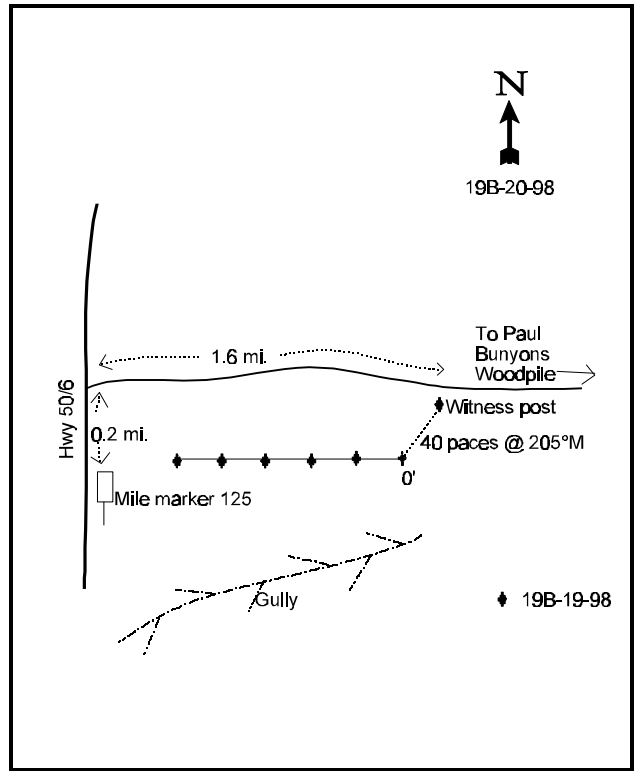
LOCATION DESCRIPTION

From Hwy 50/6 go 0.2 miles north of mile marker 125. Turn right heading toward the Paul Bunyon Woodpile. Drive 1.6 miles to a four foot tall witness post on the right side of the road. The 0-foot stake for this study is 40 paces at 205°M from the witness post. The site is marked by short green fenceposts. The 0-foot stake is marked by browse tag # 74.



Map Name: McIntyre, Utah

Township 12S, Range 3W, Section 23



Diagrammatic Sketch

UTM 4401419.791 N, 401929.871 E

DISCUSSION

Trend Study No. 19B-20

This study, the Paul Bunyon Burn & Chain trend study site, was placed approximately 300 feet northwest of the Paul Bunyon Burn site (# 19B-19). Seed was aurally applied and then this site was chained one-way with an Ely chain to help cover the seed and enhance establishment of seeded species. It has a western aspect with a gentle slope of 5%. Elevation is approximately 5,900 feet. The pellet group transect found no deer sign but rabbit pellets were found in moderately high numbers.

Soil on this site is very similar to the adjacent Paul Bunyon Burn site (# 19B-19). Effective rooting depth is estimated at 14 inches. Soil texture is a sandy clay loam with a neutral pH (7.0). Percent phosphorus is lower at just 8.9 ppm which may be limiting to plant development. Vegetative, litter, and rock cover on the soil surface is similar to the unchained site, although pavement cover is much lower, 17% compared to 32%. Bare ground is much higher at 50% compared to 40% on the burned only site. This is mostly due to the chaining treatment which roughed up the soil surface. There is little sign of erosion.

Seeded fourwing saltbush was applied from a seed dribbler which dropped seed over the tracks of the bulldozers as they pulled the chain over the site. They have become well established and are vigorous with an estimated density of 280 plants/acre. A few stickleaf low rabbitbrush were also encountered on the site.

The herbaceous understory has established well after the fire with 5 perennial and one annual grass providing 19% ground cover. Seeded grasses have established much better here compared to the adjacent unchained site. Nest frequency of seeded grasses is 3 times higher and cover is 4 times greater. Crested wheatgrass is the most abundant perennial grass, providing 38% of the grass cover. Tall wheatgrass and Russian wildrye are also common and account for 14% and 20% of the grass cover respectively. Native grasses are represented by small numbers of bluebunch wheatgrass and bottlebrush squirreltail. Nested frequency of these species is twice as high as the unchained site. Cheatgrass has very similar nested frequency values compared to the unchained site (270 on the chained site versus 268 on the unchained site), but cover is nearly 3 times lower (4.4% vs 12.5%). Cheatgrass plants are much smaller due to the competition with seeded perennial grasses. It currently accounts for only 23% of the grass cover.

Forbs are lacking on the chained site likely due to the same competition which appears to be keeping cheatgrass in check. Total forb cover is actually higher on the unchained site, but composition is similar and only prickly lettuce and tumble mustard are common.

1998 APPARENT TREND ASSESSMENT

Percent bare ground is abundant, but significant erosion does not appear to be occurring. Vegetation cover is well dispersed and consists mostly of perennial grass cover. The soil trend will continue to improve as more herbaceous vegetation becomes established. The seeded fourwing saltbush has established well with a density of 280 plants/acre. These are vigorous and age class composition indicates an expanding population with a biotic potential of 7% and young plants accounting for half of the population. The herbaceous understory is well established and will most likely increase in the future. Perennial seeded grasses are abundant and robust. Native grasses are also present in small numbers. Cheatgrass has similar nested frequency values compared to the unchained site, but cover is one-third lower (12.5% vs 4.4%). The vigorous perennial grasses appear to be suppressing cheatgrass. Forbs are infrequent with a similar poor composition compared to the unchained site. Composition will likely change in the future with some of the weedy species dying out, however there will probably never be a good forb component due to the lack of an adequate seed bank. Forbs were not included in the seeding mix because of the possibility of future spraying to kill noxious weeds.

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 20

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron cristatum	133	52	7.22
G	Agropyron elongatum	52	24	2.69
G	Agropyron spicatum	9	3	.56
G	Bromus tectorum (a)	270	84	4.39
G	Elymus junceus	78	32	3.87
G	Sitanion hystrix	4	3	.21
Total for Annual Grasses		270	84	4.39
Total for Perennial Grasses		276	114	14.56
F	Alyssum alyssoides (a)	13	5	.19
F	Astragalus spp.	10	4	.09
F	Calochortus nuttallii	2	1	.00
F	Chaenactis douglasii	4	2	.03
F	Cryptantha spp.	3	1	.00
F	Gilia spp. (a)	3	1	.00
F	Lactuca serriola	35	19	.58
F	Lesquerella spp.	1	1	.01
F	Lomatium spp.	3	1	.03
F	Phlox hoodii	2	1	.00
F	Salsola iberica (a)	1	1	.03
F	Sisymbrium altissimum (a)	20	12	.32
F	Streptanthus cordatus	9	3	.06
Total for Annual Forbs		37	19	0.55
Total for Perennial Forbs		69	33	0.83

BROWSE TRENDS --
Herd unit 19B, Study no: 20

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	0	-
B	Atriplex canescens	14	.63
B	Chrysothamnus viscidiflorus viscidiflorus	1	-
B	Juniperus osteosperma	0	-
Total for Browse		15	0.63

BASIC COVER --

Herd unit 19B, Study no: 20

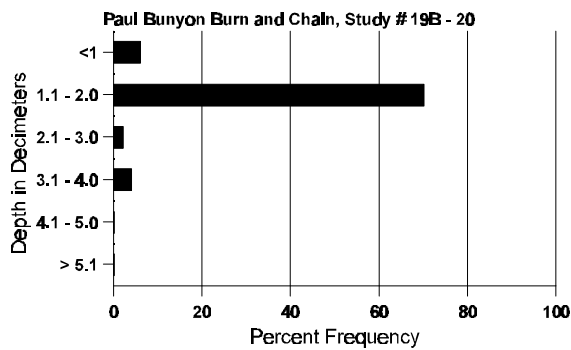
Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	345	21.46
Rock	207	4.19
Pavement	446	17.03
Litter	465	13.75
Bare Ground	469	49.65

SOIL ANALYSIS DATA --

Herd Unit 19B, Study # 20, Study Name: Paul Bunyon Burn and Chain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.9	69.0 (14.5)	7.0	48.4	25.1	26.6	2.7	8.9	134.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 20

Type	Quadrat Frequency '98
Rabbit	3

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 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			
Artemisia tridentata wyomingensis																
X	98	-	-	-	-	-	-	-	-	-	-	-	-	120		6
% Plants Showing '98		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'98	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				
Atriplex canescens																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140	31	35	7
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	280	Dec:	-	
Chrysothamnus viscidiflorus viscidiflorus																		
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	20	Dec:	-	
Juniperus osteosperma																		
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	360		18	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	0	Dec:	-	

SUMMARY

Site Comparisons Between Paul Bunyon Burn 19B-19 and Paul Bunyon Burn & Chain 19B-20

1998 Comparisons

Ground cover characteristics are similar in some categories but quite different with respect to pavement cover and percent bare ground. Pavement cover is very high at more than 32% on the unchained site (# 19B-19) compared to just 17% on the chained site (# 19B-20). The difference is due primarily to the ground disturbance caused by the Ely chain used on the chained site. This disturbance is also responsible for the much higher bare ground cover value on the chained site compared to the unchained site (50% vs 40%). However, erosion on these two sites is localized and not currently a problem.

Shrubs are nearly absent from the burned site and consist of a few scattered fourwing saltbush (40 plants/acre). The chained site has a much higher density of the seeded fourwing saltbush estimated at 280 plants/acre. Half of these are young plants.

Vegetation cover on the two sites is very similar at around 21%. The composition of the cover is very different however. Seeded grasses established better on the Paul Bunyon Burn site than on the previously discussed Leamington Burn (# 21-20) site. However, cover is low at only 3.5% and the sum of nested frequency is only 92. The Paul Bunyon Burn & Chained site has a cover value 4 times higher for seeded grasses at almost 14% and a sum of nested frequency 3 times more than the unchained site at 263. Native grasses are lacking on both sites partly due to the dominance of juniper trees prior to the burn where their population was estimated at 331 trees/acre with an average diameter of 7.6 inches. At this density there were few residual native grasses with a correspondingly poor seed bank. Sum of nested frequency of native grasses was low on the chained site but it was twice that compared to the unchained site. Cover values were similar for both sites.

The forb composition is poor for both sites and no forbs were included in the seed mix. Sum of nested frequency and cover are higher on the unchained site due primarily to the lack of competition with perennial grasses. Most of the common species are annuals or weedy biennials.

Trend Study 19B-21-98

Study site name: Jericho State Section .

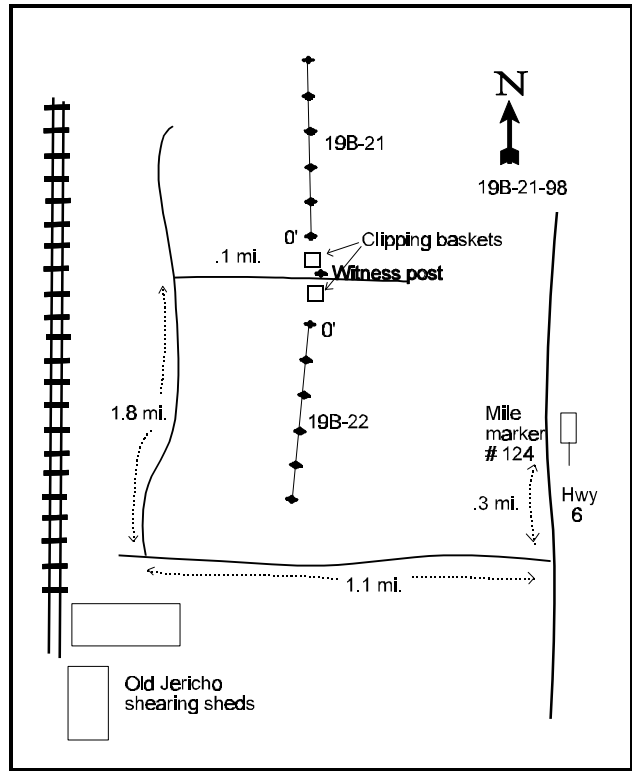
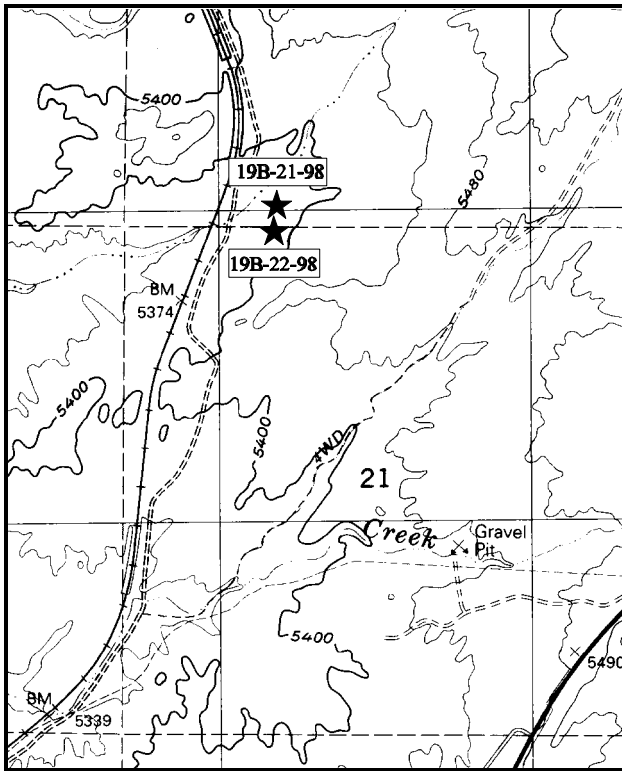
Range type: Burn

Compass bearing: frequency baseline 0 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From mile marker 124 on highway 6, drive 0.3 miles south to a road heading west. Take this road for 1.1 miles to the old Jericho shearing sheds on the left and an intersection before the railroad tracks. Turn right and follow the road on the east side of the tracks for 1.8 miles. At this point is the border of state land and BLM land. Turn right and follow the faint road along the border for 0.1 miles to a witness post and some clipping baskets. The 0-foot stake is 100 feet directly north of the witness post.



Map Name: McIntyre, Utah

Diagrammatic Sketch

Township 12S, Range 3W, Section 16

UTM 4403001.852 N, 398199.220 E

DISCUSSION

Trend Study No. 19B-21

This new site, Jericho State Section, is located in the Tintic Valley west of U.S. Highway 6 north of the old Jericho sheep shearing sheds. It samples a burned sagebrush flat just east of the railroad tracks. The area was also part of the extensive Leamington burn of 1996. It is nearly level with a slight southwest aspect. Elevation is approximately 5,400 feet. The site once supported a dense stand of basin big sagebrush. Burned sagebrush stems, counted in 1998, provide an estimated pre-burn density of 5,600 plants/acre. The fire burned very hot because the only evidence of sagebrush was burned stems on the ground surface. Low hills surround the site which once contained a mixture of sagebrush and juniper. This study samples a section of land owned by the State of Utah that was aerially seeded with crested wheatgrass, intermediate wheatgrass, alfalfa, and yellow sweetclover after the fire (see seed list). The site was not chained to cover the seed. Pellet group data demonstrates little rabbit use and sign of only a few trespass cattle.

Soil on the site is fairly deep with an effective rooting depth (see methods) of 16 inches. Texture is a loam with very little rock or pavement on the surface. Rock is also uncommon in the soil profile. Soil temperature is quite high averaging 67°F at a depth of almost 18 inches. Phosphorus appears to be limiting at only 3.8 ppm when 10 ppm is thought to be minimal for normal plant growth and development. Bare ground is abundant averaging almost 57% over the site. The soil surface had large cracks present indicating the existence of shrink-swell clays. This surface characteristic likely enhanced the establishment some of seeded grasses and forbs by providing safe-sites for establishment. Erosion is not a problem on the site due to the abundant herbaceous cover combined with the level terrain. Some shallow gullies found on the site indicate some erosion in the past but these channels are now filled with grasses and forbs.

There are currently no shrubs on the site and none were included in the seeding mix. The herbaceous understory consists of nearly equal amounts of grass and forb cover (23% for grasses and 22% for forbs). Grass composition is dominated by seeded grasses, crested wheatgrass and intermediate wheatgrass, which provide 71% of the grass cover. The only other common grass is cheatgrass which accounts for 26% of the grass cover. Native grasses, Indian ricegrass and bottlebrush squirreltail, occur infrequently.

There are two annual and eight perennial forbs found on the site, however seeded forbs, yellow sweetclover and alfalfa, totally dominate the forb component by providing 94% of the forb cover. These plants are large and very vigorous. Grasshoppers were abundant on the site and had apparently selectively eaten all of the yellow sweetclover leaves while alfalfa was unutilized.

1998 APPARENT TREND ASSESSMENT

The soil is currently stable with no apparent erosion occurring. Trend for soil will improve with increased litter and vegetative cover. There are no shrubs on the site or in the general vicinity except on the adjacent Jericho BLM site (# 19B-21) which was seeded with fourwing saltbush. Shrubs will take many years to establish on the site due to a lack of a nearby seed source. The herbaceous understory is well established with an almost equal amount of grass and forb cover. Seeded grasses are abundant and will likely increase in the next few years until competition becomes more acute. The composition of forbs will likely change in a few years as yellow sweet clover, a short lived forb, becomes less abundant. However, alfalfa appears to be well established and should persist unless subjected to overutilization by livestock. The abundance of perennial grasses and forbs appears to be keeping cheatgrass suppressed. Nested frequency is fairly high at 247, but cover is only 6%.

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 21

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron cristatum	250	78	9.84
G	Agropyron intermedium	159	58	6.69
G	Bromus tectorum (a)	247	69	5.99
G	Oryzopsis hymenoides	4	1	.03
G	Sitanion hystrix	18	10	.79
Total for Annual Grasses		247	69	5.99
Total for Perennial Grasses		431	147	17.36
F	Alyssum alyssoides (a)	13	4	.19
F	Astragalus spp.	3	1	.03
F	Descurainia pinnata (a)	3	1	.00
F	Erigeron spp.	2	2	.15
F	Melilotus officinalis	93	40	8.05
F	Medicago sativa	175	76	12.24
F	Phlox hoodii	2	1	.15
F	Phlox longifolia	2	1	.03
F	Potentilla gracilis	1	1	.15
F	Sisymbrium altissimum (a)	10	4	.49
F	Sphaeralcea coccinea	2	2	.03
Total for Annual Forbs		26	9	0.68
Total for Perennial Forbs		280	124	20.84

BROWSE TRENDS--
Herd unit 19B, Study no: 21

Species	Strip Frequency '98	Average Cover % '98
Artemisia tridentata tridentata	0	-
Opuntia spp.	0	-
Total for Browse	0	-

BASIC COVER --
Herd unit 19B, Study no: 21

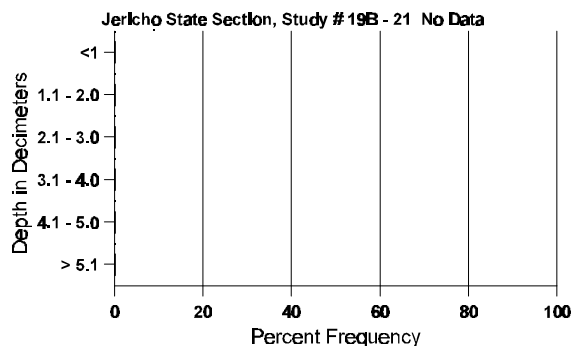
Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	429	41.50
Rock	33	.13
Pavement	219	.80
Litter	468	10.19
Bare Ground	456	56.47

SOIL ANALYSIS DATA --

Herd Unit 19B, Study # 21, Study Name: Jericho State Section

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.1	67.0 (17.5)	7.1	44.0	31.1	24.9	.9	3.8	278.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 21

Type	Quadrat Frequency '98
Rabbit	2

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 21

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 tridentata tridentata																	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	5600		280
% Plants Showing '98		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'98	0	Dec:	-		
Opuntia spp.																	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing '98		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'98	0	Dec:	-		

Trend Study 19B-22-98

Study site name: Jericho BLM .

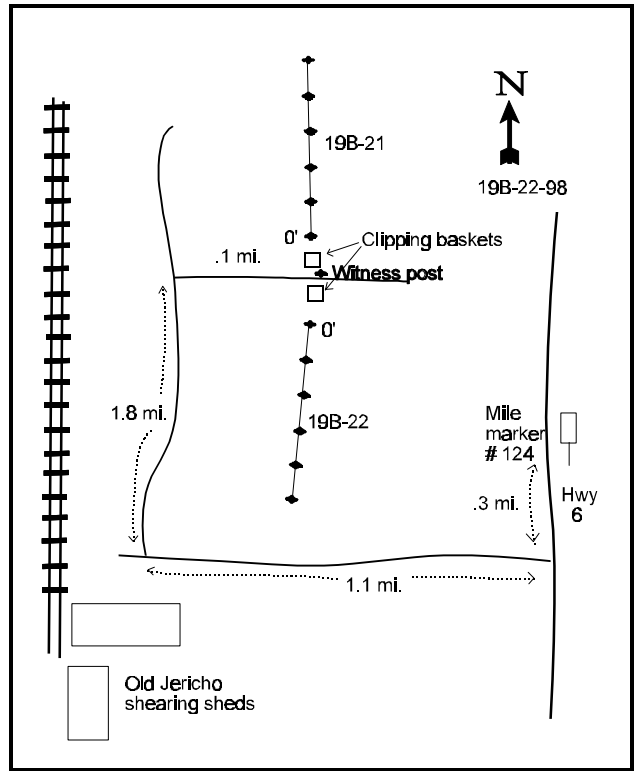
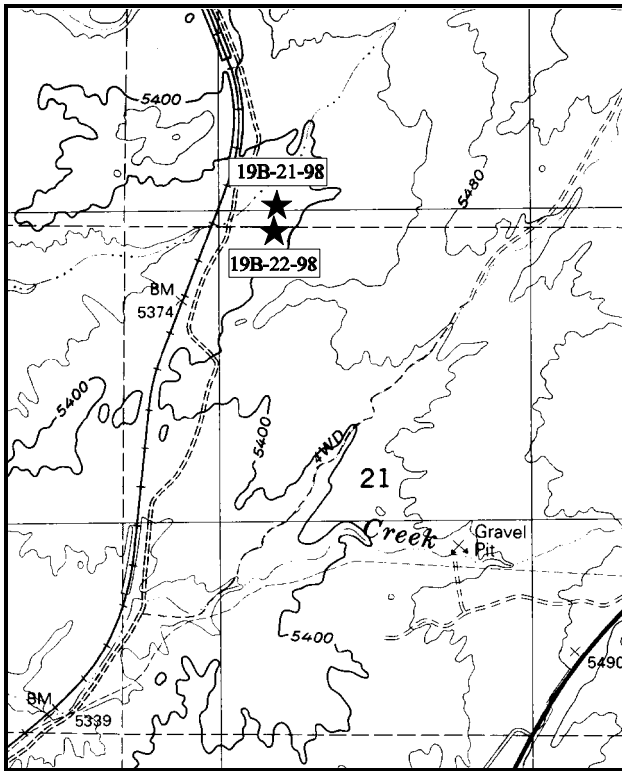
Range type: Burn

Compass bearing: frequency baseline 0 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From mile marker 124 on highway 6, drive 0.3 miles south to a road heading west. Take this road for 1.1 miles to the old Jericho shearing sheds on the left and an intersection before the railroad tracks. Turn right and follow the road on the east side of the tracks for 1.8 miles. At this point is the border of state land and BLM land. Turn right and follow the faint road along the border for 0.1 miles to a witness post and some clipping baskets. The 0-foot stake is 100 feet @ 192°M from the witness post. The 0-foot stake has browse tag #475.



Map Name: McIntyre, Utah

Diagrammatic Sketch

Township 12S, Range 3W, Section 16

UTM 4402944.546 N, 398179.270 E

DISCUSSION

Trend Study No. 19B-22

This trend study, Jericho BLM, samples the same sagebrush flat as study # 19B-21. The baseline begins about 200 feet south of the Jericho State Section baseline stake. Terrain is nearly level with a slight southwest aspect. Elevation is approximately 5,400 feet. This area was aerielly seeded then one-way chained with an Ely chain to enhance establishment of seeded species. The seed mix (see seed list) consisted of 4 exotic perennial grasses and one shrub, fourwing saltbush. The fourwing seed was applied with a seed dribbler which dropped seeds on the bulldozer tracks during the chaining. The pellet group transect encountered only one deer pellet group and a few trespass cattle pats. No rabbit pellets were found.

Soil on this site is very similar to the unchained site 19B-21. Effective rooting depth (see methods) is estimated at almost 18 inches with little rock or pavement on the surface or within the profile. Soil texture is a loam with a neutral pH (7.3). Percent organic matter is two and one-half times higher than the unchained site. Phosphorus is low at only 4 ppm and may be limiting to plant growth and development where 10 ppm is considered minimal. Bare ground is abundant at 50%, yet there is no noticeable soil movement due to the abundant vegetative cover combined with the gentle terrain.

The site once supported a dense stand of big sagebrush. Counts of burned stems on this site estimate a lower density of pre-burn sagebrush (2,640 plants/acre), but the chaining obviously disturbed the ground surface enough to skew our sample. Currently, the seeded shrub, fourwing saltbush, has become established in fairly good numbers (400 plants/acre). Most (75%) of these were classified as young. Larger plants which were classified as mature, were not yet producing seed.

This site received a seed mix of only exotic perennial grasses which established very well. Tall wheatgrass is the most abundant followed by crested wheatgrass, Russian wildrye, and smooth brome. Cheatgrass is also common with a high nested frequency value of 334 and a quadrat frequency of 94%. However, cover value is only 10%, accounting for 29% of the grass cover. Cheatgrass occurs primarily in patches where perennial grasses did not become establish. Native grasses, Indian ricegrass and bottlebrush squirreltail, were both found on the site but only bottlebrush squirreltail is very abundant.

Forbs are rare with only 3 annual and 4 perennial species encountered. Annual forbs, pale alyssum and tumble mustard, provide nearly all of the forb cover (99%). Forbs will probably never be a significant component on this site unless seeded.

1998 APPARENT TREND ASSESSMENT

The soil trend appears stable with abundant and well dispersed vegetation cover. The trend will improve in the future as vegetation and litter cover increase. The only shrub on the site is seeded fourwing saltbush which appears to have established in sufficient numbers to maintain itself and probably increase in the future. Currently, there are an estimated 400 plants/acre, 75% of which were classified as young. The herbaceous understory is dominated by seeded perennial grasses which appear to be well established. Cheatgrass is present and occurs in dense patches, but only where perennial grasses did not establish in good numbers. Overall, cheatgrass accounts for 29% of the grass cover. It will likely not increase as long as the site is not overgrazed in the future. Forbs are scarce and the composition is poor with two annuals providing nearly all of the forb cover.

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 22

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron cristatum	133	57	5.14
G	Agropyron intermedium	198	70	14.29
G	Bromus inermis	35	17	1.29
G	Bromus tectorum (a)	334	94	9.84
G	Elymus junceus	35	16	1.79
G	Oryzopsis hymenoides	-	-	.00
G	Sitanion hystrix	31	13	1.79
Total for Annual Grasses		334	94	9.84
Total for Perennial Grasses		432	173	24.32
F	Agoseris glauca	3	1	.00
F	Alyssum alyssoides (a)	87	30	.62
F	Calochortus nuttallii	2	1	.00
F	Descurainia pinnata (a)	4	1	.01
F	Senecio multilobatus	1	1	.00
F	Sisymbrium altissimum (a)	33	15	1.91
F	Sphaeralcea coccinea	-	-	.00
Total for Annual Forbs		124	46	2.54
Total for Perennial Forbs		6	3	0.01

BROWSE TRENDS --
Herd unit 19B, Study no: 22

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata tridentata	0	-
B	Atriplex canescens	16	.33
Total for Browse		16	0.32

BASIC COVER --
Herd unit 19B, Study no: 22

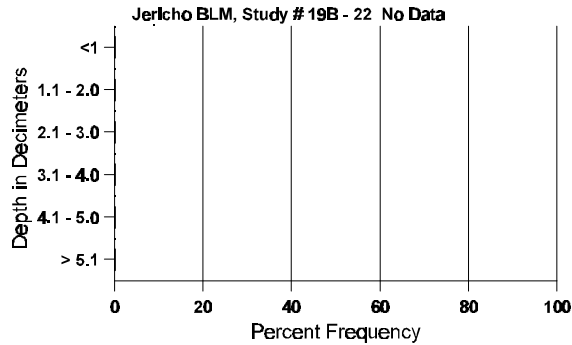
Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	413	39.77
Rock	32	.11
Pavement	289	2.41
Litter	484	14.53
Bare Ground	459	49.61

SOIL ANALYSIS DATA --

Herd Unit 19B, Study # 22, Study Name: Jericho BLM

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.5	67.4 (17.7)	7.3	44.0	30.1	25.9	2.5	4.0	364.8	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 22

Type	Quadrat Frequency '98
Rabbit	1

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 22

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total			
		1	2	3	4	5	6	7	8	9	1	2	3	4						
Artemisia tridentata tridentata																				
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	2640		132			
% Plants Showing '98		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>								
		00%			00%			00%												
Total Plants/Acre (excluding Dead & Seedlings)												'98	0	Dec:	-					
Atriplex canescens																				
Y	98	15	-	-	-	-	-	-	-	-	-	-	-	14	-	-	300		15	
M	98	5	-	-	-	-	-	-	-	-	-	-	-	5	-	-	100	17	17	5
% Plants Showing '98		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>								
		00%			00%			00%												
Total Plants/Acre (excluding Dead & Seedlings)												'98	400	Dec:	-					

Trend Study 21-20-98

Study site name: Leamington Burn .

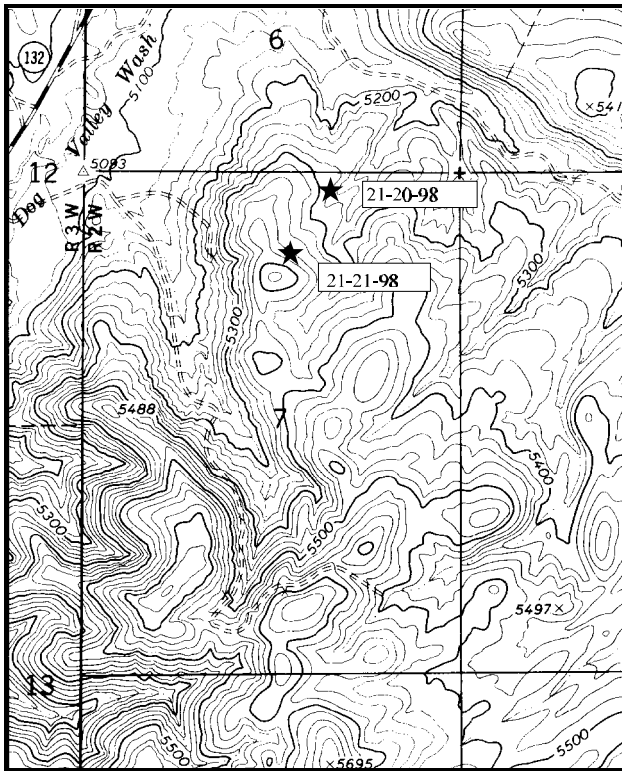
Range type: Burned Pinyon-Juniper .

Compass bearing: Frequency baseline 286 M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

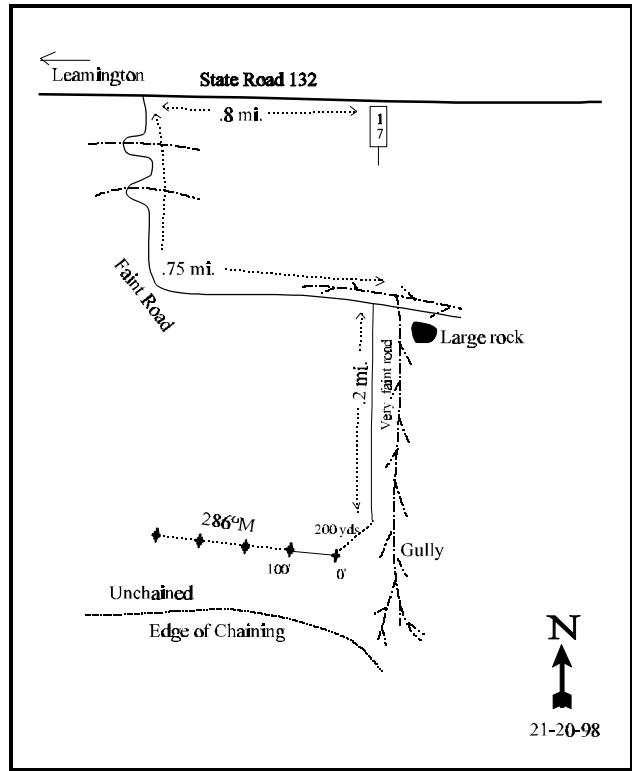
LOCATION DESCRIPTION

From Nephi, drive about 17.1 miles on State Road 132. Drive west 0.8 miles past mile marker 17 to a faint road on the left. Drive 0.75 miles past a water trough to a gully with a large boulder by the road. Go up the gully 0.2 miles to where it forks. Park here. The study is located on the ridge west of the gully. From the fork the study is 200 yards away by the edge of the chaining. The study is marked by 12-18 inch, green, steel fenceposts.



Map Name: Sage Valley .

Township 14 S, Range 2 W, Section 7



Diagrammatic Sketch

UTM 4385967.903 N, 404471.621 E

DISCUSSION

Study No. 21-20

The Leamington Burn is a new study established in 1997 on a burned and seeded pinyon-juniper area. It occurs on BLM land about 17 miles west of Nephi and approximately one mile south of SR-132. It is part of the extensive Leamington Burn Complex that took place during the summer of 1996. The fire burned approximately 138,340 acres of mostly pinyon-juniper woodland. Rehabilitation efforts were started during the fall of 1996 that included drilling, chaining, and seeding. About 6,100 acres were treated with a rangeland drill, 10,736 acres were aerially seeded and followed by a one-way chaining with an Ely chain to help cover the seed, and 8,308 acres were aerially seeded only. This site samples a burned site that was aerially seeded and not chained. A nearby burned area that was aerially seeded then chained is sampled by study no. 21-21 to contrast the difference between the two treatments. Pellet group data indicates light use of the area by elk with 5 elk use days/acre estimated in 1998.

This site lies on a ridge that slopes gently (3% to 5%) to the southeast. Elevation is about 5,200 feet. Soil is relatively deep with an effective rooting depth estimated at 14 inches. Texture is a sandy clay loam with a neutral pH (7.0). The soil is loose and lacks structure on the surface. Rocks and pavement are common on the surface and in the profile. Some rocks under the surface have deposits of white calcium carbonate. Phosphorus in the soil may be limiting to plant growth and development at 8.0 ppm, where 10 ppm are thought to be the minimum necessary for plant development. Soil erosion is not a problem on the site due to the abundant vegetation cover and levelness of the terrain even though there is a considerable amount of bare ground (32% in 1997 down to 28% in 1998).

Prior to the fire, the site was dominated by pinyon and juniper. Currently, few remain alive. Shrubs are rare and include small numbers of sprouting species, including rubber rabbitbrush, stickyleaf low rabbitbrush, and broom snakeweed. There were a few young green ephedra sampled in 1997, but none were sampled in 1998. The majority of the vegetation cover comes from grasses and forbs which combine to produce a total of almost 13% cover in 1997, which increased to 39% by 1998. Common grasses include: cheatgrass, bluebunch wheatgrass, Indian ricegrass, and Sandberg bluegrass. Bluebunch wheatgrass is currently knee high and abundant in scattered patches. The only seeded grass that commonly occurs on this unchained site is crested wheatgrass, which had a quadrat frequency of only 4% in 1997, up to 15% by 1998. A few seeded Russian wildrye plants were also encountered in 1998. Cheatgrass is abundant and widespread. In 1997, it produced a total of 2% cover and accounted for 33% of the grass cover. It has since increased 13 fold in cover to 26% which contributes 71% of the grass cover and 66% of the total herbaceous cover on the site. It is now dense enough in some places to carry another fire. The only other grass to increase significantly in nested frequency is crested wheatgrass which still occurs in low numbers.

Forbs are diverse, but only the native Douglass chaenactis occurs more than occasionally. All forbs combined produce less than 3% cover. Seeded forbs, consisting of alfalfa and small burnet, were found on the site but in very low numbers.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable at the moment and it should improve as more vegetation becomes established in the future. Current erosion is minimal. Browse is limited to a few re-sprouting green ephedra and some broom snakeweed. The shrub trend will likely improve as more shrubs establish on the burn. The herbaceous understory is not particularly abundant at only 12% cover. The composition of grasses is good with the exception of cheatgrass which currently accounts for 33% of the grass cover. The composition of forbs is poor. The only common species include low growing native forbs and weedy annuals. Seeded forbs occur in such low numbers that they will likely not persist on this site.

1998 TREND ASSESSMENT

Trend for soil appears to be improving although a large amount of bare ground is still exposed (32% in 1997, 28% in 1998). Vegetative cover has increased 3 fold, litter cover has increased 4 fold, and rock/pavement cover has declined from 32% to 22%. Unfortunately, most of the increase in vegetation cover comes from an increase in cheatgrass. There are few shrubs on the site, yet trend is considered stable. The herbaceous understory trend is down due to a significant increase and dominance in cheatgrass. Cover of cheatgrass has increased 11 fold since 1997, and it currently accounts for 71% of the grass cover. All other grasses except crested wheatgrass, declined in nested frequency but not significantly. Crested wheatgrass increased significantly in nested frequency but it only occurs in 15% of the quadrats. Forbs are diverse with several annual and perennial species sampled but none are abundant. Cover of forbs has declined 2 fold and nested frequency has gone down 3 fold since 1997.

TREND ASSESSMENT

soil - up slightly

browse - stable, but depleted

herbaceous understory - down due to a significant increase of cheatgrass

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 20

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'98	'97	'98	'97	'98
G	Agropyron cristatum	6	*35	4	15	.27	1.50
G	Agropyron elongatum	-	3	-	2	-	.04
G	Agropyron spicatum	60	41	26	19	2.20	3.90
G	Bromus tectorum (a)	153	*430	54	99	2.34	26.01
G	Elymus junceus	-	4	-	2	-	.03
G	Oryzopsis hymenoides	68	58	30	28	1.26	3.06
G	Poa secunda	63	54	25	20	.87	1.22
G	Sitanion hystrix	16	22	9	8	.17	.78
Total Annual Grasses		153	430	54	99	2.34	26.01
Total Perennial Grasses		213	217	94	94	4.79	10.56
F	Alyssum alyssoides (a)	1	2	1	1	.00	.00
F	Arabis spp.	3	-	1	-	.00	-
F	Astragalus beckwithii	4	-	2	-	.06	.00
F	Camelina microcarpa (a)	-	6	-	2	-	.06
F	Calochortus nuttallii	3	-	2	-	.01	-
F	Centaurea spp.	-	*7	-	5	-	.05
F	Chaenactis douglasii	52	42	23	15	.97	1.20
F	Crepis acuminata	-	-	-	-	-	.03
F	Descurainia pinnata (a)	14	*-	8	-	.13	-
F	Draba spp. (a)	-	*14	-	4	-	.02
F	Eriogonum cernuum (a)	6	3	2	2	.30	.03

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'98	'97	'98	'97	'98
F	Erigeron spp.	-	3	-	1	-	.03
F	Gilia spp. (a)	77	*-	37	-	1.64	-
F	Lactuca serriola	6	17	3	8	.61	.49
F	Lesquerella spp.	38	*-	19	-	.19	-
F	Medicago sativa	1	4	1	2	.00	.18
F	Nicotiana attenuata (a)	-	2	-	1	-	.00
F	Phlox longifolia	46	*13	22	7	.36	.03
F	Ranunculus testiculatus (a)	112	*3	34	2	.76	.03
F	Salsola iberica (a)	-	-	-	-	-	.15
F	Sanguisorba minor	1	2	1	1	.15	.15
F	Sisymbrium altissimum (a)	-	1	-	1	-	.15
F	Streptanthus cordatus	7	-	3	-	.04	-
F	Tragopogon dubius	3	3	1	2	.03	.10
Total Annual Forbs		210	31	82	13	2.83	0.44
Total Perennial Forbs		164	91	78	41	2.46	2.30

* Indicates significant difference at % = 0.10

BROWSE TRENDS --

Herd unit 21 , Study no: 20

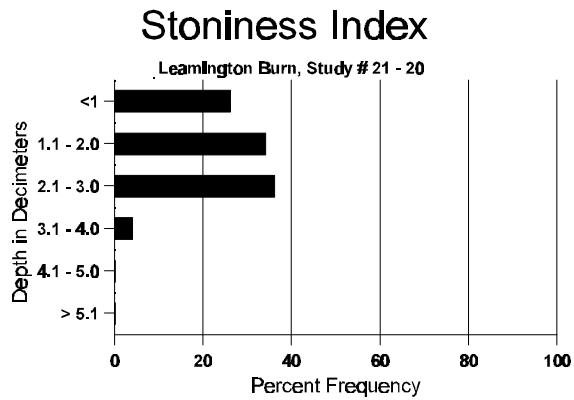
Type	Species	Strip Frequency		Average Cover %	
		'97	'98	'97	'98
B	Artemisia tridentata vaseyana	0	0	-	-
B	Chrysothamnus nauseosus albicaulis	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	.03	.15
B	Ephedra viridis	1	0	-	-
B	Gutierrezia sarothrae	3	8	.18	.86
B	Juniperus osteosperma	0	0	-	-
B	Leptodactylon pungens	-	-	.00	-
Total for Browse		4	10	0.21	1.00

BASIC COVER --
Herd unit 21 , Study no: 20

Cover Type	Nested Frequency		Average Cover %	
	'97	'98	'97	'98
Vegetation	303	444	13.11	39.16
Rock	314	251	11.08	9.00
Pavement	451	376	20.50	12.50
Litter	383	489	7.05	28.25
Cryptogams	108	9	2.08	.19
Bare Ground	424	372	32.10	28.43

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 20, Study Name: Leamington Burn

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.7	62.0 (13.5)	7.0	46.7	28.4	24.8	2.4	8.0	214.4	.6



PELLET GROUP FREQUENCY --
Herd unit 21 , Study no: 20

Type	Quadrat Frequency	
	'97	'98
Rabbit	15	1
Elk	-	1
Deer	1	1
Cattle	1	-

BROWSE CHARACTERISTICS --

Herd unit 21 , 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>																		
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	0		-			
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
<i>Ephedra viridis</i>																		
Y	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	60	Dec:	-			
												'98	0		-			
<i>Gutierrezia sarothrae</i>																		
S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	6	4	3
	98	12	-	-	-	-	-	-	-	-	12	-	-	-	240	12	20	12
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+ 0%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	80	Dec:	-			
												'98	240		-			

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																	
X	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>					
'97		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-		
												'98	0		-		

Trend Study 21-21-98

Study site name: Leamington Burn and Chain .

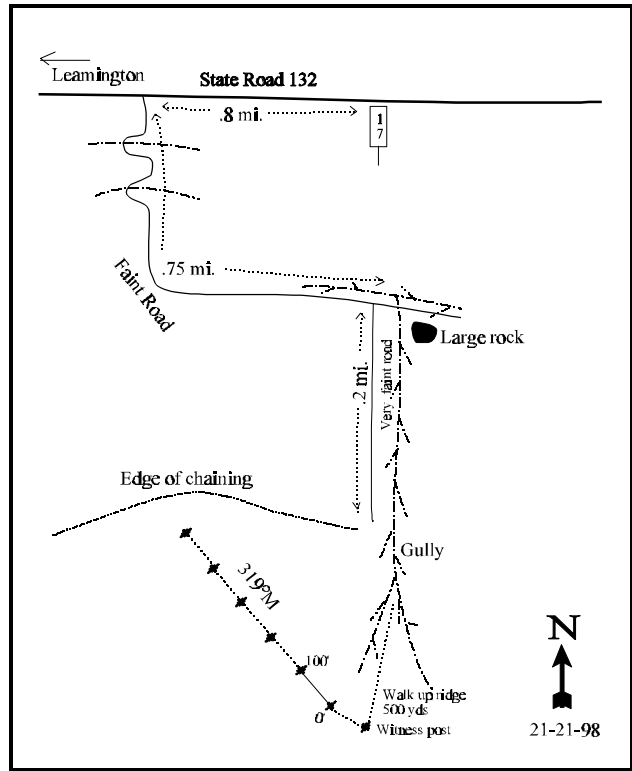
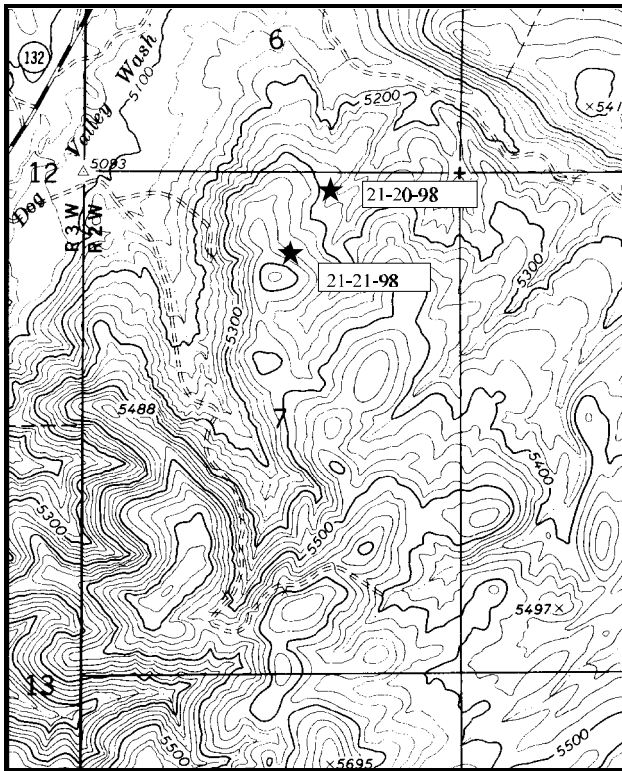
Range Type: Chained, Burned P-J .

Compass bearing: frequency baseline 319 M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From Nephi, drive about 17.1 miles on State Road 132. Drive west 0.8 miles past mile marker 17 to a faint road on the left. Drive 0.75 miles past a water trough to a gully with a large boulder by the road. Go up the gully 0.2 miles to where it forks. Park here. From where the drainage divides in two, walk up the middle ridge about 500 yards at a bearing of 205° M to a witness post. The 0-foot stake is 20 feet from the witness post at about 319°M. The study is marked by 12-18 inch, green, steel fenceposts.



Map name: Sage Valley .

Diagrammatic Sketch

Township 14 S, Range 2 W, Section 7

UTM 4385761.607 N, 404379.844 E

DISCUSSION

Study No. 21-21

The Leamington Burn and Chain study is a new trend study established in 1997 which samples a burned, seeded, and then chained area about 500 feet west of the Leamington Burn site (# 21-20). It was established to contrast secondary succession and establishment of seeded grasses and forbs with the nearby burned and seeded treatment that made no attempt to cover the seed. The Leamington Burn & Chain site has a slope of 10% to 12% with a east-southeast aspect at an elevation of about 5,300 feet. The area burned during the summer of 1996 and is part of the previously mentioned Leamington Burn Complex (see 21-20). Seed was aerially applied and then the site was chained one-way with an Ely chain to cover the seed and enhance establishment of seeded species. The area is currently used lightly by deer and elk. Pellet group data indicate <1 deer and 1 elk use day/acre in 1997, increasing to 8 elk days use/acre by 1998. Cattle grazed the area prior to the burn, but are currently kept off to allow rehabilitated areas to recover.

Soil on the site is very similar to the Leamington burn site (# 21-20). Effective rooting depth is estimated at almost 14 inches. Rocks and pavement are abundant on the surface averaging nearly 30% cover. Rock is also common through the soil profile. Soil texture is a sandy clay loam with a neutral pH (7.0). Percent organic matter is higher compared to the burn and seeded site (3% vs 2.4%). Phosphorus is also higher at 12.3 ppm compared to 8 ppm. Percent bare ground was quite high at nearly 40% in 1997, but decreased to 27% by 1998. However, herbaceous vegetation and litter are well dispersed and erosion is not currently a problem.

Browse is limited to some seeded fourwing saltbush that was applied with a seed dribbler, and a few rubber rabbitbrush, stickyleaf low rabbitbrush, and Nevada ephedra. Broom snakeweed was the most abundant shrub in 1997 with a density of 500 plants/acre, decreasing to 400 by 1998.

Grasses and forbs combined to produced 11% cover in 1997, increasing to 31% by 1998. The most common perennial grass is crested wheatgrass which provided 43% of the grass cover in 1997, decreasing to 24% in 1998. Intermediate wheatgrass, bluebunch wheatgrass, orchard grass, and Indian ricegrass are also fairly common. Perennial grasses are very vigorous and robust with some reaching 3 to 4 feet in height. Cheatgrass also occurs on the site and accounted for 15% of the grass cover in 1997. It has increased significantly in nested frequency and now produces 10% cover which accounts for 34% of the grass cover. If one were to look only at the nested frequency value, it would appear that cheatgrass is doing almost as well on the chained site as the nearby unchained site. However, cheatgrass cover is 2½ times lower on the chained site and plants are small in stature due to the abundant and vigorous perennial grass component, not making them a fire hazard. Forbs are diverse but only produce about 2% total cover. There are several annual and native perennial species encountered. Seeded forbs, alfalfa and small burnet, occur in small numbers.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the good establishment of seeded and native herbaceous species along with litter cover provided by chained dead trees. Grasses and forbs will increase in the future and provide even more soil protection. The browse trend will depend on how well the seeded fourwing saltbush becomes established. The few plants seeded around the site are vigorous and will likely increase in the future. The herbaceous understory is diverse with eight perennial grasses and 11 perennial forbs encountered. There are less annual forbs here than on the adjacent site (# 21-20). There is nothing to suggest that the herbaceous trend will not continue to improve in the future.

1998 TREND ASSESSMENT

Trend for soil is improving as more perennial vegetation becomes established on the site. Percent cover of bare ground has declined from 39% to 27%, which is still high, but erosion is not currently a problem due to

the well dispersed vegetation and litter cover. The browse trend is up slightly due to an increase in density of browse. Shrubs are still in low numbers but some fourwing saltbush and Nevada ephedra appear to be establishing. Broom snakeweed is still the most abundant shrub on the site, but density has declined slightly since 1997. Trend for the herbaceous understory is up for grasses yet down slightly for forbs. Grasses increased in cover from 9% in 1997 to 29% in 1998. Cheatgrass is the most abundant grass on the site with a significant increase in nested frequency and a 7 fold increase in cover since 1997. It currently accounts for 34% of the grass cover. However, plants are small in stature compared to the perennial grasses. The most common perennial grass, crested wheatgrass, remained at a similar frequency compared to 1997. Most of the other perennial grasses increased significantly in nested frequency. Forbs are not abundant and declined slightly in nested frequency since 1997. However, much of the change is due to several annual forbs disappearing from the site. Trend for the herbaceous understory is considered up.

TREND ASSESSMENT

soil - up

browse - up slightly, but still depleted

herbaceous understory - up, but forbs lacking

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 21

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'98	'97	'98	'97	'98
G	Agropyron cristatum	144	152	57	54	3.69	6.94
G	Agropyron elongatum	39	*96	16	37	.98	4.71
G	Agropyron spicatum	27	*47	15	18	1.25	3.46
G	Bromus inermis	9	*30	3	10	.22	.73
G	Bromus tectorum (a)	98	*318	38	83	1.35	9.86
G	Dactylis glomerata	18	28	8	11	.70	.65
G	Elymus junceus	-	*22	-	9	-	.91
G	Oryzopsis hymenoides	26	28	10	15	.37	1.47
G	Poa fendleriana	4	-	2	-	.01	-
G	Poa secunda	4	*19	3	11	.06	.58
Total Annual Grasses		98	318	38	83	1.35	9.86
Total Perennial Grasses		271	422	114	165	7.31	19.47
F	Alyssum alyssoides (a)	-	2	-	1	-	.00
F	Astragalus beckwithii	3	-	1	-	.00	-
F	Astragalus calycosus	12	7	4	3	.12	.09
F	Astragalus spp.	6	6	2	3	.18	.19
F	Camelina microcarpa (a)	-	2	-	1	-	.03
F	Carduus nutans (a)	16	*-	8	-	.04	-
F	Calochortus nuttallii	-	-	-	-	.00	-
F	Chaenactis douglasii	10	10	6	4	.32	.24
F	Cryptantha spp.	1	-	1	-	.00	-
F	Descurainia pinnata (a)	-	1	-	1	-	.02

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'98	'97	'98	'97	'98
F	Descurainia spp. (a)	15	*-	8	-	.10	-
F	Draba spp. (a)	-	1	-	1	-	.00
F	Gilia spp. (a)	23	*-	13	-	.92	-
F	Lactuca serriola	-	*15	-	8	-	.38
F	Lesquerella spp.	5	4	3	3	.01	.16
F	Medicago sativa	1	4	1	3	.11	.29
F	Nicotiana attenuata (a)	1	-	1	-	.00	-
F	Phlox hoodii	-	1	-	1	-	.00
F	Phlox longifolia	4	-	2	-	.01	-
F	Ranunculus testiculatus (a)	7	*-	4	-	.02	-
F	Sanguisorba minor	2	3	1	2	.15	.18
F	Senecio multilobatus	-	2	-	1	-	.03
F	Streptanthus cordatus	8	*-	5	-	.02	-
Total Annual Forbs		62	6	34	4	1.08	0.05
Total Perennial Forbs		52	52	26	28	0.97	1.58

* Indicates significant difference at % = 0.10

BROWSE TRENDS --

Herd unit 21 , Study no: 21

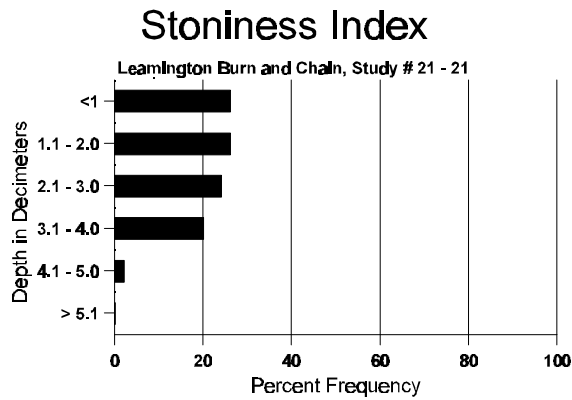
Type	Species	Strip Frequency		Average Cover %	
		'97	'98	'97	'98
B	Atriplex canescens	0	1	.03	-
B	Chrysothamnus nauseosus albicaulis	0	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	-	-
B	Ephedra nevadensis	0	1	-	-
B	Gutierrezia sarothrae	18	11	.07	.59
B	Purshia tridentata	0	1	-	-
Total for Browse		18	15	0.10	0.59

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

Cover Type	Nested Frequency		Average Cover %	
	'97	'98	'97	'98
Vegetation	257	406	10.43	34.11
Rock	372	350	16.54	20.72
Pavement	444	380	13.43	10.18
Litter	388	476	9.42	27.58
Cryptogams	45	-	1.96	0
Bare Ground	446	402	39.39	27.02

SOIL ANALYSIS DATA --
Herd Unit 21, Study # 21, Study Name: Leamington Burn and Chain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.8	62.8 (14.4)	7.0	46.0	33.1	20.9	3.0	12.3	195.2	.9



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

Type	Quadrat Frequency	
	'97	'98
Rabbit	2	3
Elk	1	4
Deer	3	-

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 21

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Atriplex canescens</i>																		
S	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	34	41	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	23	20	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	0		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	-	1	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
<i>Ephedra nevadensis</i>																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	22	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	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>Gutierrezia sarothrae</i>																		
S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
M	97	23	-	-	-	-	-	-	-	-	-	-	-	460	6	6	23	
	98	20	-	-	-	-	-	-	-	-	-	-	-	400	12	18	20	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			-78%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	460	Dec:	-			
												'98	400		-			
<i>Purshia tridentata</i>																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	1	-	-	-	-	-	-	-	-	-	-	-	20		1		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			

SUMMARY

Site Comparisons between Leamington Burn & Seed 21-20 and Leamington Burn and Chain 21-21

1997 Comparisons

Basic ground cover characteristics are similar between the two sites but some slight differences are apparent. Vegetation cover is slightly higher on the unchained site. However, this is due primarily to the abundance of cheatgrass and annual forbs which are over two times more abundant and produced 4 times more cover here compared to the chained site. Litter cover is higher (7% vs 10%) on the chained site due in part to the presence of chained tree cover lying on the ground. This provides better soil protection than dead standing snags.

The chaining treatment provided for better seeded grass establishment. Seeded species, crested wheatgrass, intermediate wheatgrass, and orchard grass have a 35 times higher sum of nested frequency compared to the burn and seeded site. In contrast, native grasses established better on the unchained treatment where they were found to be three times higher in nested frequency. Unfortunately, the unchained site also provided a better environment for cheatgrass and weedy annual forbs to become established. Native species do not compete very well against cheatgrass. Cheatgrass is nearly twice as abundant and produces almost two times more cover on the unchained site while annual forbs are more than three times more abundant and produce twice as much cover.

Both sites had nearly identical low frequencies of the seeded forbs alfalfa and small burnet. From these preliminary findings, seeded grasses and forbs did not successfully establish on the unchained site after one growing season. In addition, seeded forbs did not establish well on the chained treatment. More data will need to be collected over several years to determine if these preliminary findings remain consistent.

1998 Comparison

Ground cover characteristics are very similar between sites with the only differences being slightly more vegetation cover and less rock cover on the unchained site. Erosion is not a problem on either site.

Shrubs are lacking on the unchained site. The few Nevada ephedra encountered in 1997 were not found in 1998. The chained site shows some establishment of the seeded shrub, fourwing saltbush. However, density is minimal at only 20 plants/acre. A few Nevada ephedra and bitterbrush were also picked up in 1998. Broom snakeweed is found in low densities on both sites, but density has declined from 500 to 400 plants/acre on the chained site while density has increased from 60 to 240 plants/acre on the unchained site. The chained site displayed a significant increase in the nested frequency of all but three grasses. Sum of nested frequency of perennial grasses increased from 271 to 422. Cover increased nearly 3 fold from 7% to 20%. Sum of nested frequency of perennial grasses on the unchained site remained similar (213 to 217) and cover increased from 5% to 11%. Cheatgrass dominates the herbaceous understory on the unchained site. Cover has increased 13 fold since 1997 from 2% to 26%. It currently provides 71% of the grass cover and 66% of the herbaceous cover. This is an increase from 1997 when cheatgrass accounted for only 33% of the grass cover. The chained site has a high nested frequency value for cheatgrass at 318 and cover has increased from 1.4% to 10%. However, cheatgrass cover is 2.6 times lower than the unchained site due to competition with perennial grasses. It is apparent that the only way to control cheatgrass on rehabilitation projects such as this is to make sure that perennial grasses become established in sufficient numbers so they can compete with the weedy species.

Forb composition is similar between sites. Seeded forbs occur at similarly low frequencies. Total forb cover is higher on the unchained site due to the presence of high numbers of weedy biennial and annual forbs. This is likely a function of the lack of competition with perennial grasses.

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