

UTAH BIG GAME RANGE TREND STUDIES 2005 Volume 1 Northeastern Region



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REPORT FOR FEDERAL AID PROJECT W-82-R-50**

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

**UTAH BIG GAME
RANGE TREND STUDIES
2005 VOLUME 1**

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Performance Report for Federal Aid Project W-82-R-50

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UTAH DEPARTMENT OF NATURAL RESOURCES
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PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R

Grant Title: Wildlife Habitat Research and Monitoring

Project Title: Wildlife Habitat Monitoring/Range Trend Studies

Need:

The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas. The majority of the permanent range trend studies will be located on deer and elk winter ranges, however on certain management units, studies will be located on spring and/or summer ranges, if vegetation composition on these ranges is the limiting factor for big game populations. Range trend data are used by wildlife biologists for habitat improvement planning purposes, reviewing BLM and USFS allotment management plans, and as one of several sources of information for revising deer and elk herd unit management plans.

Objective:

Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers and private landowners of significant changes in plant community composition in these areas.

Expected Results or Benefits:

Range trend studies in each region will be reread every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database to evaluate the impact of land management programs on big game habitat. Annual reports will be readily available on the Division's website, on CDs, and in hard copies located in DWR regional offices, BLM and USFS offices, and public libraries. Special studies (habitat project monitoring and big game/livestock forage utilization studies) will give DWR biologists and public land managers additional information to address local resource management problems.

REMARKS

The work completed during the 2005 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Northeast and Southeastern Regions. Most trend studies surveyed in these management units were established in the 1980's with rereads at 5 year intervals.

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

Bureau of Land Management

Price Field Office

Vernal Field Office

Moab Field Office

Ashley National Forest

Vernal Ranger District

Roosevelt Ranger District

Duchesne Ranger District

Flaming Gorge National Recreation Area

Wasatch-Cache National Forest

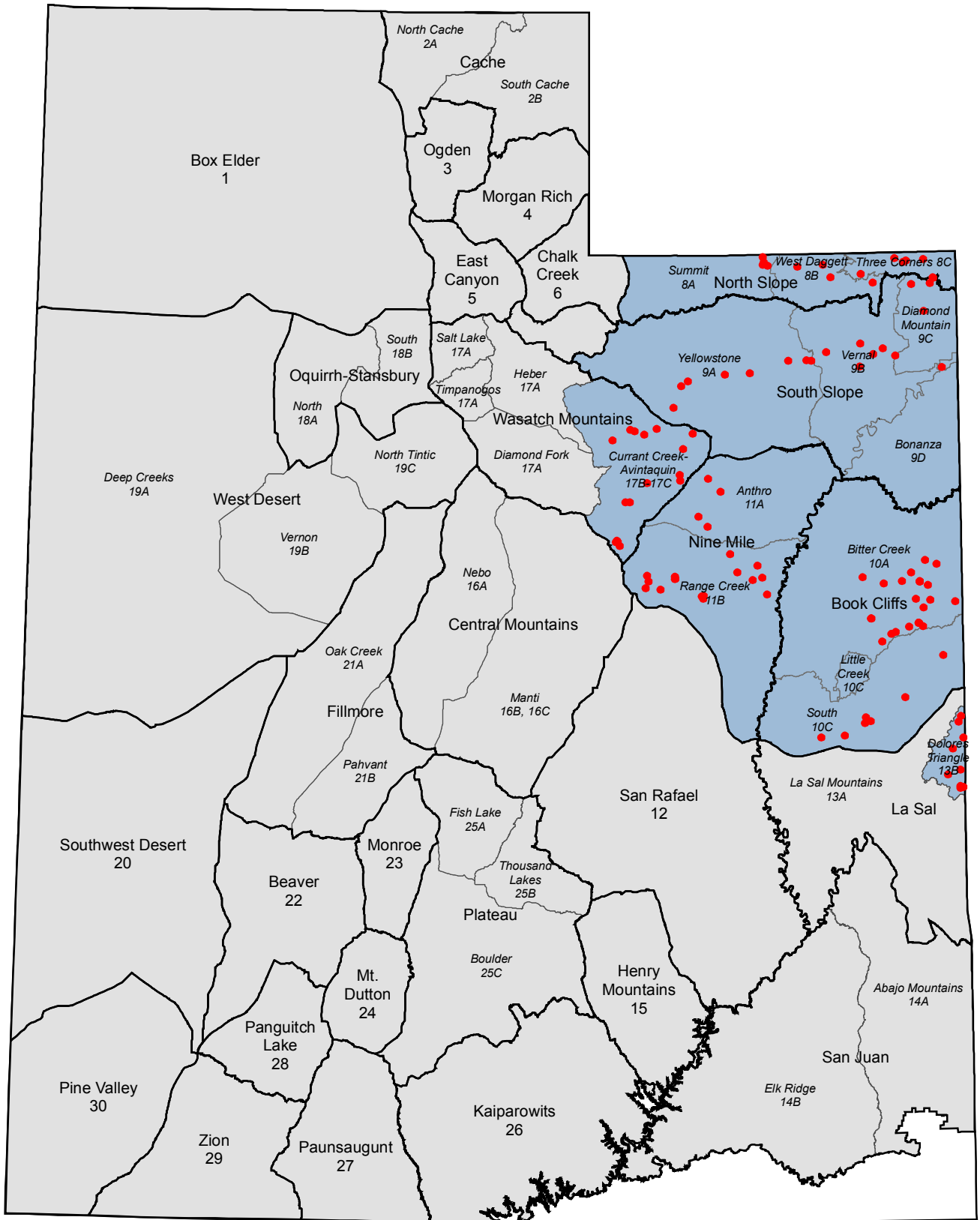
Mountain View Ranger District

Ute Indian Tribe Natural Resources

Fort Duchesne, Utah

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

Utah Management Units Surveyed in 2005



RANGE TREND STUDY METHODS

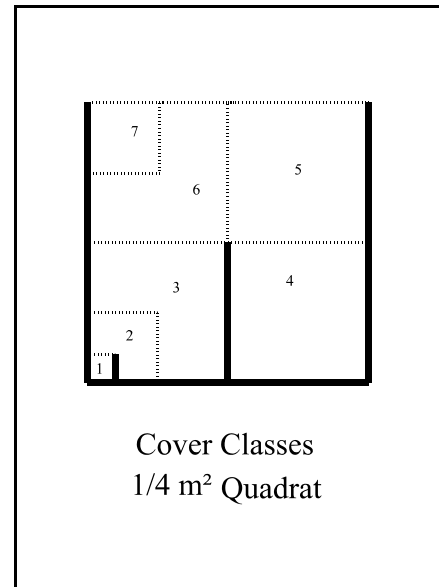
Studies monitoring range trend depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetative or habitat types within a unit, it is necessary to concentrate on specific sites and/or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

Vegetative composition

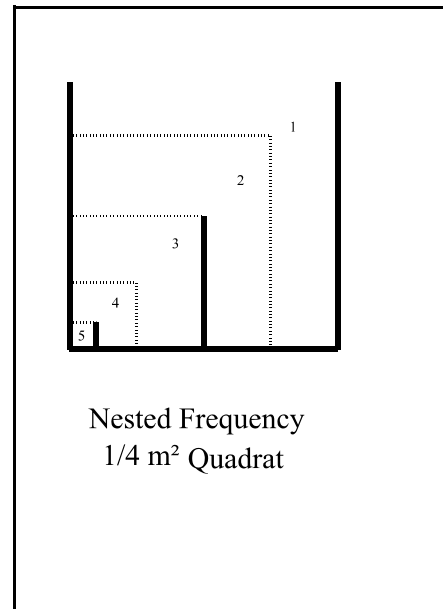
Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 foot baseline transects in the area of interest. This 500 foot line is the baseline and one, 100 foot belt is placed perpendicular to each 100 foot section of the baseline at random foot marks and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

Cover is determined using an ocular cover estimation procedure using 7 cover classes (Bailey and Poulton, 1968, Daubenmire 1969). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100%. For example, to estimate vegetative cover with this method, an observer would visualize which cover class all the vegetation would fit into if the plants were moved together until they were touching. To quantify percent cover for bare ground, litter, rock, pavement, and cryptogams, the observer would visually estimate which cover class could accommodate all of the specified cover type within the quadrat. These numbers are then recorded. To determine percent cover for each belt, the midpoint for each cover class value observed is summed and divided by the number of sampling quadrats (20). The mean for the five belts is the average for a given site.

Total canopy cover of shrubs or trees is estimated using the line-intercept method. The distance along each belt covered by a particular species of tree or shrub is divided by the total length of the line to give percent canopy cover. Prior to 2002, only canopy cover above eye level was estimated.



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



Higher nested frequency scores represent a higher abundance for that plant species or cover type. These summed values are used to help determine changes in trend and composition through time. Nested frequency has been found to be a more sensitive measurement for changes taking place within plant communities than quadrat frequency (Smith et al. 1987, Smith et al. 1986, Mosley et al. 1986). Plant cover and density values are not reliable indicators of trend for herbaceous species and can fluctuate greatly with precipitation and time of season sampled. Therefore, plant cover and density values can be misleading if used by themselves and do not necessarily indicate changes in composition and/or distribution of key plant species.

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

Shrub densities are estimated using five, 1/100th acre strips centered over the length of each 100 foot belt. All shrubs rooted within each strip are counted and placed in the following five classes. (U.S. Department of Interior Bureau of Land Management 1996).

Seedling: Plants up to three years old which have become firmly established, usually less than 1/8-inch diameter.

Young: Larger with more complex branching. Does not show signs of maturity. Usually between 1/8 and 1/4-inch diameter.

Mature: Complex branching, rounded growth form, larger size, seed is produced on healthy plants. Generally larger than 1/4-inch diameter.

Decadent: Plant, regardless of age, that is in a state of decline, usually evidenced by 25% or more dead branches.

Dead: A plant which is no longer living.

Shrubs are also rated according to their availability and the amount of use they display, and placed in one of 9 form classes.

1. All available, lightly hedged.
2. All available, moderately hedged.
3. All available, heavily hedged.
4. Largely available, lightly hedged.
5. Largely available, moderately hedged.
6. Largely available, heavily hedged.
7. Mostly unavailable.
8. Unavailable due to height.
9. Unavailable due to hedging.

Lightly hedged: 0 to 40 percent of twigs browsed.

Moderately hedged: 41 to 60 percent of twigs browsed.

Heavily hedged: Over 60 percent of twigs browsed. Degree of hedging is based on leader use over the past three years: current annual growth is not included.

Largely available: One-third to two-thirds of plant available to animal.

Mostly unavailable: Less than one-third of plant available to animal.

In classifying browse to a form class, unavailability may be the result of height, location, or density.

Shrubs are also rated on their health and placed into one of 4 vigor classes.

1. Normal and vigorous.
2. Insect infested or diseased.
3. Poor vigor - chlorotic or discolored leaves, smaller than normal stems or leaves, flowering restricted, partially trampled, pulled up, or otherwise damaged. Stunted growth, partial crown death.
4. Dying - substantial portion of crown dead (more than 50%), more extreme than 3 above. Probably an irreversible condition.

In addition, each mature shrub species closest to every 10 foot mark along a sampling belt is measured to determine average height and crown. This allows a maximum sample of 50 plants per species to be measured at a given site depending on their respective densities. Annual leader growth is estimated for key browse species at each study site. This is done by measuring five leaders on the closest mature shrub in each quarter (similar to point-center quarter method) from 3 stakes along the study site baseline (0', 200' and 400' stakes).

These numbers are then averaged. Tree density is determined using the point-center quarter method at two hundred foot intervals along the baseline. Three hundred feet are added to the end of the transect so that five, 200 foot point-quarter centers can be read. This allows sampling trees on a much larger scale. The strip method that is used to estimate shrub density, can in most cases, effectively inventory seedling and young tree densities. However, the strip method is less effective at estimating densities of mature trees that are often widely disbursed.

Prior to 1992, shrub frequency was determined using the nested frequency method that was previously described. It was found that nested frequency of shrubs did not usually reflect accurate trends in shrub populations which had particularly low or high densities. Therefore, beginning in mid-1992, each 1/100th acre shrub strip is divided into 20, five foot segments. To give a more accurate measure of shrub frequency, presence or absence of shrub species is determined within these strip segments, and this measurement is termed strip frequency. For example, if a species was rooted in 25 of the 100 shrub strips, strip frequency for this species would be 25%. This larger sample will better reflect changing trends in shrub populations. This data along with shrub cover is recorded in the "Browse Trends" table.

TREND DETERMINATION

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

- 1) changes in density or number of plants/acre
- 2) proportion of decadent plants, and the percentage of decadent plants that are classified as dying
- 3) biotic potential or proportion of seedlings to the population
- 4) proportion of young plants in population
- 5) proportion of individuals moderately or heavily browsed
- 6) proportion of plants in poor vigor
- 7) changes in height and crown diameter measurements for mature age class
- 8) changes in browse species composition
- 9) strip frequency values
- 10) proportion of cover contributed by key species

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

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

In the following example, grasses had a combined total cover value of 11.39% in 1998 and 7.08% in 2003. In 1985 and 1991, bluebunch wheatgrass (*Agropyron spicatum*) had a nested frequency value of 227 out of a possible nested frequency score of 400. By 1998, nested frequency declined to 183. The subscript letters indicate that the nested frequency value for *A. spicatum* between 1991 and 1998 declined significantly. Nested frequency declined to 160 in 2003, but the subscript letters indicate that this was not a significant change. Cover was estimated at 7.78% for *A. spicatum* in 1998 declining to 5.59% in 2003. Trend for this grass is down over the life of the transect due to a significant decline in sum of nested frequency since 1991.

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

T y p e	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	<i>Agropyron spicatum</i>	_b 227	_b 227	_a 183	_a 160	7.78	5.59
G	<i>Bromus tectorum</i> (a)	-	-	_b 42	_a 15	.43	.03
G	<i>Oryzopsis hymenoides</i>	4	12	12	5	.17	.04
G	<i>Poa fendleriana</i>	_a 6	_{bc} 36	_c 49	_{ab} 24	.98	.46
G	<i>Poa secunda</i>	_a 3	_a 18	_b 94	_b 80	2.00	.94
G	<i>Sitanion hystrix</i>	_c 25	_{bc} 20	_{ab} 6	_a 2	.01	.01
Total for Annual Grasses		0	0	42	15	0.43	0.03
Total for Perennial Grasses		265	313	344	271	10.95	7.05
Total for Grasses		265	313	386	286	11.39	7.08
F	<i>Agoseris glauca</i>	_a -	_a 10	_{ab} 1	_a -	.00	-
F	<i>Arabis</i> spp.	_a -	_b 18	_a 1	_a 1	.00	.00
F	<i>Astragalus convallarius</i>	2	4	6	6	.15	.10
F	<i>Calochortus nuttallii</i>	4	8	-	-	-	-
F	<i>Crepis acuminata</i>	-	6	7	-	.06	-
F	<i>Eriogonum racemosum</i>	-	-	4	-	.03	-
F	<i>Eriogonum umbellatum</i>	_a -	_a 1	_b 9	_{ab} 5	.16	.07
F	<i>Phlox austromontana</i>	-	6	4	6	.16	.15
F	<i>Physaria chambersii</i>	1	4	-	-	-	-
F	<i>Phlox longifolia</i>	_a 8	_b 27	_a 16	_a 6	.20	.02
Total for Annual Forbs		0	0	0	0	0.00	0
Total for Perennial Forbs		15	84	48	24	0.83	0.35
Total for Forbs		15	84	48	24	0.83	0.35

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

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

The following “Browse Trends” table summarizes strip frequency and cover for all shrub species occurring on this site. All of the shrubs encountered at study number 23-1 are listed. For example, mountain big sagebrush (*Artemisia tridentata vaseyana*) had a strip frequency of 40 out of a possible 100 in 1998, declining to 26 in 2003. Average cover is determined using cover classes in conjunction with the 1/4m² quadrat and estimating the percent of the quadrat covered. In this case, mountain big sagebrush cover was estimated to be 2.54% in 1998, declining to only 0.76% in 2003.

BROWSE TRENDS --

Management unit 23 , Study no: 1

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

To more accurately estimate canopy cover of trees and shrubs, the line-intercept method is used along each 100 foot belt. This data is reported in the “Canopy Cover, Line Intercept” table. For example, Utah juniper (*Juniperus osteosperma*) had an estimated average cover of 23.31% in 2003. Prior to 2002, only trees species were sampled in the line-intercept transect. Beginning in 2002, all woody species are included in the line-intercept transect and a canopy cover value for each is determined.

CANOPY COVER, LINE INTERCEPT --

Management unit 23 , Study no: 1

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

Beginning in 2002, annual leader growth of the key browse species is measured to get an idea of shrub production and vigor. This data is displayed in the “Key Browse Annual Leader Growth” table. For example, annual leaders on bitterbrush (*Purshia tridentata*) averaged 4 inches in length while mountain big sagebrush leaders averaged only 1.1 inches in 2003.

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 23 , Study no: 1

Species	Average leader growth (in)
	'03
<i>Artemisia tridentata vaseyana</i>	1.1
<i>Purshia tridentata</i>	4.0

The following “Point-Quarter Tree Data” table displays tree density estimates using the point-center quarter method which better estimates density of widely disbursed trees than the shrub density strips. Average basal diameter is also listed in inches. Data from 2003 estimated 197 juniper and 119 pinyon trees/acre with average basal diameters of 7.0 inches and 5.3 inches respectively.

POINT-QUARTER TREE DATA --

Management unit 23 , Study no: 1

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

The “Basic Cover” table summarizes average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground. Average cover prior to mid-1992 adds up to only 100%, while cover with the current method (post mid-1992) estimates several layers of plant and ground cover and will usually exceed 100%. For vegetation cover, the previous method only determined basal vegetative cover (2.0 and 5.75), while the new method estimates the vertical projection of the crown, or aerial cover (30.04 and 32.5%). Therefore, comparisons can be made for all cover measurements except for general vegetation cover.

BASIC COVER --

Management unit 23 , Study no: 1

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

A summary of the soil data is found in the “Soil Analysis Data” table. Effective rooting depth is an average of 25 soil penetrometer readings, 5 of the deepest probes possible near each of the 5 baseline starting stakes. The effective rooting depth is a relative index that can be used for site comparisons with regard to individual species differences, site preferences, and abundance. Average soil temperature is taken from the deepest probe, one at each of the 5 baseline starting stakes. The temperature is listed in the table as the top measurement (e.g., 62.3°F), with the average depth (in inches) as the lower measurement (12.7). Average soil temperature is re-measured with each reading and the most current soil temperature and depth is listed in the soil analysis table. Chemical and textural (Day 1965) characteristics are also listed and were determined by laboratory analysis of a composite soil sample taken near each of the 5 baseline starting stakes.

SOIL ANALYSIS DATA --

Management unit 23, Study # 01, Study Name: Bear Ridge

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

The descriptive terms used for ranges in pH (Rhodes 1982) are as follows:

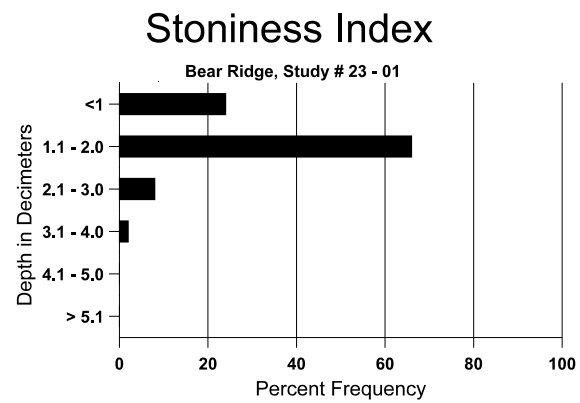
Ultra acid	< 3.5
Extremely acid	3.5-4.4
Very strongly acid	4.5-5.0
Strongly acid	5.1-5.5
Moderately acid	5.6-6.0
Slightly acid	6.1-6.5
Neutral	6.6-7.3
Slightly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strongly alkaline	> 9.1

Percent organic matter (% OM) refers to the amount of organic matter in the top 12 inches of the soil profile. Parts per million (ppm) of phosphorus (P) (Olsen et al. 1954) and potassium (K) (Schoenau and Karamonos 1993) are also included. Values for phosphorus and potassium less than 10 ppm and 70 ppm respectively may be limiting to plant growth and development (Tiedemann and Lopez 2004).

The electrical conductivity (Rhodes 1982) of the soil is reported in decisiemens per meter (dS/m). Electrical conductivity is related to the amount of salts more soluble than gypsum in the soil. The following classes can be used as a reference.

Non saline	0-2
Very slightly saline	2-4
Slightly saline	4-8
Moderately saline	8-16
Strongly saline	>16

To determine how rock is distributed throughout the upper soil profile, a stoniness index (Richard and Murdock 1963) is determined for each study site. Depth to the nearest rock is estimated on the first 10 feet (at one-foot intervals) along each of the 5 baselines, which allows 50 measurements. These data are then analyzed for each of the 5 incremental decimeter measurements, making it possible to visually determine the proportion (relative percent of rock at each depth) of rock from <1 decimeter to >5 decimeters. In the following example, most of the rock in the soil profile (~65%) was encountered in the 1 to 2 decimeter (4 to 8 inch) depth range. The distribution of rock in the soil profile can be an important factor for what is growing on the site.



The “Pellet Group Data” table summarizes the frequency of animal pellets sampled within the 100 quadrats placed along the sampling belts as well as data from a pellet group transect read parallel to the study site baseline. Quadrat frequency of wildlife and livestock droppings is included in reports done prior to mid-1992. For example in 1998, rabbit pellets were found in 25% of the quadrats placed on study 23-1, increasing to 32% in 2003. Quadrat frequency of rabbit or big game pellets indicate a relative amount of use by that particular animal. This data can help characterize changes in wildlife use patterns on the site.

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

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

It was determined that additional information on pellet groups was necessary. Therefore, a pellet group transect is now sampled in conjunction with the vegetative transects. The pellet group transect utilizes 50, 100ft² circular plots which are placed through the study area. These are usually two parallel transects of 25 plots on each side of the vegetative transect which runs 500 feet in length. The number of recent pellet groups for wildlife (usually deer and elk) and pats for cattle are recorded. That number is then converted to days use per acre. In the above example, deer days use/acre was estimated at 51 in 1998 increasing slightly to 54 in 2003. If a trend study needs to be read annually and more precision is required, the pellet group transect is marked permanently (rebar) and the pellet groups within the circular plots are removed or marked after being counted.

The "Browse Characteristics" table summarizes characteristics of the shrub community on study 23-1. Only mountain big sagebrush is included in this example. The sagebrush population is characterized by age class, vigor, utilization, and average height and crown for mature plants. Total density in plants/acre for mountain big sagebrush, excluding seedlings, was 1,400 in 1985, 1,065 in 1991, 1,100 in 1998, and 840 plants/acre in 2003. Seedlings are excluded from the population estimate because with summer drought, many will die by late fall causing great fluctuations in population estimates between sampling dates. Since mid-1992, a larger shrub sample (more than three times larger) is used to better characterize the shrub populations. Therefore, changes in density (before and after 1992) may not necessarily indicate changes in trend, especially shrub populations that characteristically are clumped and/or have discontinuous distributions. The earlier smaller sample could easily either overestimate or underestimate shrub populations. Other characteristics like percent of the population classified as dying, percent decadence, percent of the population displaying poor vigor, percent heavy hedging, young recruitment, etc. should be given more weight in determining shrub trend when comparing survey years where sample sizes are different.

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

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

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

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

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

The desirable components index (DCI) was created by Range Trend Program personnel as a tool to address condition and/or value of winter ranges for mule deer. This index is meant to be a companion to, not a replacement for, the site specific range trend assessments that are found in the annual Utah Big Game Range Trend Studies report. This index was designed to score mule deer winter range based upon several important vegetative components (ie., preferred browse cover, shrub decadence and young recruitment, cover of perennial grasses and forbs and annual grasses, etc.). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies. The Desirable Components Index Ratings are divided into three categories because of different ecological potential, these include: Wyoming Big Sagebrush – Cliffrose – Desert shrubs, Mountain Big Sagebrush, and Mountain Brush. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover.

Desirable Components Index Ratings

Desirable Components Index Scoring

Lower potential sites (Wyoming Big Sagebrush and Desert Shrub Communities)

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

Preferred Browse (60 points)

(Preferred Browse species are favorable or critical to deer)

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

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

Percent Young (15 points possible)
0.5 points for each 1% of young

Mid level potential sites (Mountain Big Sagebrush)

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

Herbaceous Understory (40 points)

Higher potential sites (Mountain Brush Communities)

Perennial Grass Cover (30 points possible)
2 points for each 1% cover

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

Perennial Forb Cover (10 points possible)
2 points for each 1% cover

Annual Grass Cover (-20 points possible)
-0.75 points for each 1% cover

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

Noxious Weeds (State List)
-2 points for each species present

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REPORT FORMAT

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

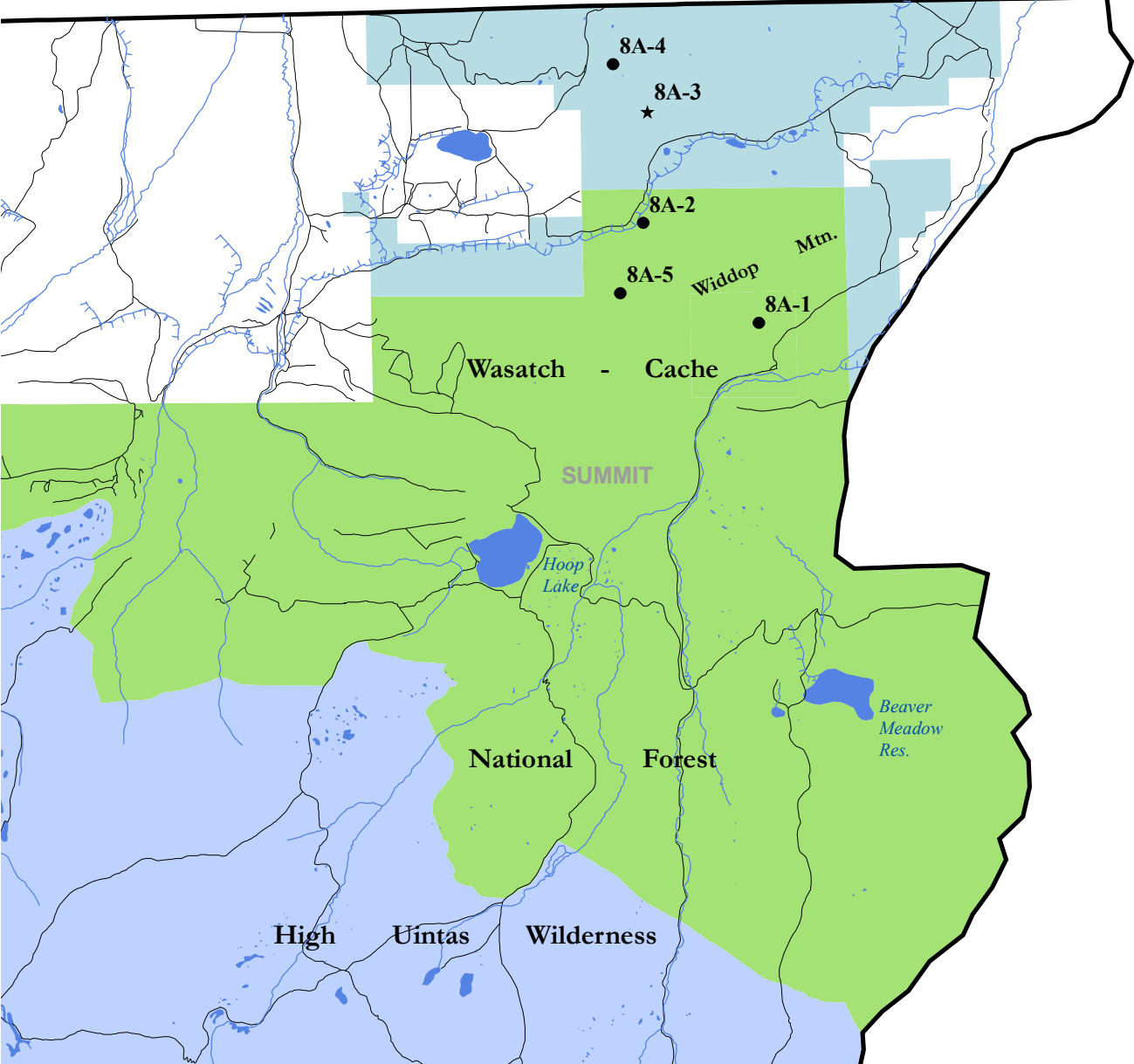
The name of the site and directions for locating the site are given on the location page. Also included on this page are the vegetation type, arrangement and diagrammatic sketch of the baseline, and the location on a topographical map. The 7.5 minute topographical map name and public land survey description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

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

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

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

Management Unit 8A

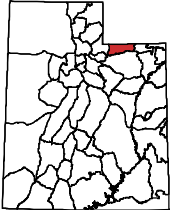


Map Scale 1:100,000 (1 inch = 1.6 miles)

- Transect location
- ★ Suspended site
- Forest Service
- State of Utah
- Private
- Water body
- River or stream
- Ditch or canal
- Road



Unit Location



WILDLIFE MANAGEMENT UNIT 8A - NORTH SLOPE, SUMMIT

BOUNDARY DESCRIPTION

Summit County - Boundary begins at the junction of Highway SR-150 and the Summit-Duchesne county line (summit of the Uinta Mountains); north along SR-150 to the Utah-Wyoming state line; east along this state line to the Brunt Fork-Birch Creek drainage divide; south along this drainage divide to the Burnt Fork-Sheep Creek drainage divide; south along this drainage divide to the Summit-Duchesne county line (summit of the Uinta Mountains); west along this county line to SR-150 and beginning point.

Unit Description

The North Slope, Summit Wildlife Management Unit is located along the north slope of the Uinta Mountains in Summit County. Unit 8A is a sub-unit of the North Slope Wildlife Management Unit. The other sub-unit, 8B, covers Daggett County. Elevation of unit 8A ranges from 7,500 feet to over 13,000 feet. Habitat varies from sagebrush and mountain brush communities to alpine tundra above the timberline which includes vast expanses of lodgepole pine. Several major drainages are located within the unit including: Bear River, Black's Fork, Smith's Fork, Henry's Fork, and Burnt Fork. Winter range in Utah is a critical limiting factor on the unit with many deer wintering in Wyoming.

In previous reports, the 5 trend study sites in this unit were included in Herd Unit 9 - Daggett. The study areas in herd unit 8A emphasize areas around Widdop Mountain and the Bald Range which are just west of the herd units eastern boundary and Burnt Fork-Birch Creek drainage divide. This area is considered important winter range for elk which summer on the north slope of the High Uinta mountains. According to the 1995 Big Game Harvest summary (Evans et. al 1995), there is approximately 365,000 acres of summer range on the unit, 88% of which is administered by the U.S. Forest Service. Private land owners control 11%, while the State of Utah administers 1%. There is about 35,100 acres of winter range with the majority (44%) being privately owned and another 42% administered by the Forest Service. The state owns 7%.

To meet the need for vegetative trend data on key elk winter ranges on the North Slope of the Uinta Mountains east of Beaver Creek, 6 new interagency range trend studies were established in the area in September 1988. The key areas are found on the mountain mahogany slopes of Phil Pico Mountain, Bald Range, Widdop Mountain, and Jessen Butte. These areas are mostly public land, although there is a considerable amount of private land in the Birch Creek and Beaver Creek drainages below the U.S. Forest boundary. The state of Utah owns several large sections, containing the study areas on Phil Pico Mountain (8B-8) and the Bald Range (8A-3 & 4). The study sites on Widdop Mountain (8A-1 & 2), including Telephone Hollow (8A-5), are in the Wasatch National Forest. The site on Phil Pico Mountain is now within sub-unit 8B and will be discussed in that section.

These sites receive moderate to heavy use by elk in the winter. Deer use is light to moderate in the winter with some summer use. Four of the 5 trend sites also show light winter use by moose, with year round antelope use of the area. Degree of winter use by antelope and deer is dependent on weather conditions. All areas are permitted for livestock grazing. While the valleys are often heavily used by cattle, on-site observations indicate light use or no use on the steep, mountain brush hillsides.

Unit Management Objectives

The management plan for Unit 8 (8A & 8B), includes a target herd size of 5,300 wintering deer with a composition of 15 bucks to 100 does. Thirty percent of the bucks are to be 3-point or better. The elk management objective is to achieve a target winter herd size of 2,100 (1,600 in Summit and West Daggett; and

500 in the Three Corners) with a minimum post season bull to cow ratio of 8:100. At least 4 of these bulls will be 2 ½ years of age or older (DeBloois et. al 2001).

Study Site Description

All range trend studies in Unit 8A sample the true (birchleaf) mountain mahogany range type. These studies provide a good representation of a majority of the key birchleaf mahogany winter range in the area. Except for Widdop Mountain North Slope (8A-2) which is situated on a north slope, the remainder of the study sites are located on south-facing slopes. These slopes tend to be moderately steep with rocky soil, typical of the dry, coarse, shallow soils often occupied by mountain mahogany.

All of the 5 trend study sites in sub-unit 8A were established in 1988 and reread in 1995. During the 2000 and 2005 season, 4 of the 5 studies were reread; Bald Range South (8A-3) was discontinued due to its close proximity to and similarity with Bald Range (8A-4).

Trend Study 8A-1-05

Study site name: Widdop Mountain South Slope .

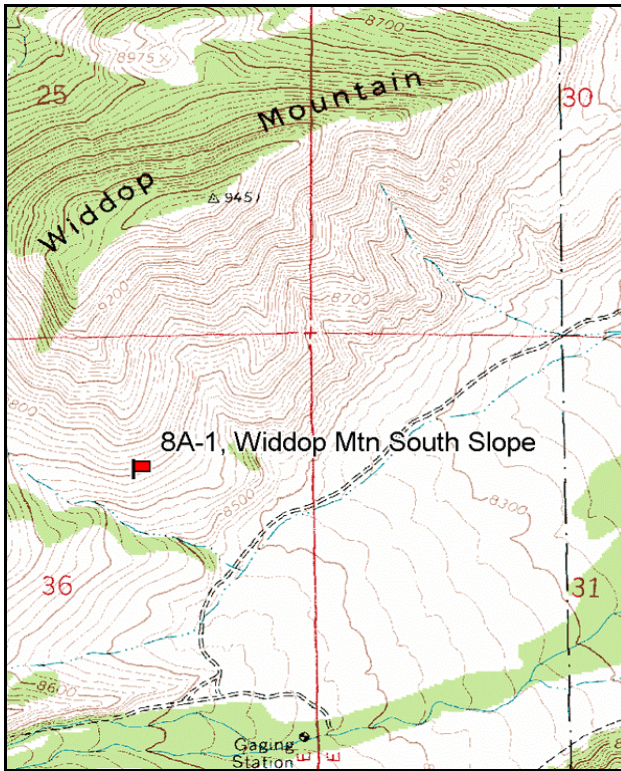
Vegetation type: True Mountain Mahogany .

Compass bearing: frequency baseline 154 degrees magnetic.

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

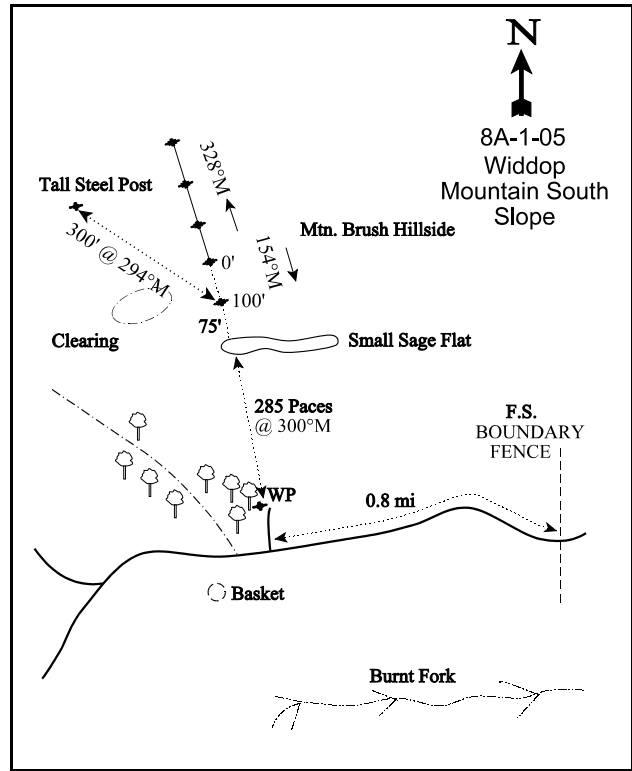
LOCATION DESCRIPTION

Two miles south of the Wyoming-Utah state line, on the Hoop Lake Road along the Middle Fork of Beaver Creek, turn east towards Gregory Basin. Go 0.6 miles to a private property fence. Continue east 1.1 miles, past a cabin, to a fence. Go 0.1 miles to a fork, continue straight. Go 0.4 miles to an old 4-way intersection south of Gregory Basin. Continue east for 0.7 miles to the FS boundary fence. Go 0.9 miles (past study 8A-2-00) to another FS fence. Continue 1.8 miles to a gate. Go through the gate and 0.4 miles to a fork. Bear right. Go 2.3 miles SW back to a FS boundary fence. Proceed 0.8 miles to a faint fork. Turn right and pull up about 50 yards along a small drainage. Stop by a witness post (tall green fencepost) next to a clump of aspens. From here, walk 285 paces at 300°M up the slope. The 0-foot baseline stake is marked by browse tag #7155.



Map Name: Hoop Lake

Township 3N, Range 16E, Section 36



Diagrammatic Sketch

GPS: NAD 27, UTM 12T 4533806 N, 578122 E

DISCUSSION

Widdop Mountain South Slope - Trend Study No. 8A-1

The Widdop Mountain South Slope study is located on the south side of Widdop Mountain. The open mountain mahogany slope overlooks large sagebrush parks in the Burnt Fork drainage. The elevation at the site is 8,650 feet. It is on a moderately steep (26%), south-facing, well-drained slope. The land is administered by the Wasatch National Forest which is permitted for summer cattle grazing. The cows tend to stay in the valley bottom near water, so livestock use is light on the steep brushy mountain slopes. These slopes receive mostly use from wintering elk, as is evidenced by the higher quadrat frequency of elk pellet groups. Pellet group data from 2000 estimated 66 elk, 15 deer, 2 cow, and 9 moose days use/acre (163 edu/ha, 44 ddu/ha, 4 cdu/ha, and 23 mdu/ha). In 2005, pellet group data estimated 48 elk, 4 cow, and 13 moose days use/acre (117 edu/ha, 11 cdu/ha, and 32 mdu/ha). Nearly all of the elk use appeared to be from winter, and moose use primarily from spring.

The soil is a moderately deep, rocky, sandy loam with an effective rooting depth of nearly 13 inches. The soil profile contains a light colored horizon at approximately 3 to 6 inches in depth that contains calcium carbonate particles. Rock cobble and gravel are common on the soil surface and concentrated in the top 12 inches of the soil. Parent material consists of limestone and sandstone colluvially deposited from Widdop Mountain. Phosphorus levels were quite high, measuring 19.6 ppm, values below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Some limited soil movement is apparent in the form of soil pedestalling on the uphill side of shrubs and some terracing on the steeper slopes. However, erosion is not a problem on the site due to the abundant vegetation and litter cover. The erosion condition class determined soil movement as stable in 2005.

True mountain mahogany is the key browse species which provided 22% cover in 1995, 24% in 2000, and 25% in 2005. The population has fluctuated slightly; in 1995 the population estimate was 4,320 plants/acre, 5,160 in 2000, and 4,920 in 2005. During the 1995 reading, the proportion of mature plants increased, while the number of plants in all other form classes declined. The biggest decline was in the number of young plants, which had been abundant in 1988. The young plants counted in 1988 had apparently established during the favorable wet years of 1983 and 1984. Young plants accounted for about 56% of the mahogany population in 1988 and have remained stable at 27-29% since 1995. Only a few seedlings were sampled from 1995 to 2005. Use of the palatable mahogany has been moderate to heavy during all years, although slightly heavier in 2000 and 2005. Percent decadence has been low and vigor has been normal for most plants. Some insect damage was noted in 1995 and 2005. Dry conditions in 2000 caused some mahogany leaves to dry out and turn yellow by early August.

Additional browse forage is provided by serviceberry, mountain big sagebrush, winterfat, bitterbrush and snowberry. Although, this currently only accounts for about 3% cover. Patches of sagebrush tend to dominate the more level areas on the hillside. Smaller plants like low rabbitbrush, horsebrush, and broom snakeweed are fairly common yet unimportant as forage.

The abundant and well established grasses provided 16% cover in 1995, 20% in 2000, but decreased to 12% in 2005. Bluebunch wheatgrass is the most abundant herbaceous species, but significantly decreased in nested frequency in 2005. A small sedge is also very common. These two species provided 84% or more of the grass cover since 1995. Indian ricegrass is moderately abundant, while other grasses are found only occasionally. Species richness has been moderately high, but cover has only been above 5% once since 1995. No forb species are very abundant except for thistle and *Cryptantha*, both significantly decreased in 2005.

1995 TREND ASSESSMENT

Ground cover characteristics haven't changed a great deal on this site. Percent bare ground has declined slightly while litter cover has gone down moderately due to drought. Erosion does not appear to be a problem on the site due to the abundant herbaceous vegetation which provides 44% of the vegetative cover. The high values for nested frequency for vegetation and litter (347 and 388 out of a possible 500) suggest well dispersed protective cover. Trend for soil is currently considered stable. Trend for the key browse species, true mountain mahogany, is mixed. On the positive side, percent decadency is less than one percent, but it was already low at 6% in 1988. The proportion of shrubs displaying heavy hedging has also declined, while generally showing good vigor. On the slightly downward side, the numbers of seedlings and young have declined, but this is not critical for a fairly long-lived species. The large number of young plants and noted decline is most likely due to the wet years in the early to mid-1980's followed by several years of drought. Differences in young and seedling plants may also be due to the much larger sample utilized in 1995, which more accurately estimates shrub populations. This trend is common throughout the herd unit and in other areas of the state. Trend for browse on the site is considered stable due to the low decadency rate, adequate reproductive potential (27%), stable vigor, and reduced heavy hedging. Trend for the herbaceous understory is slightly down due to a decline in sum of nested frequency for both perennial grasses and forbs. This is also a common trend throughout the state during these drought years. Nested frequency of bluebunch wheatgrass increased significantly while frequency of most of the other perennial grasses declined. The Desirable Components Index rated this site as excellent with a score of 98 due to good perennial grass cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Excellent (98) High Potential scale

2000 TREND ASSESSMENT

Trend for soil is fairly stable. Erosion is not a problem on the site due to the abundant and well dispersed vegetation and litter cover. Trend for the key browse species, true mountain mahogany, is also stable. Utilization is somewhat heavier than 1995 estimates. However, percent decadence is relatively low at 10%, vigor is normal on most plants, and 29% of the population consists of young plants. Some of what appears as increased use may be due to poor leader growth on mahogany in response to the extremely dry conditions of this growing season. Poor leader growth makes shrubs appear to be more heavily used. Trend for the herbaceous understory is stable with similar sum of nested frequencies for perennial grasses and forbs compared to 1995. However, they are somewhat lower than before, but not enough to warrant a change in trend at this time. The Desirable Components Index rated this site as excellent with a score of 95 due to good perennial grass cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Excellent (95) High Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Bare ground has remained at previous levels and erosion is kept minimal with good vegetation and litter cover. Trend for key browse species, true mountain mahogany, continues to be stable. The population has remained fairly stable with some fluctuation in percentage of young plants in the population. Percent decadence is low and vigor for most plants is normal. Utilization has increased slightly from moderate-heavy use to heavy use, although plants appear to still have moderate leader growth. Trend for the herbaceous understory is slightly down. The sum of nested frequency for perennial herbaceous species is down about 11% and there has been a gradual downward trend since 1995. The nested frequency of bluebunch wheatgrass, the most abundant herbaceous species, decreased significantly from 1995 and 2000 estimates. Sum of nested frequency for forbs decreased, but they contribute little to total herbaceous cover. The Desirable Components Index rated this site as good with a score of 88, which is a decrease from an excellent score the two previous years mostly due to a slight decrease in perennial grass cover. Sum of nested frequency for perennial grasses changed slightly, although perennial grass cover decreased by almost 45%.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Good (88) High Potential scale

HERBACEOUS TRENDS --
Management unit 08A, Study no: 1

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	a-	ab3	b12	c25	.03	.10	.28
G	Agropyron spicatum	a233	b286	b276	a230	9.56	12.51	5.66
G	Bromus inermis	-	10	2	3	.06	.00	.01
G	Carex sp.	b188	a136	ab157	ab172	3.57	6.02	4.34
G	Festuca ovina	-	-	4	-	-	.03	-
G	Koeleria cristata	c60	bc45	ab26	a21	.58	.23	.20
G	Leucopoa kingii	c23	ab10	b10	a-	.02	.07	-
G	Oryzopsis hymenoides	65	59	42	51	1.72	1.34	.73
G	Poa fendleriana	a-	b14	a-	ab5	.08	-	.04
G	Poa secunda	-	-	1	3	-	.00	.06
G	Stipa comata	c40	ab6	a-	b17	.09	-	.26
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		609	569	530	527	15.72	20.34	11.60
Total for Grasses		609	569	530	527	15.72	20.34	11.60
F	Arabis sp.	-	3	-	4	.03	-	.01
F	Aster chilensis	10	4	-	-	.06	-	-
F	Astragalus sp.	3	-	1	1	-	.03	.03
F	Calochortus nuttallii	-	7	2	2	.07	.00	.00

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Castilleja sp.	-	-	-	1	-	-	.00
F	Chaenactis douglasii	-	1	6	1	.00	.01	.00
F	Chenopodium leptophyllum(a)	-	2	-	-	.01	-	-
F	Cirsium sp.	_b 59	_b 48	_b 57	_a 9	1.62	1.47	.26
F	Comandra pallida	1	1	-	3	.03	-	.03
F	Cryptantha sp.	_{ab} 42	_c 90	_{bc} 71	_a 25	1.04	.94	.46
F	Cymopterus sp.	-	-	1	-	-	.00	-
F	Descurainia pinnata (a)	14	54	1	-	.22	.03	-
F	Eriogonum umbellatum	-	-	1	4	-	.00	.03
F	Hymenoxys acaulis	2	-	-	1	-	-	.00
F	Lesquerella alpina	_{bc} 40	_{ab} 19	_c 40	_a 15	.05	.31	.07
F	Leucelene ericoides	21	10	15	18	.02	.13	.13
F	Linum lewisii	_a 2	_{ab} 5	_{bc} 21	_c 24	.03	.12	.36
F	Lithospermum ruderales	_a 8	_{ab} 26	_b 28	_{ab} 26	.39	.40	.41
F	Machaeranthera canescens	-	-	1	-	-	.00	-
F	Machaeranthera grindelioides	_a 4	_{ab} 18	_b 25	_b 24	.20	.48	.90
F	Penstemon humilis	_b 96	_a 38	_a 30	_a 37	.24	.45	.26
F	Phlox hoodii	_b 51	_a 34	_a 34	_{ab} 37	.42	.60	.67
F	Physaria sp.	_a -	_a -	_a -	_b 17	-	-	.04
F	Senecio multilobatus	_b 30	_a 6	_b 26	_a 6	.01	.37	.04
F	Taraxacum officinale	_a -	_b 10	_{ab} 2	_b 7	.03	.03	.02
F	Tragopogon dubius	-	-	1	-	-	.00	-
F	Zigadenus paniculatus	4	6	1	9	.01	.00	.05
Total for Annual Forbs		14	56	1	0	0.23	0.03	0
Total for Perennial Forbs		373	326	363	271	4.29	5.38	3.84
Total for Forbs		387	382	364	271	4.52	5.41	3.84

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

BROWSE TRENDS --
 Management unit 08A, Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	6	5	7	1.06	1.52	1.79
B	Artemisia frigida	7	10	8	.03	.18	.21
B	Artemisia tridentata vaseyana	5	6	7	.66	1.00	.53
B	Ceratoides lanata	2	1	1	.01	-	-
B	Cercocarpus montanus	93	93	96	21.65	24.07	25.18
B	Chrysothamnus depressus	1	0	0	-	-	-
B	Chrysothamnus nauseosus hololeucus	0	1	1	-	-	-
B	Chrysothamnus viscidiflorus lanceolatus	23	24	14	.48	.33	.63
B	Eriogonum microthecum	16	12	12	.12	.34	.16
B	Gutierrezia sarothrae	26	60	66	.62	1.49	2.56
B	Purshia tridentata	1	1	1	.03	.15	.03
B	Symphoricarpos oreophilus	4	3	3	.15	.41	.38
B	Tetradymia canescens	34	32	28	.81	.77	1.10
Total for Browse		218	248	244	25.66	30.29	32.59

CANOPY COVER, LINE INTERCEPT --
 Management unit 08A, Study no: 1

Species	Percent Cover
	'05
Amelanchier utahensis	.93
Artemisia frigida	.28
Artemisia tridentata vaseyana	.20
Cercocarpus montanus	26.58
Chrysothamnus viscidiflorus lanceolatus	.25
Eriogonum microthecum	.01
Gutierrezia sarothrae	2.75
Symphoricarpos oreophilus	.50
Tetradymia canescens	.50

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 08A, Study no: 1

Species	Average leader growth (in)
	'05
Cercocarpus montanus	3.2

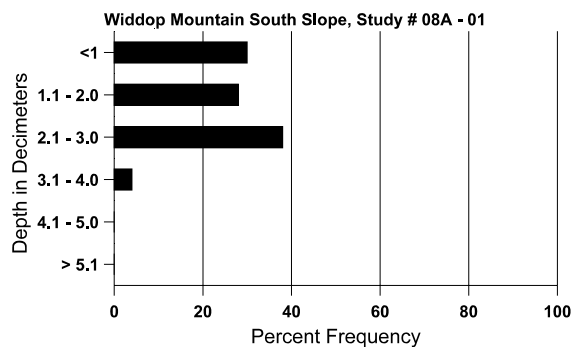
BASIC COVER --
 Management unit 08A, Study no: 1

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	8.00	39.14	51.17	45.63
Rock	3.75	6.31	5.54	4.87
Pavement	18.50	13.45	18.63	17.74
Litter	57.00	47.96	43.00	34.52
Cryptogams	0	.00	0	.30
Bare Ground	12.75	10.57	15.58	14.50

SOIL ANALYSIS DATA --
 Herd Unit 8A, Study # 1, Study Name: Widdop Mountain Slope

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
12.8	59.2 (14.3)	6.6	72.0	13.4	14.6	7.0	19.6	208.0	0.6

Stoniness Index



PELLET GROUP DATA --
 Management unit 08A, Study no: 1

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	1	1	-
Moose	4	3	9
Elk	40	28	23
Deer	20	-	4
Cattle	-	2	3

Days use per acre (ha)	
'00	'05
-	-
9 (23)	13 (32)
66 (162)	48 (117)
15 (36)	-
2 (4)	4 (11)

BROWSE CHARACTERISTICS --
 Management unit 08A, Study no: 1

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	200	-	100	100	-	-	30	20	0	-	0	27/31
00	120	20	-	80	40	-	33	50	33	-	0	20/28
05	180	-	-	160	20	-	11	89	11	-	0	24/33
<i>Artemisia frigida</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	140	-	20	120	-	-	14	0	-	-	0	3/8
00	280	40	60	220	-	-	0	0	-	-	0	2/6
05	160	-	20	140	-	-	13	0	-	-	0	5/8
<i>Artemisia nova</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	4/11
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Artemisia tridentata vaseyana</i>												
88	333	-	133	200	-	-	0	0	0	-	0	9/15
95	120	-	40	80	-	-	50	0	0	-	0	7/14
00	140	-	-	100	40	-	71	0	29	14	14	8/15
05	160	-	-	80	80	-	38	38	50	25	25	8/16
<i>Ceratoides lanata</i>												
88	66	-	-	66	-	-	100	0	-	-	0	5/4
95	40	-	-	40	-	-	0	0	-	-	0	6/4
00	20	-	-	20	-	-	0	0	-	-	0	9/11
05	20	-	-	20	-	-	0	100	-	-	0	8/7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
88	6733	400	3800	2533	400	-	32	39	6	-	2	26/38
95	4320	40	1180	3120	20	-	44	34	0	.46	2	31/50
00	5160	140	1520	3120	520	20	29	57	10	3	3	23/37
05	4920	140	1380	3420	120	-	8	88	2	.81	.81	28/43
Chrysothamnus depressus												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	20	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus nauseosus hololeucus												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	16/16
Chrysothamnus viscidiflorus lanceolatus												
88	398	-	66	266	66	-	17	0	17	-	17	10/11
95	820	-	160	660	-	-	0	0	0	-	0	9/12
00	660	-	-	640	20	-	0	0	3	-	0	6/11
05	420	20	20	400	-	-	5	0	0	-	0	7/13
Eriogonum microthecum												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	600	-	20	580	-	-	0	0	0	-	0	4/10
00	420	60	-	380	40	-	0	0	10	5	5	4/7
05	300	-	20	240	40	-	0	0	13	-	0	5/10
Gutierrezia sarothrae												
88	9465	-	733	8666	66	-	0	0	1	.21	.70	7/5
95	780	-	20	760	-	-	0	0	0	-	0	7/6
00	2520	240	80	2380	60	-	0	0	2	.79	.79	5/8
05	3160	-	120	3040	-	-	0	0	0	-	0	7/11
Leptodactylon pungens												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	5/8
05	0	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	20	-	-	-	100	0	-	-	0	-/-
00	20	-	20	-	-	-	100	0	-	-	100	-/-
05	20	-	-	20	-	-	0	100	-	-	0	4/14
Symphoricarpos oreophilus												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	80	-	-	80	-	-	0	0	-	-	0	8/21
00	120	-	40	80	-	-	33	0	-	-	0	9/35
05	60	-	-	60	-	-	0	0	-	-	0	14/30
Tetradymia canescens												
88	866	66	400	466	-	-	23	0	0	-	8	7/7
95	1280	-	80	1200	-	-	3	0	0	-	0	6/8
00	1240	-	100	1000	140	-	8	5	11	3	3	6/10
05	960	-	120	800	40	-	48	27	4	2	2	6/11

Trend Study 8A-2-05

Study site name: Widdop Mountain North Slope .

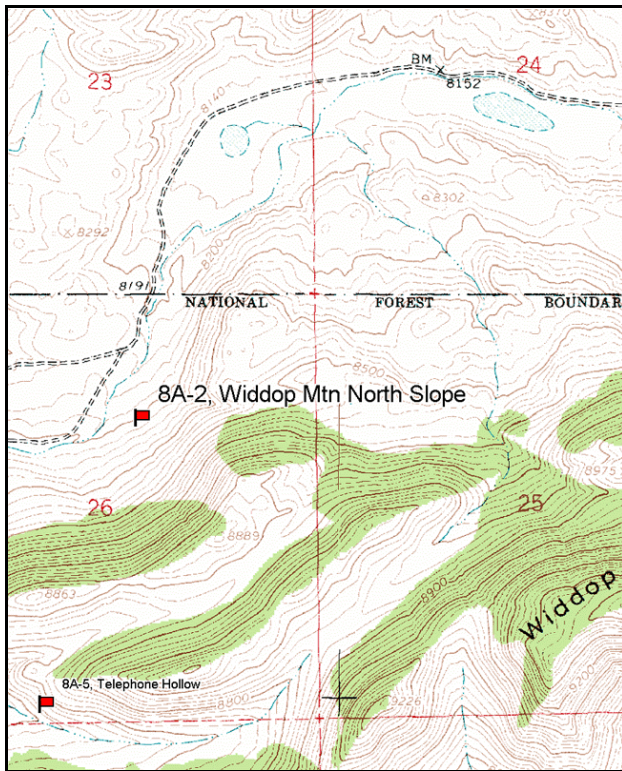
Vegetation type: True Mountain Mahogany .

Compass bearing: frequency baseline 146 degrees magnetic.

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

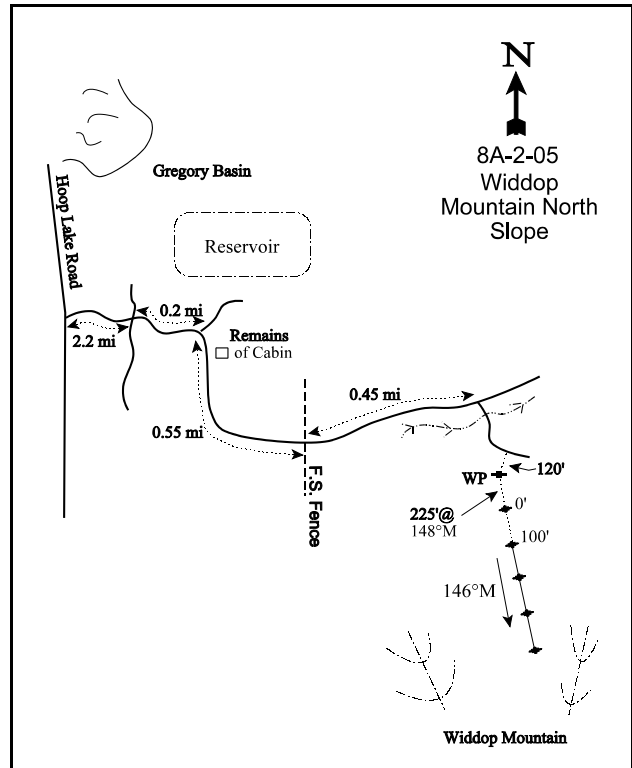
LOCATION DESCRIPTION

Two miles south of the Wyoming-Utah state line, on the Hoop Lake Road along the Middle Fork of Beaver Creek, turn east towards Gregory Basin. Go 0.6 miles to a private property fence. Continue east 1.1 miles, past a cabin, to a fence. Go 0.1 miles to a fork, continue straight. Go 0.4 miles to an old 4-way intersection south of Gregory Basin. Continue straight east 0.2 miles to an old cabin, bear right. Proceed 0.55 miles to the FS boundary fence. Go along the bottom 0.45 miles to a faint fork. Bear right and go across the stream. Continue east 0.1 miles towards the base of Widdop Mountain. On the south side of the road, look for a witness post in the sagebrush. The 0-foot baseline stake is 225 feet south of the witness post at 148°M.



Map Name: Hoop Lake

Township 3N, Range 16E, Section 26



Diagrammatic Sketch

GPS: NAD 27, UTM 12T 4535321 N, 576367 E

DISCUSSION

Widdop Mountain North Slope - Trend Study No. 8A-2

The Widdop Mountain North Slope study is located on the opposite side of the mountain from the Widdop Mountain South Slope study site (8A-1). This site on Widdop Mountain also samples a true mountain mahogany type. This site has a northwest aspect. It is moderately steep at the top, but a more gentle slope towards the bottom where the study is located. The site has a slope of approximately 22% and an elevation of 8,300 feet. Although located on a northerly exposure, this windswept hillside receives considerable use by elk in the winter. Pellet group data from 2000 estimated 44 elk, 3 deer, 2 cow, and 16 moose days use/acre (109 edu/ha, 7 ddu/ha, 30 cdu/ha, and 32 mdu/ha). Pellet group data from 2005 estimated 31 elk, 7 deer, 12 cow, and 19 moose days use/acre (78 edu/ha, 18 dhu/ha, 30 cdu/ha, and 47 mdu/ha). Most of the elk pellet groups appeared to be from winter use, while moose seemed to be using the site more in the spring. There is excellent thermal and escape cover provided by a nearby dense conifer stand. Cattle use appeared to be from last season and is managed by the Forest Service.

Soils are moderately deep but variable. Effective rooting depth is estimated at nearly 14 inches, but soil depth varies between 11 inches at the bottom of the slope to 16 inches further up the slope at the end of the baseline. The study site begins further up slope where mountain mahogany is found. The valley below the site is dominated by black sagebrush, which is typically found on more shallow soils. Near the top of the slope there is abundant gravel in the soil profile which becomes small cobble further down. There is also calcium carbonate deposits on the rocks. Most of the rock is concentrated within the top 8 inches of the soil profile. The soil has a loam texture with a slightly alkaline pH of 7.4. It has a relatively high organic matter content, but it is very low in phosphorus at only 3.4 ppm. Values below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Soil parent material is limestone and sandstone. The ground surface is well covered by vegetation and litter, leaving little exposed bare ground. Aside from some mild soil pedestaling of shrubs, there is little soil movement or erosion on the site. The erosion condition class determined soil movement as slight in 2005.

The slope is dominated by true mountain mahogany associated with snowberry, pockets of black sagebrush, and occasional mountain big sagebrush and serviceberry. True mountain mahogany provides nearly half of the browse cover and estimated 24,332 plants/acre in 1988. The majority of the plants (89%) were young plants and predominately established during years of above average precipitation (1983-1984). Mature mahogany plant density increased in the following years an estimated 6,880 plants/acre in 1995, 7,360 in 2000, and 7,770 in 2005. Percent cover has remained between 18-20% since 1995. Utilization was predominantly light to moderate in 1988 and 1995, but increased to moderate-heavy in 2000 and 2005. Percent decadence has been low for all years, recruitment of seedlings has always been good, and annual leader growth moderate at 3.5 inches in 2005.

Black sagebrush has provided around 1% cover since 1995. Density decreased in 2000 from 1,740 plants/acre in 1995 to 1,280 in 2000 and has remained almost the same in 2005. Utilization has always been light and drought conditions since 2000 have begun to increase percent decadence and dying. Serviceberry has provided roughly 1.5% cover since 1995 and has averaged 740 plants/acre since 2000. Utilization has been moderate to heavy with good vigor.

Perennial grasses are diverse, moderately abundant, and with an estimated cover of 13% in 1995, 15% in 2000, and 12% in 2005. Prominent species include: bluebunch wheatgrass, Carex, mutton bluegrass and needle-and-thread. Forbs are diverse with over 25 species encountered during all sample years. Common species are low growing forbs like desert phlox, pussytoes, ballhead sandwort, and sulfur eriogonum. Desirable species include: yellow Indian paintbrush, Lewis flax, and low penstemon.

1995 TREND ASSESSMENT

Even with drought conditions, ground cover characteristics have improved. Percent bare ground has declined somewhat, while percent litter cover has remained fairly stable. There is more than adequate ground cover to control erosion. Trend for soil is considered stable. The browse trend is stable for the abundant palatable species, especially so for the key species, true mountain mahogany. The large numbers of seedlings and young estimated in 1988, were exceptionally high due to above average precipitation in the mid-1980's in conjunction with the much smaller sample size utilized at that time. The number of mature plants increased in 1995 and percent decadence remained low at 2%. The number of seedlings and young declined, but they remain at high numbers and are more than adequate to maintain the population. Secondary browse species, serviceberry, black sagebrush, mountain big sagebrush and snowberry provide additional forage. These species generally display stable to improving trends with light to moderate use. The herbaceous trend is mixed. Sum of nested frequency for grasses has remained relatively stable, while nested frequency of forbs declined. This has been a common trend during dry years. Overall, the combined sum of nested frequency for grasses and forbs have declined slightly, indicating a slightly downward trend. The Desirable Components Index rated this site as excellent with a score of 95 due to good perennial grass/forb cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Excellent (95) High Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable even though relative percent bare ground increased slightly. The ratio of protective cover (vegetation, litter and cryptogams) to bare ground has remained identical to 1995 at almost 4 to 1. Vegetation and litter cover are abundant and well dispersed and erosion is minimal. Trend for the key browse species, mountain mahogany, is also stable. Use is heavier with 41% of the shrubs sampled being classified as heavily browsed. However, vigor is normal and percent decadence is still very low. The number of seedlings has declined from 35% to 16%, but the proportions of young and mature plants have remained similar. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has declined slightly, with nested frequency for perennial forbs declining moderately. This decline has been a common trend in the state this year due to the dry conditions. Trend is considered slightly down since forbs and grasses both showed substantial downward trends. The Desirable Components Index rated this site as excellent with a score of 98 due to good perennial grass/forb cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Excellent (98) High Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable because the slight increase in bare ground and a reduction in litter, does not warrant a change in trend. This is somewhat mediated by the increase in vegetative cover. The ratio of protective cover (vegetation, litter, and cryptogams) to bare ground still remains good at 3 to 1. Trend for key browse species, true mountain mahogany, is stable. Percent decadence is low, while seedling and young recruitment remains good. Utilization has increase slightly to moderate-heavy use, but shrubs continue to have moderate leader

growth. Trend for the herbaceous understory is slightly up. Sum of nested frequency for grasses showed slight improvement, close to 1995 levels and forbs increased as well. The weighted and totaled sum of frequency values showed more than a 10% increase since 2000. Forbs had the highest species diversity of any previous reading. The Desirable Components Index rated this site as excellent with a score of 92 due to good perennial grass/forb cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Excellent (92) High Potential scale

HERBACEOUS TRENDS --

Management unit 08A, Study no: 2

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	a-	a-	a7	b36	-	.04	.25
G	Agropyron spicatum	151	154	169	127	2.74	5.26	1.82
G	Bromus inermis	a-	a3	a-	b20	.01	-	.11
G	Carex sp.	a59	b115	b132	b114	2.68	5.48	4.72
G	Koeleria cristata	a-	b29	b17	b35	.16	.18	.53
G	Leucopoa kingii	c26	ab9	bc18	a2	.04	.43	.00
G	Oryzopsis hymenoides	-	3	3	-	.15	.03	-
G	Poa fendleriana	b104	a17	a42	a29	.28	2.90	.79
G	Poa secunda	a-	b32	b37	b46	.14	.25	.84
G	Stipa comata	b174	b148	a43	a89	6.46	.67	2.77
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		514	510	468	498	12.68	15.27	11.88
Total for Grasses		514	510	468	498	12.68	15.27	11.88
F	Agoseris glauca	-	-	-	4	-	-	.03
F	Allium sp.	-	3	-	-	.00	-	-
F	Antennaria rosea	17	39	22	12	.25	.29	.25
F	Androsace septentrionalis (a)	-	a1	a2	b9	.00	.00	.04
F	Arabis sp.	b33	ab23	a5	b37	.08	.03	.19
F	Arenaria sp.	b96	b101	a58	b111	1.25	.54	.92
F	Astragalus convallarius	a-	a3	b10	ab5	.03	.15	.04
F	Astragalus sp.	ab17	b25	ab14	a7	.20	.06	.07
F	Castilleja flava	b21	ab10	a6	ab13	.11	.04	.11
F	Calochortus nuttallii	-	5	-	3	.02	-	.00
F	Chenopodium leptophyllum(a)	-	8	-	4	.01	-	.01
F	Crepis acuminata	5	-	-	-	-	-	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Cruciferae	2	-	-	-	-	-	-
F	Cryptantha sp.	_{ab} 4	_a -	_b 8	_{ab} 1	-	.05	.00
F	Cymopterus sp.	-	-	-	2	-	-	.00
F	Descurainia pinnata (a)	-	-	5	3	-	.01	.00
F	Erigeron eatonii	_b 90	_a 32	_a 22	_a 15	.08	.11	.12
F	Eriogonum umbellatum	24	25	49	28	.62	.68	.96
F	Heuchera parvifolia	_b 8	_{ab} 1	_a -	_{ab} 5	.03	-	.04
F	Hymenoxys acaulis	-	7	3	-	.03	.15	-
F	Lesquerella alpina	_b 46	_a 8	_{ab} 23	_{ab} 22	.03	.12	.13
F	Linum lewisii	2	10	5	6	.10	.07	.06
F	Lithospermum sp.	-	-	-	7	-	-	.01
F	Lupinus sp.	_b 21	_a -	_a -	_a -	-	-	-
F	Lychnis drummondii	-	2	3	1	.00	.00	.00
F	Machaeranthera canescens	-	8	6	1	.19	.18	.03
F	Machaeranthera grindelioides	-	-	1	5	-	.03	.18
F	Penstemon humilis	_b 92	_b 90	_a 39	_b 81	1.05	.64	1.28
F	Penstemon sp.	-	3	-	-	.00	-	-
F	Petroradia pumila	3	-	-	-	-	-	-
F	Phlox hoodii	144	133	113	113	3.98	3.90	3.26
F	Phlox longifolia	_c 143	_b 75	_{ab} 70	_a 36	.40	.58	.16
F	Potentilla gracilis	_a -	_b 21	_b 14	_b 16	.08	.05	.11
F	Schoenocrambe linifolia	_a -	_a -	_a -	_b 35	-	-	.16
F	Sedum lanceolatum	-	-	1	-	-	.03	-
F	Senecio multilobatus	-	-	7	8	-	.09	.10
F	Taraxacum officinale	-	1	-	8	.00	-	.02
F	Zigadenus paniculatus	36	32	32	17	.12	.14	.14
Total for Annual Forbs		0	9	7	16	0.01	0.01	0.05
Total for Perennial Forbs		804	657	511	599	8.70	7.98	8.44
Total for Forbs		804	666	518	615	8.72	8.00	8.49

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

BROWSE TRENDS --

Management unit 08A, Study no: 2

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	21	29	29	1.14	1.81	1.57
B	Artemisia frigida	0	0	1	-	-	-
B	Artemisia nova	40	25	30	1.20	.97	1.09
B	Artemisia tridentata vaseyana	3	8	7	.41	.66	.53
B	Cercocarpus montanus	97	97	95	19.55	19.04	17.77
B	Chrysothamnus viscidiflorus lanceolatus	80	73	68	3.75	3.28	3.94
B	Eriogonum microthecum	80	78	67	2.24	3.62	3.52
B	Gutierrezia sarothrae	23	16	17	.11	.39	.68
B	Mahonia repens	1	2	3	-	.03	-
B	Pediocactus simpsonii	0	0	1			
B	Pinus flexilis	0	0	1	-	-	.00
B	Symphoricarpos oreophilus	82	85	82	13.37	12.45	11.01
B	Tetradymia canescens	26	27	27	.34	.45	.21
Total for Browse		453	440	428	42.15	42.73	40.36

CANOPY COVER, LINE INTERCEPT --

Management unit 08A, Study no: 2

Species	Percent Cover
	'05
Amelanchier utahensis	1.81
Artemisia nova	.88
Cercocarpus montanus	20.01
Chrysothamnus viscidiflorus lanceolatus	2.71
Eriogonum microthecum	3.06
Gutierrezia sarothrae	.26
Symphoricarpos oreophilus	16.56
Tetradymia canescens	.33

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 08A, Study no: 2

Species	Average leader growth (in)
	'05
Amelanchier utahensis	1.8
Cercocarpus montanus	3.6

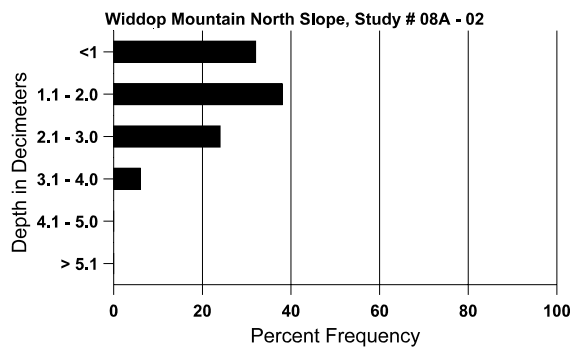
BASIC COVER --
 Management unit 08A, Study no: 2

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	12.75	53.54	60.28	57.32
Rock	2.75	2.89	1.05	1.89
Pavement	15.25	3.31	7.23	6.55
Litter	57.25	57.47	59.54	40.15
Cryptogams	0	.15	.33	.11
Bare Ground	12.00	6.32	13.68	16.10

SOIL ANALYSIS DATA --
 Herd Unit 8A, Study # 2, Study Name: Widdop Mountain North

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.8	57.6 (15.8)	7.4	43.3	34.2	22.6	5.5	3.4	115.2	0.9

Stoniness Index



PELLET GROUP DATA --
 Management unit 08A, Study no: 2

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	-	-	3
Moose	8	14	12
Elk	19	17	27
Deer	4	1	3
Cattle	-	1	3

Days use per acre (ha)	
'00	'05
-	-
16 (38)	19 (47)
44 (109)	31 (78)
3 (7)	7 (18)
12 (30)	12 (30)

BROWSE CHARACTERISTICS --
 Management unit 08A, Study no: 2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
88	598	133	466	66	66	-	11	22	11	-	11	39/31
95	660	20	320	300	40	-	42	12	6	3	3	39/42
00	740	120	340	280	120	20	35	22	16	3	3	28/22
05	740	120	380	220	140	-	11	43	19	8	8	22/19
Artemisia frigida												
88	266	-	-	266	-	-	0	0	-	-	25	5/4
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	-/-
Artemisia nova												
88	5332	1266	1866	2600	866	-	5	0	16	-	5	10/7
95	1740	220	280	1380	80	160	28	1	5	1	1	8/13
00	1280	60	200	1040	40	160	2	2	3	-	0	9/14
05	1220	140	240	820	160	220	3	0	13	11	11	10/13
Artemisia tridentata vaseyana												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	80	-	-	80	-	40	25	0	0	-	0	12/11
00	160	-	20	120	20	-	0	0	13	-	0	15/20
05	200	60	-	160	40	20	0	20	20	20	20	17/26
Cercocarpus montanus												
88	24332	6600	21666	2066	600	-	20	12	2	-	.82	25/18
95	6880	2440	3060	3680	140	40	47	19	2	.29	.29	26/37
00	7360	1180	3220	3680	460	-	27	41	6	2	2	22/30
05	7740	1960	2980	4420	340	120	12	69	4	3	3	24/32

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus lanceolatus												
88	4066	-	2200	1800	66	-	2	0	2	-	7	11/9
95	4100	40	220	3880	-	-	0	0	0	-	0	13/15
00	3020	-	100	2780	140	-	2	0	5	2	2	10/11
05	2940	60	220	2640	80	-	18	0	3	1	1	12/15
Eriogonum microthecum												
88	10466	333	4200	6133	133	-	1	0	1	-	17	6/7
95	5060	180	80	4980	-	-	.79	2	0	-	0	8/11
00	3880	20	180	3660	40	-	3	0	1	1	2	7/11
05	3380	60	60	3300	20	-	10	0	1	.59	.59	7/12
Gutierrezia sarothrae												
88	4733	400	1600	3000	133	-	0	0	3	-	1	5/3
95	740	-	140	600	-	-	0	0	0	-	0	6/5
00	420	-	-	420	-	-	0	0	0	-	0	6/7
05	640	80	-	640	-	-	0	0	0	-	0	6/10
Mahonia repens												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	60	-	-	60	-	-	0	0	-	-	0	5/4
00	120	-	-	120	-	-	0	0	-	-	0	3/6
05	160	-	80	80	-	-	0	0	-	-	0	3/5
Pediocactus simpsonii												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	4/4
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	5/4
Pinus flexilis												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	20	-	-	-	0	0	-	-	0	-/-
Pseudotsuga menziesii												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	20	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Symphoricarpos oreophilus</i>												
88	5933	400	2200	2600	1133	-	10	3	19	1	6	11/10
95	5140	180	840	4300	-	-	6	4	0	-	0	12/31
00	4080	160	300	3660	120	-	2	0	3	1	10	11/25
05	6600	140	1460	5060	80	-	4	.90	1	.90	.90	11/22
<i>Tetradymia canescens</i>												
88	2999	-	1733	1133	133	-	9	0	4	-	0	11/6
95	880	80	120	760	-	-	16	0	0	-	0	9/9
00	780	20	100	580	100	-	15	0	13	3	3	7/8
05	780	20	320	460	-	-	13	0	0	-	0	8/11

Trend Study 8A-4-05

Study site name: Bald Range.

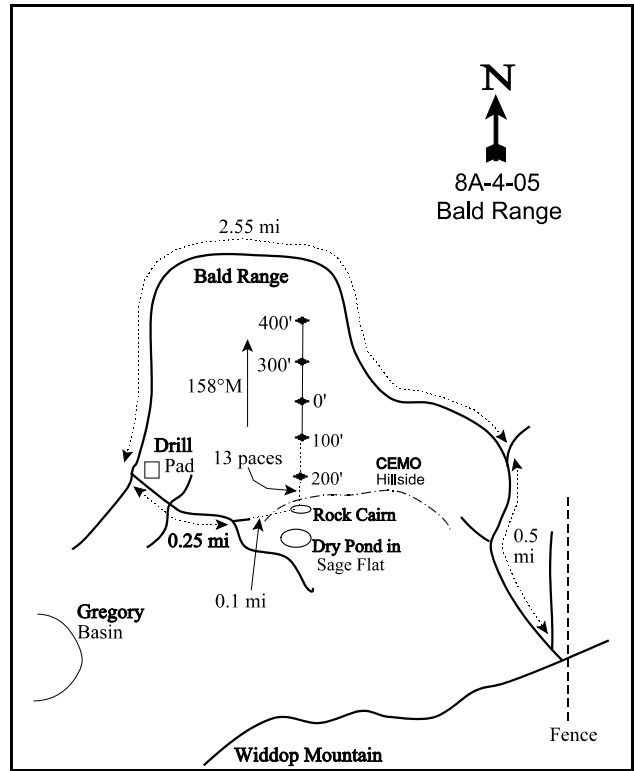
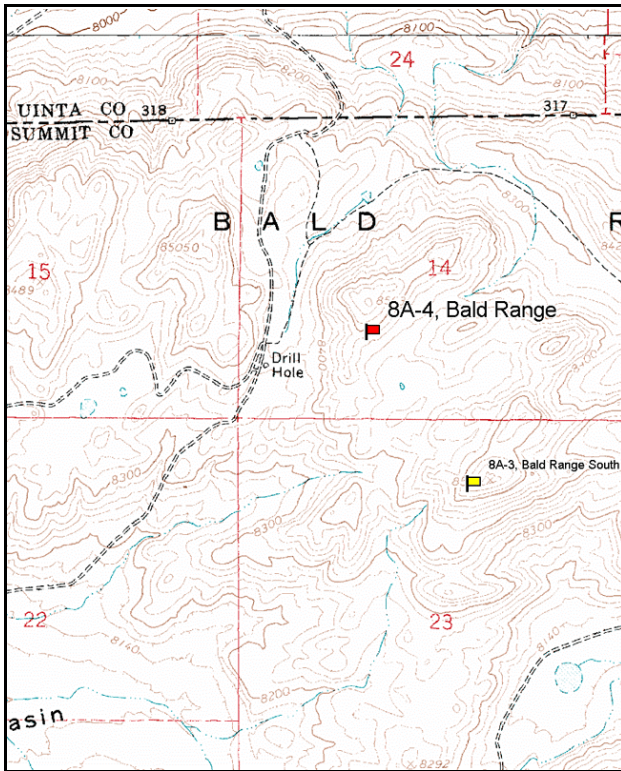
Vegetation type: True Mountain Mahogany.

Compass bearing: frequency baseline 158 degrees magnetic.

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

LOCATION DESCRIPTION

From the Hoop Lake-Beaver Creek Road, turn off east towards Gregory Basin. Go 0.6 miles to a gate onto private land. Continue past the cabins for 1.1 miles to a fence. Go along a canal 0.5 miles to the 4-way intersection. Proceed east 0.7 miles to a cattle guard at the boundary, and 0.9 miles more to the eastern FS boundary fence. Continue 1.8 miles to another fence. Just on the west side of the fence, make a 45° turn to the left and follow the jeep road NW up the drainage about .5 miles to a fork at the top. Continue on the main jeep road 2.55 miles to an old drill pad. Just past the pad, turn left onto a faint road that goes east about 0.25 miles to the top of a ridge. From the ridge, walk about 0.1 miles along the edge of the sage and mahogany to a rock cairn. From there it is 13 paces north to the 200 foot baseline stake. The 0-foot baseline stake is marked by browse tag #9076.



Map Name: Hoop Lake

Diagrammatic Sketch

Township 3N, Range 16E, Section 14

GPS: NAD 27, UTM 12T 4537722 N, 575918 E

DISCUSSION

Bald Range - Trend Study No. 8A-4

The Bald Range trend study is located on a south-facing mountain mahogany slope. It has a slope of about 22% and an elevation of 8,440 feet. At the time the study was established in 1988, the area was exceptionally dry. Water often limits livestock grazing in the area. Cattle use this state land in the spring when the nearby stock ponds contain water. Elk sign is concentrated on the rocky, windswept ridges where they bed down. Pellet group data from 2000 estimated 40 elk, 3 antelope, and 2 cow days use/acre (99 edu/ha, 8 adu/ha, and 5 cdu/ha). Pellet group data from 2005 estimated 75 elk, 2 deer, 4 cow, 1 moose, and 2 antelope days use/acre (185 edu/ha, 5 ddu/ha, 11 cdu/ha, 2 mdu/ha, and 5 adu/ha). The majority of the elk and moose pellet groups encountered were from fall and winter. Cow use was from the previous summer, while antelope appeared fairly recent and were seen near the site in 2000.

The soil is moderately shallow and rocky with an effective rooting depth of just over 9 inches. It has a sandy loam texture with a slightly alkaline pH. The soil surface is covered by a high percentage of rock and gravel as well as throughout the profile. A hard pan layer is found at 6 to 8 inches in depth. The surface soil is loose and appears it can be easily disturbed and would make it more susceptible to erosion. Areas with open interspaces that lack litter and vegetative cover display noticeable patterns of erosion in the past. Phosphorus is limited at just 3.6 ppm. Values below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). The erosion condition class determined soil movement as currently stable in 2005.

True mountain mahogany is the key browse species on this site. It provided 21% cover in 1995, 16% in 2000, and 19% in 2005. Shrub density was estimated at 5,599 plants/acre in 1988, 3,340 in 1995, 3,560 in 2000, and 3,720 in 2005. Densities were higher in 1988 mainly because of the high percentage (55%) of young plants in the population and a much smaller sample size from the methods used before 1992. Density has remained fairly stable from 1995 to 2005. Use has been moderate to heavy since 1988 with a slight increase in heavy use since 2000. The population appeared healthy in 2005, with young plants accounting for 40% of the population and vigor appeared normal. Percent decadence has remained low and annual leader growth averaged 4 inches in 2005, which had improved from 1.2 inches in 2000.

Other desirable browse are limited to a few scattered serviceberry, a moderate population of black sagebrush, and a small number of snowberry. The population of black sagebrush did not show much evidence of use in 1988, but demonstrated more moderate use in 1995. Use was mostly light in 2000 and 2005. The large increase in population density of black sagebrush between 1988 and 1995 is due to the much larger sample size in 1995. Black sagebrush density dropped from 2,340 plants/acre in 2000 to 1,700 in 2005. Broom snakeweed was very common in 1988 (17,066 plants/acre) and appeared to be increasing, but declined considerably during the following drought years. It has almost doubled its density every five years since 1995 (400 plants/acre) and had a population density of 1,580 plants/acre in 2005.

Grass composition is very similar to other mahogany sites on the unit. The dominant grasses include: bluebunch wheatgrass, sedge spp., Indian ricegrass, and thickspike wheatgrass. Nested frequency of bluebunch wheatgrass and *Carex* increased significantly between 1988 and 1995. Both of these species decreased in 2000 but the change was not significant. In 2005, bluebunch wheatgrass decreased and was significantly different from the 1995 reading. Indian ricegrass significantly declined in nested frequency in 2000, but rebounded in 2005 to previous readings. *Carex* was heavily utilized in 2000. All the other grasses displayed poor seed production due to the dry conditions. Forbs are diverse but contain only a few useful species. The dominant forbs include low growing species like sulfur eriogonum, low penstemon, and desert phlox.

1995 TREND ASSESSMENT

Basic ground cover characteristics have improved slightly on the site. Protective ground cover has increased, although litter cover declined slightly which is typical for an extended drought. Trend for soil is considered stable. Trend for the key browse species, true mountain mahogany, is stable. The number of seedlings has increased while the number of young plants has declined. Young plants are still abundant and adequate to maintain the stand. The extremely high number of young plants sampled in 1988 appear to have established during the wet years of 1983-84. They are now declining in number with a return to drier conditions. The number of young in the population may have been overestimated with the smaller sample size used in 1988. The number of decadent mahogany has declined from 18% to 1% with the proportion of shrubs displaying heavy use decreasing from 45% to 25%. The less preferred browse species, black sagebrush, displays a stable population trend. Another positive factor in the trend is the significant decline in the population of broom snakeweed. The herbaceous understory is very similar to other sites in the unit. Grass composition is good, while forbs contain several low growing weedy species. Sum of nested frequency for grasses increased slightly, while sum of nested frequency for perennial forbs declined. Combined sum of nested frequency for grasses and forbs declined slightly, but not enough to suggest a downward trend since the decline is due to forbs which provide only 26% of the total herbaceous cover. Trend for the herbaceous understory is considered stable. The Desirable Components Index rated this site as good with a score of 84 due to moderate perennial grass/forb cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Good (84) High Potential scale

2000 TREND ASSESSMENT

Trend for soil is still considered stable. Percent bare ground has increased, but the ratio of protective ground cover to bare ground has remained similar to 1995. There is little erosion occurring on the site. Trend for the key browse species, true mountain mahogany, is stable. There is more heavy use, yet vigor is normal on most plants, percent decadence is low at only 7%, and young plants account for 21% of the population. Sum of nested frequency for perennial grasses declined slightly, while frequency of forbs remained stable. Nested frequency of thickspike wheatgrass increased significantly; bluebunch wheatgrass and Carex declined slightly, but not significantly. Sum of nested frequency for Indian ricegrass continued to decline significantly and is now found in only 3 quadrats. Desert phlox has remained stable while the preferred low penstemon declined significantly in nested frequency. Weighing all of these factors, trend for the herbaceous understory is considered down slightly. The Desirable Components Index rated this site as good to excellent with a score of 89 due to good perennial grass/forb cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down slightly (-1)

winter range condition (DC Index) - Good to Excellent (89) High Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has increased, but protective cover has remained similar to previous years. Increase in bare ground appears to be mostly a loss of litter cover, due perhaps to previous drought conditions. Trend for the key browse species, true mountain mahogany, is stable. Density, utilization,

and percent decadence have all remained at previous levels. Utilization is moderate to heavy, but plants have normal vigor, good annual leader growth, and excellent seedling and young recruitment. Trend for the herbaceous understory is stable. Thickspike wheatgrass decreased significantly from 2000 and bluebunch wheatgrass continued to decline, having declined significantly from 1995 levels. Sum of nested frequency for both grasses and forbs were slightly higher than 2000 reading. Indian ricegrass rebounded back to 1995 levels after a decline in 2000. Forb diversity remains high, though most are low growing species. The Desirable Components Index rated this site as good with a score of 85 due to moderate perennial grass/forb cover, excellent recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Good (85) High Potential scale

HERBACEOUS TRENDS --

Management unit 08A, Study no: 4

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	a ³⁷	a ⁵⁰	b ¹⁰⁶	a ⁵¹	.44	1.18	.31
G	Agropyron spicatum	a ¹⁵⁸	b ²¹⁷	ab ¹⁸⁷	a ¹⁴⁶	3.98	6.72	2.16
G	Carex sp.	a ⁹⁴	b ¹³⁶	ab ¹²³	b ¹³⁶	3.55	5.14	4.00
G	Koeleria cristata	b ⁵⁴	a ²²	a ¹	a ¹⁸	.22	.00	.25
G	Leucopoa kingii	a ⁻	a ⁻	a ⁹	b ²⁵	-	.33	.25
G	Oryzopsis hymenoides	c ⁹⁶	bc ⁶⁵	a ⁵	b ⁵⁵	1.89	.18	.63
G	Poa fendleriana	a ⁻	ab ⁸	b ¹³	ab ⁸	.04	.36	.05
G	Poa secunda	b ²⁷	ab ¹⁹	ab ¹⁰	a ⁴	.17	.07	.03
G	Stipa comata	b ⁴⁹	ab ²⁷	a ¹⁹	ab ³⁹	.22	.96	.67
G	Stipa lettermani	-	-	-	1	-	-	.03
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		515	544	473	483	10.53	14.98	8.42
Total for Grasses		515	544	473	483	10.53	14.98	8.42
F	Antennaria rosea	a ¹³	a ⁸	a ⁵	b ⁴⁸	.21	.03	.47
F	Arabis sp.	2	3	-	2	.01	-	.00
F	Arenaria sp.	a ⁻	a ⁻	b ¹⁴	ab ⁴	-	.20	.01
F	Arenaria hookeri	-	-	-	5	-	-	.04
F	Astragalus sp.	a ⁵	b ⁵¹	a ⁷	a ⁶	.64	.05	.04
F	Calochortus nuttallii	-	1	-	12	.00	-	.02
F	Chaenactis douglasii	a ⁻	a ⁻	a ⁻	b ⁹	-	-	.03
F	Chenopodium leptophyllum(a)	-	b ¹⁰	a ⁻	a ⁻	.05	-	-
F	Cirsium sp.	26	12	15	9	.11	.10	.34
F	Cryptantha sp.	-	1	3	-	.03	.00	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Descurainia pinnata</i> (a)	-	_b 78	_a -	_a 2	.31	-	.00
F	<i>Eriogonum umbellatum</i>	_a -	_a 8	_c 61	_b 40	.09	1.48	1.39
F	<i>Haplopappus acaulis</i>	_{ab} 7	_{bc} 15	_c 24	_a -	.37	.57	-
F	<i>Hackelia patens</i>	-	-	7	-	-	.33	-
F	<i>Heterotheca villosa</i>	-	-	1	-	-	.00	-
F	<i>Hymenoxys acaulis</i>	_a -	_{ab} 6	_{ab} 5	_b 13	.04	.03	.24
F	<i>Hymenoxys richardsonii</i>	-	-	3	-	-	.15	-
F	<i>Ipomopsis aggregata</i>	4	-	-	-	-	-	-
F	<i>Lappula occidentalis</i> (a)	-	1	-	-	.00	-	-
F	<i>Lesquerella alpina</i>	_b 45	_c 76	_a 5	_a 9	.23	.01	.02
F	<i>Leucelene ericoides</i>	-	1	1	1	.00	.00	.00
F	<i>Lepidium</i> sp. (a)	-	3	-	-	.00	-	-
F	<i>Linum lewisii</i>	-	-	-	3	-	-	.01
F	<i>Lithospermum ruderale</i>	-	6	2	8	.01	.03	.08
F	<i>Machaeranthera canescens</i>	_a -	_a -	_{ab} 8	_b 16	-	.04	.28
F	<i>Machaeranthera grindelioides</i>	6	6	10	9	.09	.09	.06
F	<i>Penstemon humilis</i>	_c 150	_b 79	_a 37	_b 60	.50	.31	.55
F	<i>Phlox hoodii</i>	61	75	64	66	1.21	1.27	.66
F	<i>Phlox longifolia</i>	_c 77	_a -	_b 28	_b 22	-	.05	.06
F	<i>Physaria</i> sp.	_a -	_a -	_a -	_b 34	-	-	.12
F	<i>Schoenocrambe linifolia</i>	-	-	-	1	-	-	.00
F	<i>Senecio multilobatus</i>	_{ab} 3	_a -	_b 12	_{ab} 7	-	.03	.04
F	<i>Trifolium</i> sp.	_c 37	_a -	_c 31	_b 8	-	.61	.22
F	Unknown forb-perennial	_a -	_a -	_a -	_b 13	-	-	.05
F	<i>Zigadenus paniculatus</i>	_b 65	_a 31	_a 18	_a 32	.16	.21	.10
Total for Annual Forbs		0	92	0	2	0.37	0	0.00
Total for Perennial Forbs		501	379	361	437	3.74	5.67	4.90
Total for Forbs		501	471	361	439	4.11	5.67	4.90

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

BROWSE TRENDS --

Management unit 08A, Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	1	1	3	-	-	-
B	Artemisia frigida	3	0	1	.03	-	.15
B	Artemisia nova	58	54	51	3.34	1.33	2.00
B	Cercocarpus montanus	82	79	84	21.40	16.20	18.95
B	Chrysothamnus viscidiflorus lanceolatus	27	33	32	.54	.80	.97
B	Eriogonum microthecum	2	9	10	-	.06	.43
B	Gutierrezia sarothrae	17	22	38	.40	.10	1.29
B	Leptodactylon pungens	0	1	2	-	-	.00
B	Pediocactus simpsonii	0	1	1	-	-	-
B	Symphoricarpos oreophilus	23	20	17	.93	1.19	1.27
B	Tetradymia canescens	13	11	12	.18	.15	.18
Total for Browse		226	231	251	26.84	19.86	25.26

CANOPY COVER, LINE INTERCEPT --

Management unit 08A, Study no: 4

Species	Percent Cover
	'05
Amelanchier utahensis	.16
Artemisia nova	1.91
Cercocarpus montanus	25.46
Chrysothamnus viscidiflorus lanceolatus	.90
Eriogonum microthecum	.25
Gutierrezia sarothrae	.31
Symphoricarpos oreophilus	1.35
Tetradymia canescens	.15

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 08A, Study no: 4

Species	Average leader growth (in)
	'05
Cercocarpus montanus	3.9

BASIC COVER --

Management unit 08A, Study no: 4

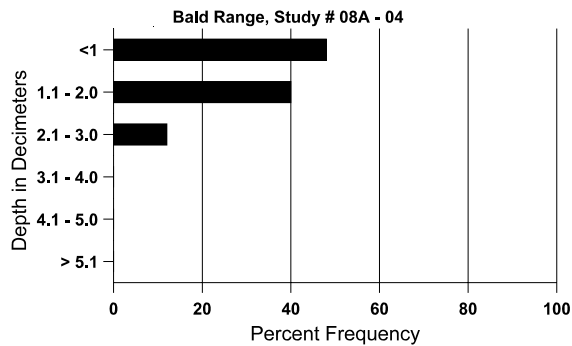
Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	6.75	35.36	39.93	35.06
Rock	2.75	8.05	6.74	5.13
Pavement	27.50	15.50	16.87	21.13
Litter	46.00	39.70	36.90	25.77
Cryptogams	0	.21	.07	.03
Bare Ground	17.00	13.14	22.08	26.37

SOIL ANALYSIS DATA --

Herd Unit 8A, Study # 4, Study Name: Bald Range

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
9.4	65.6 (11.1)	7.5	58.4	24.1	17.6	3.3	3.6	112.0	0.9

Stoniness Index



PELLET GROUP DATA --

Management unit 08A, Study no: 4

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	1	-	-
Antelope	-	-	-
Moose	-	-	1
Elk	21	24	30
Deer	8	2	2
Cattle	2	1	1

Days use per acre (ha)	
'00	'05
-	-
3 (8)	2 (5)
-	1 (2)
40 (99)	75 (185)
-	2 (5)
2 (5)	4 (10)

BROWSE CHARACTERISTICS --
Management unit 08A, Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	-	20	-	-	100	0	-	-	0	20/34
00	20	-	-	20	-	-	100	0	-	-	100	31/62
05	60	-	-	60	-	-	33	67	-	-	0	18/45
Artemisia frigida												
88	66	-	-	66	-	-	0	0	-	-	0	1/5
95	100	40	-	100	-	-	0	0	-	-	0	2/5
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	6/8
Artemisia nova												
88	866	-	466	200	200	-	0	0	23	-	0	9/8
95	2300	60	40	2100	160	100	35	6	7	4	4	8/14
00	2340	100	220	1820	300	120	5	.85	13	4	4	6/12
05	1700	60	320	1180	200	140	5	6	12	4	4	7/14
Cercocarpus montanus												
88	5599	66	3066	1533	1000	-	37	45	18	.35	5	24/27
95	3340	320	820	2500	20	20	59	25	1	-	14	29/48
00	3560	160	760	2540	260	20	22	69	7	.56	4	29/44
05	3720	980	1480	2100	140	-	11	66	4	3	3	29/46
Chrysothamnus viscidiflorus lanceolatus												
88	666	-	333	333	-	-	0	0	0	-	0	7/10
95	800	-	-	800	-	-	0	0	0	-	0	10/16
00	1220	-	20	1000	200	-	3	0	16	7	13	6/10
05	1020	-	140	820	60	-	53	4	6	4	4	8/13
Eriogonum microthecum												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	40	-	-	40	-	-	0	0	0	-	0	8/14
00	600	-	140	460	-	-	0	0	0	-	0	6/9
05	740	-	220	500	20	-	0	0	3	3	3	5/10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
88	19199	-	2133	17066	-	-	0	0	0	-	0	6/6
95	480	-	40	440	-	-	0	0	0	-	0	5/6
00	800	-	20	780	-	-	0	0	0	-	5	5/6
05	1580	40	80	1480	20	-	0	0	1	1	1	6/8
Leptodactylon pungens												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	0	0	-	-	0	-/-
05	40	-	20	20	-	-	0	0	-	-	0	2/1
Pediocactus simpsonii												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	0	0	-	-	0	1/2
05	20	-	-	20	-	-	0	0	-	-	0	2/3
Symphoricarpos oreophilus												
88	200	-	-	200	-	-	67	0	0	-	0	10/15
95	620	20	100	520	-	-	3	10	0	-	0	9/24
00	580	-	-	540	40	-	0	0	7	3	21	12/22
05	680	-	180	480	20	-	6	0	3	-	0	11/29
Tetradymia canescens												
88	199	-	66	133	-	-	0	0	0	-	0	9/6
95	300	-	-	300	-	-	7	0	0	-	0	6/9
00	380	-	20	320	40	-	16	5	11	5	5	4/9
05	360	-	40	300	20	-	33	22	6	6	6	5/9

Trend Study 8A-5-05

Study site name: Telephone Hollow .

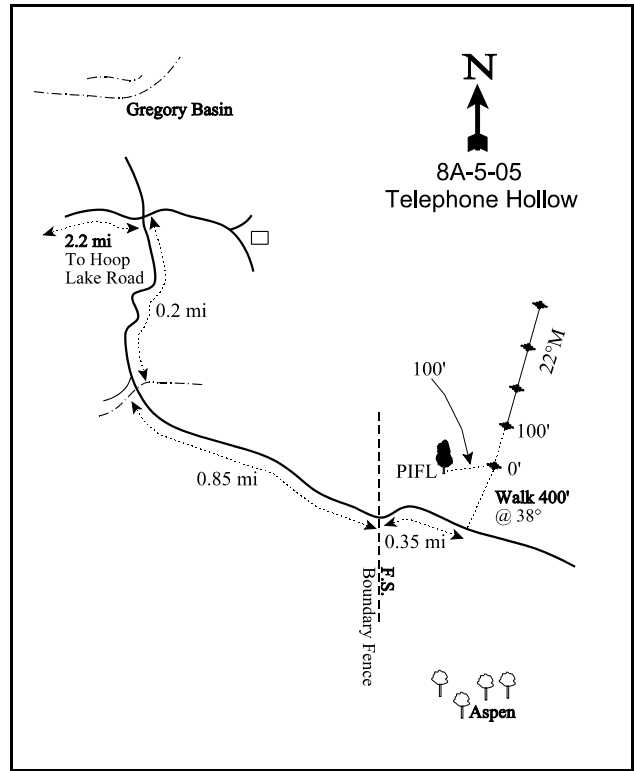
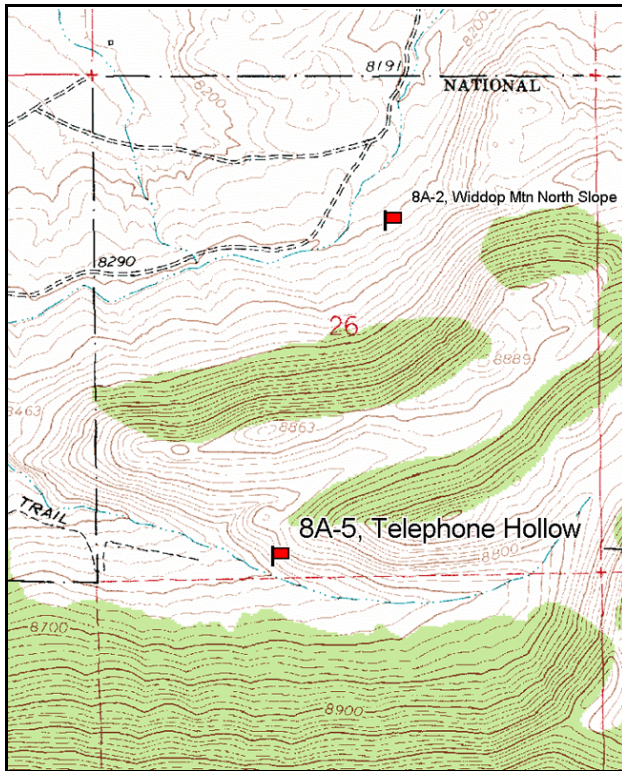
Vegetation type: True Mountain Mahogany .

Compass bearing: frequency baseline 22 degrees magnetic.

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

LOCATION DESCRIPTION

From the Hoop Lake Road along Beaver Creek, proceed east on the road to Gregory Basin. Go 0.6 miles to a gate at a private property line. Continue east 1.7 miles to the 4-way intersection south of Gregory Basin. Turn right and go 0.2 miles to a creek. Cross the creek and drive 0.85 miles to a gate at the FS boundary. Go through the gate and continue for 0.35 miles. Stop across from a lone *Pinus flexilis* on the bottom of the south facing slope. The 0-foot stake is approximately 100 feet to the east of the lone *Pinus flexilis*. There is a red browse tag, #7148, attached to the green fencepost marking the 0-foot end of the frequency baseline.



Map Name: Hoop Lake

Diagrammatic Sketch

Township 3N, Range 16E, Section 26

GPS: NAD 27, UTM 12T 4534297 N, 576175 E

DISCUSSION

Telephone Hollow - Trend Study No. 8A-5

The Telephone Hollow study is located on the southwest side of Widdop Mountain, on land administered by the Forest Service. Access is through state and privately owned land. The study is located on the south-facing hillside with a slope of approximately 38% to 40% and an elevation of 8,650 feet. At this elevation, the valley is generally covered by snow through the winter and much of the spring. On the hillside above the seeded hollow, the south slope is dominated by true mountain mahogany. These south slopes are important to wintering elk, commonly used by moose, and, to a lesser extent, deer. Thermal cover is provided by conifer on the nearby north-facing slopes. Cattle graze the area early in the season, mostly in the seeded hollow at the base of the slope. Pellet group data from 2000 estimated 31 elk, 3 deer, 1 cow, and 16 moose days use/acre (77 edu/ha, 8 ddu/ha, 4 cdu/ha, and 40 mdu/ha). Pellet group data from 2005 estimated 30 elk, 3 deer, and 11 moose days use/acre (73edu/ha, 7 ddu/ha, and 26 mdu/ha).

Soil on the Telephone Hollow site is similar to the other trend studies on Widdop Mountain. It is moderately deep but very rocky on the surface and throughout the profile. The surface horizon is loose, while the layer six inches below the surface is compacted with more rock and gravel. The soil has a loam texture with a slightly alkaline pH of 7.4. Parent material is a conglomerate rock formation composed of both limestone and sandstone cobble. Phosphorus and potassium are both limited at just 2.8 ppm and 35.2 ppm, respectively. Values less than 6 ppm for phosphorus and 60 ppm for potassium may limit normal plant growth and development (Tiedemann and Lopez 2004). There is a high erosion potential due to the slope. There is evidence of down slope soil movement in the form of pedestaling and terracing. However, protective ground cover is abundant and well dispersed, keeping soil movement to a minimum. The erosion condition class determined soil movement as slight in 2005.

The key browse species is true mountain mahogany. It provided 19% cover in 1995, 17% in 2000, and 22% in 2005. In 1988, population density was estimated at 7,266 plants/acre, 6,200 in 1995, 6,720 in 2000, and 6,800 in 2005. The 1988 density was larger because over half (55%) the population was classified as young. Density of young plants declined from 4,000 plants/acre in 1988 to 1,800 plants/acre in 1995 and has remained near this level. Utilization has been moderate to heavy since 1988, although the plants appear quite vigorous. Vigor was reduced in 1995 on 42% of the mature mahogany because of insect damage from caterpillars. Leaf damage by insects was also observed in 2005, which caused many of the stem tips to wilt. Annual leader growth was good in 2005 at 4.4 inches, compared to 2.5 inches in 2000 which experienced very dry conditions. Percent decadence has remained low since the site was established.

The less preferred browse include serviceberry and black sagebrush. In 1995, 42% of the black sagebrush displayed heavy use, but has had only light use since then. Serviceberry had moderate to heavy use. By far the most numerous shrub is broom snakeweed which has varied over the years with available moisture. In 1988 its estimated density was 16,932 plants/acre, 1,940 in 1995, 5,520 in 2000, and 5,840 in 2005.

The herbaceous understory is not as diverse or abundant as it is on the other mahogany sites in the unit. Site potential would not be as high as the other sites due to the steeper slope and the south aspect. Common species include: bluebunch wheatgrass, a dry land sedge, and Indian ricegrass. Forbs are moderately diverse but none are very abundant. The most common forbs are low growing species such as cryptantha, low penstemon, and hoods phlox.

1995 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1988 with the exception of a slight increase in bare ground (5% to 7%). Unlike some other sites within this unit, litter cover did not decline a great deal. Erosion potential on this site is high, but due to the well dispersed litter and herbaceous vegetation cover, it is not a serious problem. The only soil movement consists of the inevitable gradual down-slope soil movement with the associated steep slope. Future increases in bare ground should be watched closely. Trend for soil is considered stable at this time. Trend for the dominant browse species, true mountain mahogany, is stable. There has been a slight population decline, with the number of mature plants increasing. Percent decadency decreased, with the proportion of plants displaying heavy use also declining. Some of this decline can be attributed to the much larger sample size and better sampling design giving a much better estimate of the browse population. The proportion of seedlings and young have declined, yet they are still more than adequate to maintain this moderately long-lived population of true mountain mahogany. Trend for herbaceous understory is slightly up. Sum of nested frequency for grasses increased slightly with nested frequency for bluebunch and Carex both increasing. Forb nested frequency also increased. The Desirable Components Index rated this site as good with a score of 85 due to moderate perennial grass/forb cover, excellent recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Good (85) High Potential scale

2000 TREND ASSESSMENT

Trend for soil is down slightly. Percent bare ground increased more than three-fold from 7% to 23% and sum of nested frequency of perennial grasses declined slightly since 1995. Trend for the key browse, mountain mahogany, is stable. Use is heavier but vigor is good and percent decadence is low at only 4%. Recruitment from young plants is excellent at 29%. Some of the heavy use may be due to the poor annual leader growth in 2000 (averaged only 2.5 inches) which gives the shrubs a more clubbed growth form. Trend for the herbaceous understory is stable. The sum of nested frequency for perennial grasses and perennial forbs declined only by 5%. Nest frequency for Carex and Indian ricegrass declined slightly, while bluebunch wheatgrass increased slightly. The Desirable Components Index rated this site as excellent with a score of 90 due to moderate perennial grass/forb cover, excellent recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - slightly down (-1)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Excellent (90) High Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground and protective cover (vegetation, litter, and cryptograms) have remained similar to 2000 estimates. Trend for key browse, true mountain mahogany, is stable. Density has remained almost unchanged to previous estimates at 6,800 plants/acre and percent decadence and dying are at 6% or less. Utilization is mostly heavy and has increased slightly, but plants still have good vigor. Recruitment remains good with 33% of the population classified as young. Trend for herbaceous understory is stable. Sum of nested frequency for perennial grasses remained similar to 2000, while perennial forbs increased slightly. Frequency of bluebunch wheatgrass decreased significantly, while Indian ricegrass and

sedge species improved somewhat. The Desirable Components Index rated this site as good with a score of 86 due to moderate perennial grass/forb cover, excellent recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Good (86) High Potential scale

HERBACEOUS TRENDS --

Management unit 08A, Study no: 5

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	-	4	3	4	.15	.01	.01
G	Agropyron spicatum	ab200	ab215	b229	a194	4.35	7.43	3.87
G	Carex sp.	121	162	127	146	2.70	3.10	3.03
G	Koeleria cristata	a-	ab6	ab8	b11	.06	.18	.13
G	Leucopoa kingii	-	-	2	-	-	.03	-
G	Oryzopsis hymenoides	78	67	43	53	1.71	1.43	1.56
G	Stipa comata	b44	a10	a1	a1	.04	.00	.03
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		443	464	413	409	9.03	12.19	8.64
Total for Grasses		443	464	413	409	9.03	12.19	8.64
F	Antennaria rosea	-	-	3	4	-	.03	.01
F	Arabis sp.	-	2	-	-	.01	-	-
F	Astragalus sp.	a-	b56	a2	a-	1.50	.18	-
F	Chenopodium leptophyllum(a)	-	b26	a-	a-	.05	-	-
F	Cirsium sp.	21	23	26	5	.39	.46	.24
F	Comandra pallida	2	15	24	28	.06	.54	.42
F	Cryptantha sp.	79	91	97	79	.79	.91	.77
F	Erigeron eatonii	-	-	10	-	-	.02	-
F	Erigeron sp.	-	-	2	-	-	.00	-
F	Heterotheca villosa	-	-	2	-	-	.03	-
F	Hymenoxys acaulis	3	13	3	13	.03	.01	.23
F	Lesquerella alpina	a13	b50	b48	a18	.13	.44	.07
F	Leucelene ericoides	-	-	-	9	-	-	.06
F	Lithospermum incisum	19	12	14	7	.11	.16	.04
F	Linum lewisii	a-	ab10	ab17	b6	.02	.20	.11
F	Lychnis drummondii	-	-	-	1	-	-	.03
F	Machaeranthera grindelioides	34	46	24	43	.26	.34	1.16

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Oenothera sp.	-	-	1	-	-	.00	-
F	Penstemon humilis	63	91	73	97	.74	.69	1.01
F	Phlox hoodii	61	47	68	58	.50	1.53	.68
F	Phlox longifolia	-	-	-	2	-	-	.00
F	Physaria sp.	a ⁻	a ⁻	a ⁻	b ⁴ 7	-	-	.23
F	Schoenocrambe linifolia	a ⁻	a ⁻	a ⁻	b ¹⁴	-	-	.04
F	Taraxacum officinale	-	-	-	1	-	-	.00
F	Townsendia incana	ab ⁷	a ⁻	ab ⁴	b ¹¹	-	.09	.07
F	Trifolium sp.	a ⁵	a ⁻	b ⁵ 3	b ⁶ 7	-	1.61	2.94
F	Zigadenus elegans	a ⁻	b ¹³	a ⁻	a ³	.03	.00	.00
Total for Annual Forbs		0	26	0	0	0.05	0	0
Total for Perennial Forbs		307	469	471	513	4.61	7.29	8.18
Total for Forbs		307	495	471	513	4.66	7.29	8.18

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

BROWSE TRENDS --

Management unit 08A, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	5	9	9	-	1.08	.73
B	Artemisia frigida	18	22	16	.22	.40	.28
B	Artemisia nova	12	14	10	.05	1.08	.39
B	Cercocarpus montanus	97	96	99	19.10	17.37	21.93
B	Chrysothamnus viscidiflorus lanceolatus	1	1	0	-	-	-
B	Eriogonum microthecum	8	12	9	.36	.27	.19
B	Gutierrezia sarothrae	40	82	81	.54	2.98	2.66
B	Pinus flexilis	0	2	2	-	-	.00
B	Tetradymia canescens	8	7	9	.03	.06	.00
Total for Browse		189	245	235	20.31	23.27	26.22

CANOPY COVER, LINE INTERCEPT --
Management unit 08A, Study no: 5

Species	Percent Cover
	'05
Amelanchier utahensis	2.15
Artemisia frigida	.25
Artemisia nova	.71
Cercocarpus montanus	24.88
Eriogonum microthecum	.33
Gutierrezia sarothrae	4.09
Pinus flexilis	.46

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 08A, Study no: 5

Species	Average leader growth (in)
	'05
Cercocarpus montanus	4.4

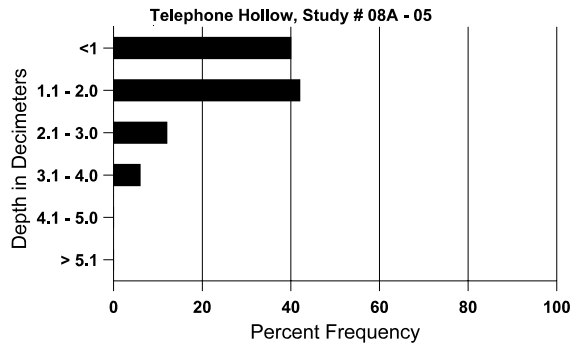
BASIC COVER --
Management unit 08A, Study no: 5

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	9.25	32.12	42.25	38.63
Rock	8.00	16.22	12.11	13.17
Pavement	45.50	21.33	25.05	22.32
Litter	32.25	30.12	29.00	17.51
Cryptogams	0	.12	0	.08
Bare Ground	5.00	7.17	23.39	20.75

SOIL ANALYSIS DATA --
Herd Unit 8A, Study # 5, Study Name: Telephone Hollow

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
14.9	56.8 (16.3)	7.4	49.4	33.0	17.6	4.1	2.8	35.2	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 08A, Study no: 5

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	-	-	1
Moose	6	9	6
Elk	15	12	33
Deer	4	-	4
Cattle	-	-	-

Days use per acre (ha)	
'00	'05
-	-
16 (39)	11 (26)
31 (76)	29 (73)
3 (8)	3 (7)
2 (4)	-

BROWSE CHARACTERISTICS --

Management unit 08A, Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
88	199	-	133	66	-	-	67	0	-	-	0	20/39
95	140	-	40	100	-	-	57	0	-	-	0	20/31
00	200	-	20	180	-	-	70	30	-	-	0	17/25
05	380	-	180	200	-	-	21	32	-	-	0	17/30
Artemisia frigida												
88	400	-	-	400	-	-	0	0	-	-	0	4/4
95	500	60	20	480	-	-	0	0	-	-	0	4/7
00	700	80	100	600	-	-	0	0	-	-	0	3/6
05	600	-	20	580	-	-	17	0	-	-	0	6/7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia nova</i>												
88	66	-	-	66	-	-	0	0	0	-	0	7/8
95	520	-	-	520	-	-	0	42	0	-	0	6/15
00	460	-	20	340	100	-	13	0	22	4	4	5/13
05	280	-	-	240	40	20	0	0	14	-	0	6/18
<i>Ceratoides lanata</i>												
88	66	-	66	-	-	-	0	0	-	-	100	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Cercocarpus montanus</i>												
88	7266	66	4000	3133	133	-	22	45	2	-	.91	25/23
95	6200	240	1800	4360	40	60	68	22	1	-	9	21/36
00	6720	80	1920	4520	280	-	17	63	4	1	2	18/28
05	6800	120	2240	4160	400	-	6	87	6	2	2	19/33
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	20	-	-	20	-	-	0	0	0	-	0	5/8
00	20	-	-	-	20	-	0	0	100	-	0	9/13
05	0	-	-	-	-	-	0	0	0	-	0	9/13
<i>Eriogonum microthecum</i>												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	300	-	-	300	-	-	0	0	0	-	0	5/11
00	440	-	20	400	20	-	0	0	5	-	0	5/7
05	320	-	-	320	-	-	6	0	0	-	0	5/11
<i>Gutierrezia sarothrae</i>												
88	16932	-	1266	15400	266	-	0	0	2	.11	.78	7/5
95	1940	20	180	1760	-	-	0	0	0	-	0	5/6
00	5520	80	140	5260	120	20	0	3	2	.36	.36	5/9
05	5840	80	240	5540	60	-	0	0	1	1	1	6/9
<i>Pinus flexilis</i>												
88	66	-	66	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	40	-	40	-	-	-	0	0	-	-	0	-/-
05	40	-	20	20	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Tetradymia canescens												
88	199	-	133	66	-	-	0	0	0	-	0	4/7
95	200	-	20	180	-	-	30	0	0	-	0	6/11
00	160	-	-	160	-	-	25	13	0	-	0	7/9
05	200	-	20	160	20	-	60	0	10	10	10	8/12

SUMMARY

WILDLIFE MANAGEMENT UNIT - 8A NORTH SLOPE SUMMIT

Five trend study sites were established on this management unit in 1988 and reread in 1995. In 2000, Bald Mtn. South (8A-3) was not reread due to its close proximity to Bald Range (8A-4). However, a pellet group transect was read and annual growth of mountain mahogany was measured. Three trend studies are located around Widdop Mountain and 2 are on the Bald Range. They all sample true mountain mahogany stands which are considered important elk winter range. Moose, deer, and antelope also use these sites. Pellet group data from 2005 indicate an average of 46 elk use days/acre (114 edu/ha) on the four trend studies in unit 8A. A high of 75 elk days use/acre (185 edu/ha) was found on Bald Range (8A-4). A low of 30 elk days use/acre (73 edu/ha) occurred at Telephone Hollow (8A-5). Moose use was found on all 4 of the sites read in 2005, Widdop Mtn. South Slope (8A-1), Widdop Mtn. North Slope (8A-2), Bald Range (8A-4), and Telephone Hollow (8A-5). Widdop Mtn. North Slope contained the most pellet groups and estimated 19 moose days use/acre (47 mdu/ha). Bald Range had the least moose use at an estimated 1 moose days use/acre (2 mdu/ha).

The key browse species on all 5 trend study sites consists of true mountain mahogany. Browse trends for all four sites in 2005 were stable. Leader growth average 3.8 inches in 2005 versus 2.4 inches in 2000, due to the unusually dry conditions in 2000. Browsing of mahogany was heavy in 2005, averaging 78%. All of the mahogany populations on these sites are in good health with abundant young plants, stable mature populations, good vigor, and low percent decadence. The following series of values are averages listed in order of year sampled (1995, 2000, and 2005). These averages are as follows:

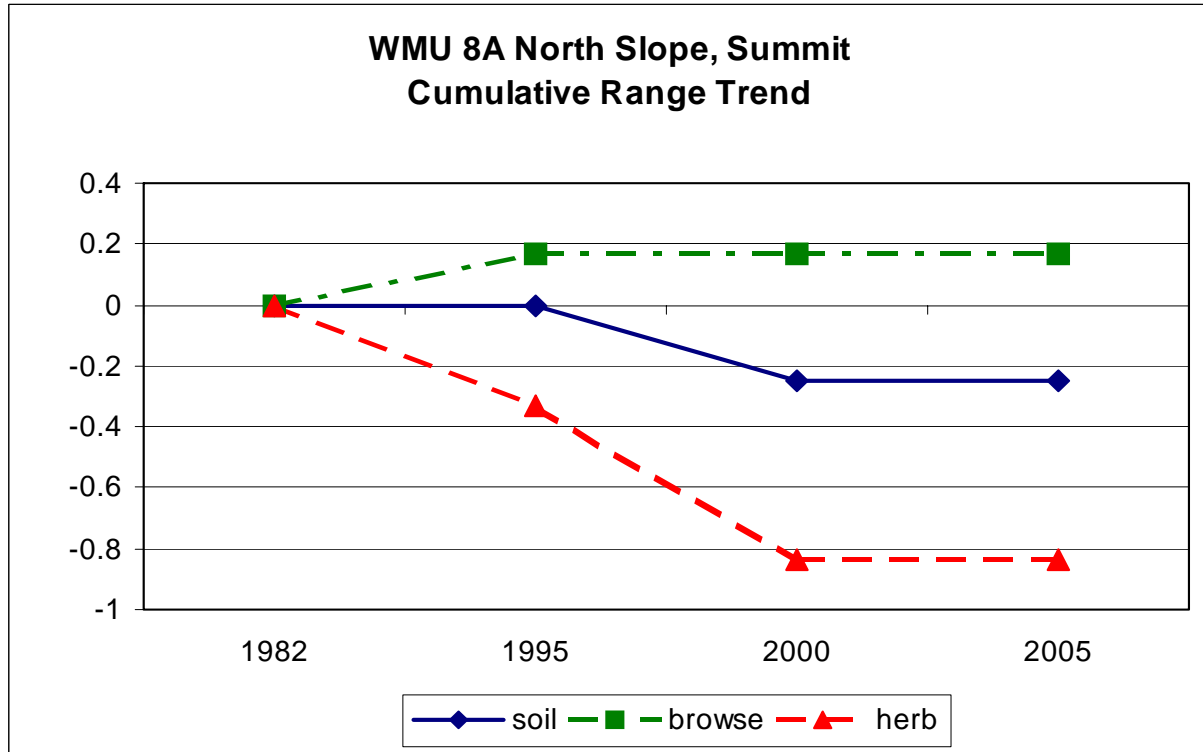
- percent decadence..... 1%, 7%, and 4% for True Mtn. Mahogany
- percent dying..... <1%, 2%, and 2% for True Mtn. Mahogany
- population changes... 5,185, 5,700, and 5,795 plants/acre for True Mtn. Mahogany (+12 % change)

Herbaceous trends were stable to slightly up on 3 of the 4 sites, which were improved after a return to normal precipitation patterns. The following values show percent change in nested frequency values for perennial grasses and forbs for True Mtn. Mahogany from 1995 and 2005.

- percent change for perennial grasses...-8% for True Mtn. Mahogany
- percent change for perennial forbs.....-0.6% for True Mtn. Mahogany

Cumulative Range Trends–WMU 8A North Slope, Summit

	1982	1995	2000	2005
soil	0	0.0	-0.3	-0.3
browse	0	0.2	0.2	0.2
herb	0	-0.3	-0.8	-0.8



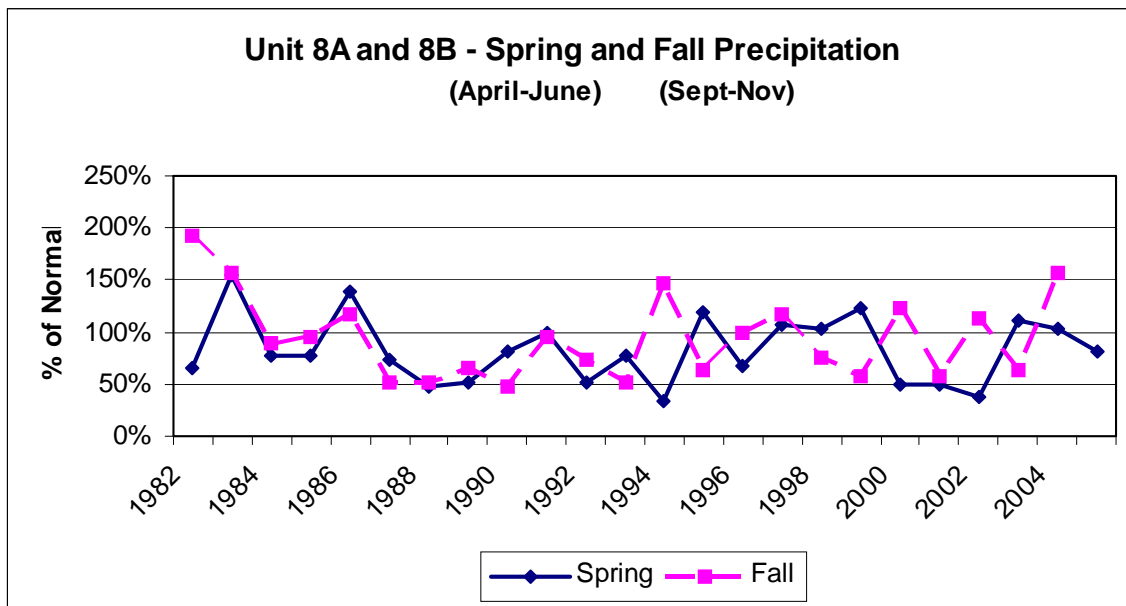
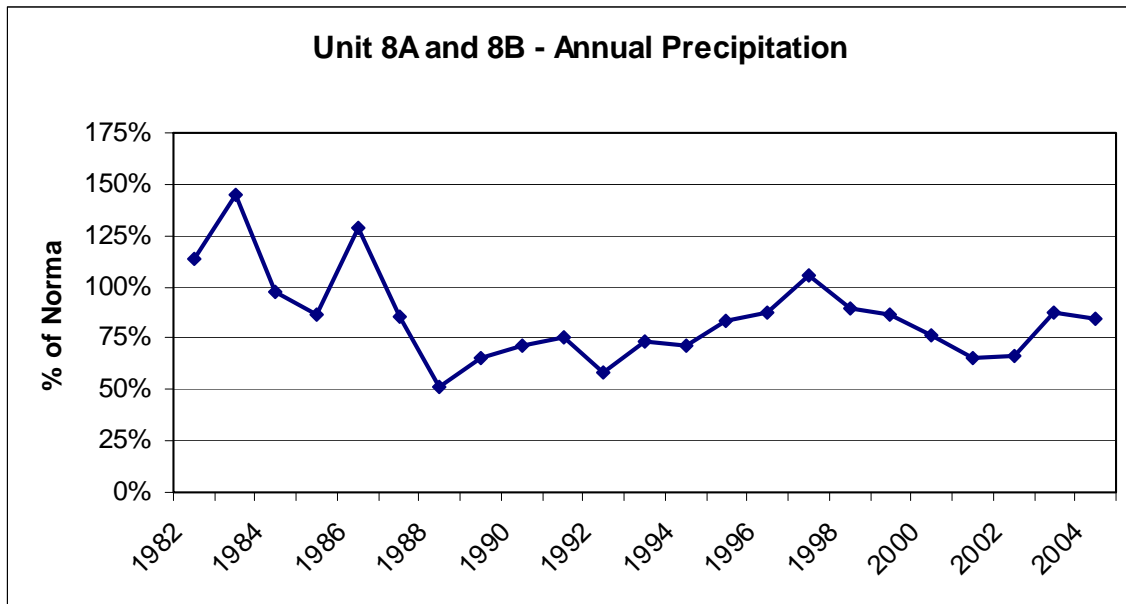
Trend Summary

	Category	1982	1995	2000	2005
8A-1 Widdop Mtn. South Slope	soil	est	0	0	0
	browse	est	0	0	0
	herbaceous understory	est	-1	0	-1
8A-2 Widdop Mtn North Slope	soil	est	0	0	0
	browse	est	0	0	0
	herbaceous understory	est	-1	-1	+1
8A-3 Bald Range South	soil	est	0	NR	NR
	browse	est	+1	NR	NR
	herbaceous understory	est	-1	NR	NR
8A-4 Bald Range	soil	est	0	0	0
	browse	est	0	0	0
	herbaceous understory	est	0	-1	0
8A-5 Telephone Hollow	soil	est	0	-1	0
	browse	est	0	0	0
	herbaceous understory	est	+1	0	0

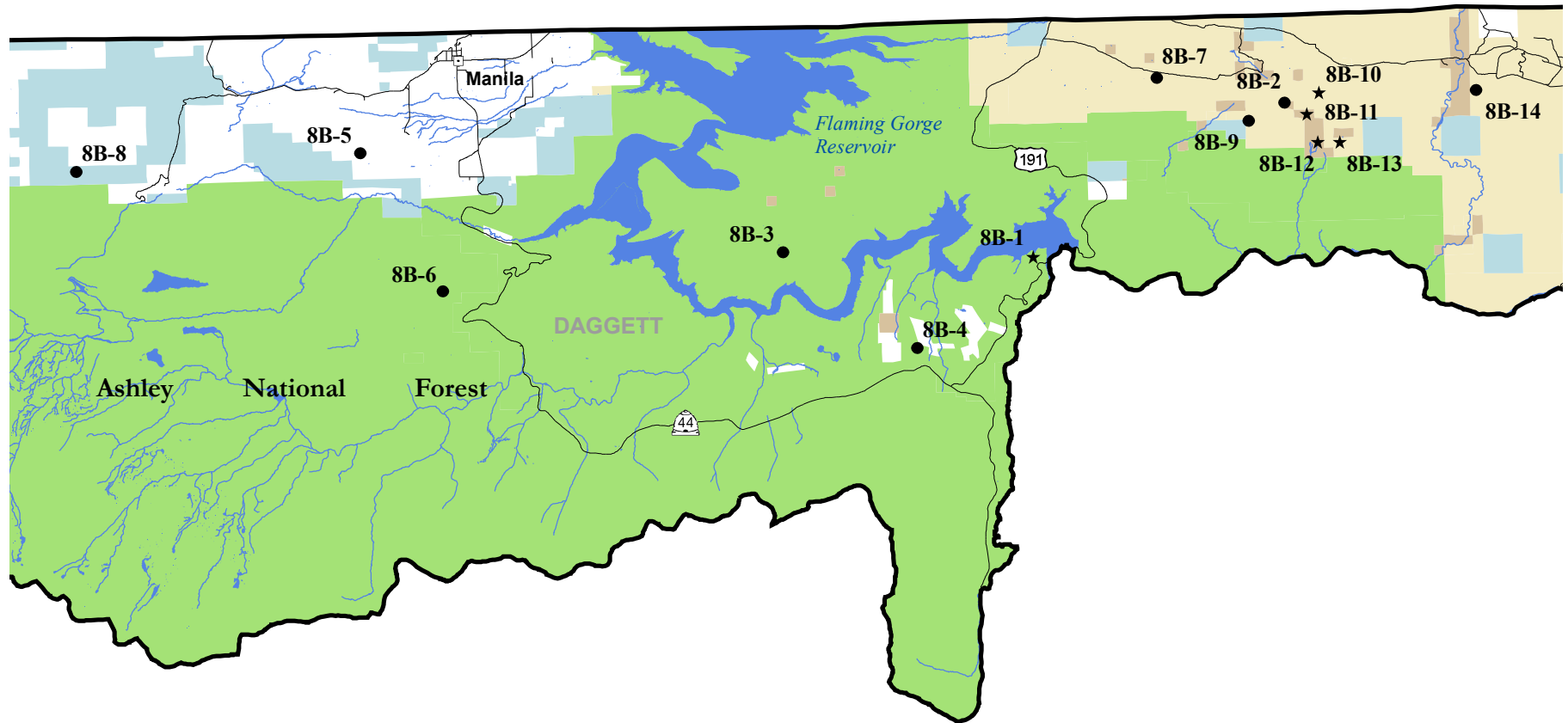
	Category	1982	1995	2000	2005
Average Range Trend	soil		0.3	-0.3	-0.3
	browse		0.2	0.0	0.0
	herbaceous understory		-0.3	-0.8	0.3
Total Number of Sites Read		5	5	4	4

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up,
 (est) = site established, (NR) = site not read

Precipitation graphs for the North Slope Summit and Daggett unit. Data is percent of normal precipitation averaged for weather stations on the Manila, Flaming Gorge, Allen Ranch, and Mountain View, WY (Utah Climate Summaries 2005).



Management Unit 8B

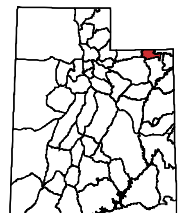


Map Scale 1:268,000 (1 inch = 4.2 miles)



- | | | | |
|---|-------------------|---|------------------------|
| ● | Transect location | □ | Private |
| ★ | Suspended site | ■ | State Wildlife Reserve |
| ■ | Forest Service | ■ | Water body |
| ■ | BLM | — | River or stream |
| ■ | State of Utah | — | Road |

Unit Location



WILDLIFE MANAGEMENT UNIT 8B - NORTH SLOPE, DAGGETT

Boundary Description

Daggett and Summit Counties - Boundary begins at the Utah-Wyoming state line and the Burn Fork-Birch Creek drainage divide; then east along this state line to the Utah-Wyoming-Colorado state lines (Three corners); south along the Utah-Colorado state line to the Green River; west along the Green River to Flaming Gorge Reservoir; west along the south shore of Flaming Gorge Reservoir to Cart Creek; south along Cart creek to Highway SR-191; south on SR-191 to the Uintah-Daggett County line (summit of the Uinta Mountains); west along this summit to the Burnt Fork-Sheep Creek drainage divide; north along this drainage divide to the Burnt Fork-Birch Creek drainage divide; north along this drainage divide to the Utah-Wyoming state line and beginning point.

Management Unit Description

The majority of the deer and elk winter range in unit 8 (8A & 8B) is on U.S. Forest Service and BLM managed lands. Privately owned lands comprise about 19% of the winter range, most notably the bottomland in the Lucerne Valley around Manila, Brown's Park, and Clay Basin. Elsewhere, privately owned land is used as rangeland for cattle or for summer homes. Manila and Dutch John are the only towns in sub-unit 8B. BLM lands are used primarily for cattle grazing, with oil and gas operations being the major activities in Clay Basin. Winter range on Forest Service land is mainly part of the Flaming Gorge National Recreation Area. Following construction of the Flaming Gorge dam, approximately 14,000 acres of deer winter range was flooded, but the reservoir does not appear to be a serious barrier to migration (Warren 1973). Concurrently, most livestock grazing was eliminated within the Green River corridor. The area is now managed for recreation and electrical power generation associated with the reservoir.

Because the majority of the land within this herd unit is public, this unit did not rank high on the winter range acquisition list. However, a property boundary survey of DWR land, which included Red Creek and Goslin Mountain, was ranked the top enhancement project in 1990.

Key Areas

Several important normal winter concentration areas were identified in the 1974 range inventory. They are: Dowd, Bear, and Goslin Mountains; Dutch John Flat, Little Hole, Red Creek Flat, Taylor Flat, Death Valley, and Digger Basin (Olson 1975). Even with very generous estimates, these areas provide only about 20% of the winter range, all of which is under federal management. The DWR owns some critical lands in Brown's Park (Taylor Flat and Red Creek) and on Goslin Mountain.

Grazing Summary

Local BLM and Forest Service personnel have provided information on past and current livestock grazing programs. With heavy season-long grazing on the Forest in the first half of the 1900's, cattle grazing since then has been reduced and adjusted downward, in particular since construction of Flaming Gorge Reservoir. There is little cattle use permitted in the Flaming Gorge Recreation Area. As of 2000, grazing takes place primarily along the southern boundary between the herd unit and Ashley National Forest. Cattle are in the Greendale area in summer, but stocking was light at 13.4 suitable acres/AUM. Eighty-five cows graze the allotment on a deferred rotation from June 1 to September 30. The Death Valley area in the Sheep Creek Mountain allotment is also lightly stocked at 15.4 suitable acres/AUM. It was permitted for 173 cows with calves from June 1 to September 15 on a deferred rotation schedule.

The sampled BLM grazing allotments are generally grazed by cattle in spring and/or summer. Antelope Flat is

part of the Goslin Mountain allotment, which is part of a deferred rotation system that is grazed either spring or fall. The higher country on Goslin Mountain, where DWR owns isolated parcels, is grazed from mid-July to early or mid-September on a deferred rotation basis for 400 AUM's.

Unit Management Objectives

The management plan for Unit 8 (8A & 8B) as of 2001, includes a target herd size of 5,300 wintering deer with a composition of 15 bucks to 100 does. Thirty percent of the bucks are to be 2-point or better. The 2001 elk management objective is to achieve a target winter herd size of 2,100 (1,600 in Summit and West Daggett; 500 in the Three Corners) with a minimum post season bull to cow ratio of 8:100. At least 4 of these bulls will be 2½ years of age or older (DeBloois et. al 2001).

Study Site Description

Trend studies were originally established at Cedar Springs (8B-1), Goslin Mountain (8B-2), Bear Top Mountain (8B-3), Greendale (8B-4) and Bennett Ranch (8B-5) in 1982. These sites were reread in 1988 along with 2 new trend studies which were established on BLM land at Antelope Flat (8B-7) and on Forest land at Phil Pico Mountain (8B-8). All of these sites were reread in 1995. Do to heavy livestock use on riparian areas on State land in the Goslin Mountain area, five new trend studies were established in 1995. Most of this heavy use was brought on by drought and poor distribution of livestock. Two studies sample mountain big sagebrush-grass range (West Goslin 8B-9 and Sagebrush Ridge 8B-10) and 3 sites monitor meadows which receive concentrated livestock and elk use (Triangle Meadow 8B-11, Big Meadow 8B-12, and Lower Big Meadow 8B-13). In 2000, all sites were reread, except for Cedar Springs which was suspended due to a poor condition and one new site was added at Clay Basin Bench (8B-14). With the exception of Cedar Springs (8B-1), Sagebrush Ridge (8B-10), Triangle Meadow (8B-11), Big Meadow (8B-12), and Lower Big Meadow (8B-13), all 8B sites were reread in 2005. Sagebrush Ridge (8B-10) was not read due to its close proximity to Goslin Mountain (8B-2) and will likely be reread in 2010. Triangle Meadow (8B-11), Big Meadow (8B-12), and Lower Big Meadow (8B-13) all showed little change, so will possibly be reread in 2010 on a 10 year rotation.

Trend Study 8B-2-05

Study site name: Goslin Mountain .

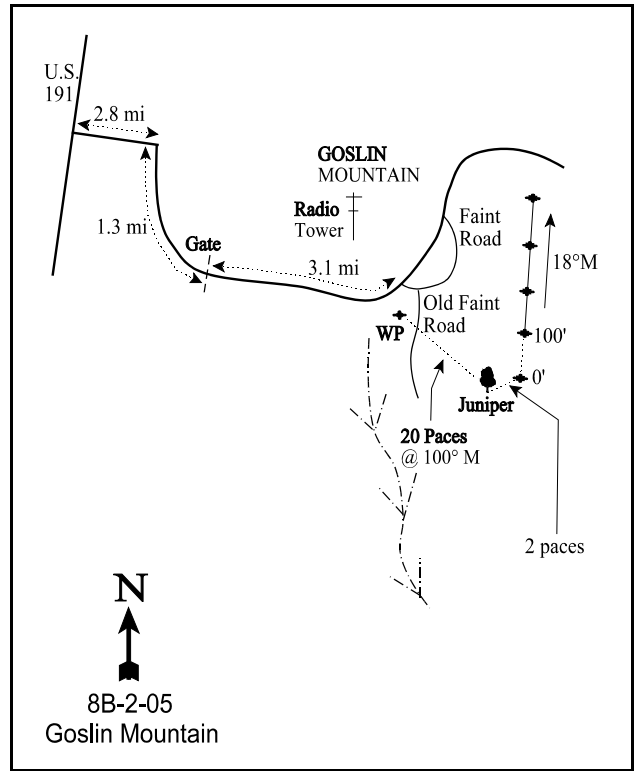
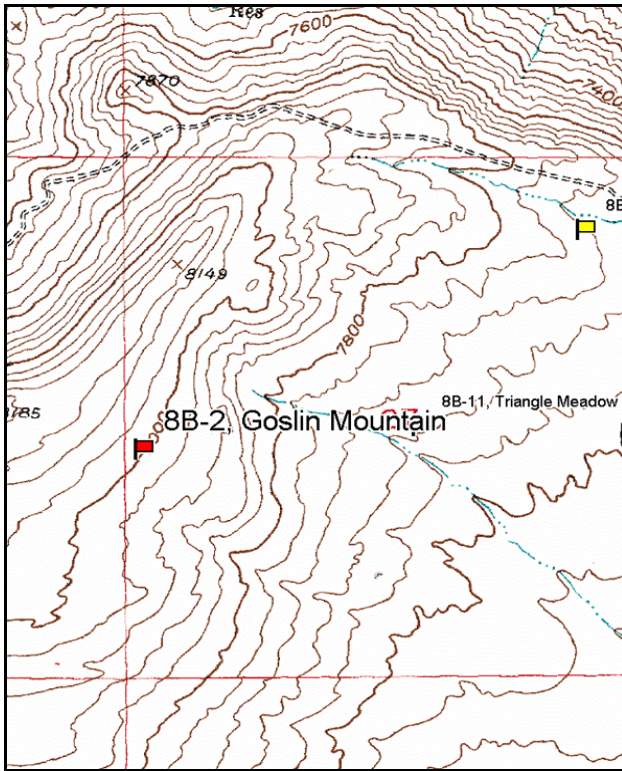
Vegetation type: Mountain Big Sagebrush .

Compass bearing: frequency baseline 18 degrees magnetic.

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

LOCATION DESCRIPTION

From Dutch John, proceed north towards Antelope Flat on Highway U.S. 191 for approximately 8 miles. Before the Wyoming border, turn east on the Antelope Flat Road towards Goslin Mountain. Go 2.8 miles and turn right towards Goslin Mountain. Proceed 1.3 miles to a gate. Continue up the mountain 3.1 miles to a turnoff to the left which goes to a radio tower. A little further down the main road there is a road to the right. Stop here and walk 20 paces down the right fork to a juniper on the left. The 0-foot baseline stake is located two paces east of the juniper.



Map Name: Goslin Mountain

Diagrammatic Sketch

Township 3N, Range 23E, Section 27

GPS: NAD 27, UTM 12T 4536282 N, 641644 E

DISCUSSION

Goslin Mountain - Trend study No. 8B-2

The Goslin Mountain trend study samples a mountain big sagebrush-grass site near the summit of Goslin Mountain at an elevation of 7,920 feet. The aspect is to the east-southeast with a gradual slope of 10 to 15%. Deer, elk, and antelope utilize the site year-round with less use occurring during severe winters. Cattle grazing is permitted in the area as part of the Goslin Mountain allotment managed by the BLM. Cattle grazing in this area takes place during the summer months on a deferred rotation schedule for 400 AUM's. The area is also considered important habitat for sage grouse. Pellet group quadrat frequency data from 1995 indicated light use by elk, deer and cattle. Pellet group data from 2000 estimated 3 elk and 15 deer days use/acre (7 edu/ha and 37 ddu/ha). Pellet group data from 2005 estimated 4 elk, 56 deer, 9 cow days use/acre (10 edu/ha, 139 ddu/ha, and 21 cdu/ha). Deer were seen on the site in 2005. It was difficult to distinguish between deer and antelope pellet groups.

Soils are moderately shallow, coarse, rocky and well-drained. Effective rooting depth was estimated at just over 12 inches. Pavement and rocks are not abundant on the surface but occur throughout the profile. Soil texture is sandy loam which has a slightly acidic pH of 6.2. Phosphorus was measured at 4.6 ppm, where levels less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Protective ground cover is abundant and well dispersed. However, there are some signs of past erosion in the form of soil pedestaling around shrubs and the bare areas. Many of these bare areas have very shallow soil less than 4 inches deep (soil penetrometer readings). The erosion condition classification determined soil movement as stable in 2005.

The key browse species consists of a moderately dense stand of mountain big sagebrush which has produced over half of the shrub cover since 1995. Density has remained relatively stable over the years between 2,100 and 2,500 plants/acre, with the exception in 1988 which estimated 4,866 plants/acre. This drastic increase was a product of a large increase in the number of young individuals in 1988, which was followed by subsequent die-off of the young plants. Utilization of the sagebrush has been mostly light to moderate with an increase to moderate-heavy use in 1995. Percent decadency has remained stable since 1995 at around one-third of the population. Vigor has also remained stable since 1995. Since 1995, plants classified as dying remained around 15%. Recruitment has been low (below 7%) during every sampling year with the exception of 1988, where 21% of the population were young plants.

Other important browse consist of serviceberry, bitterbrush, and snowberry. The bitterbrush population has remained around 550 plants/acre and provided around 18% of the total shrub cover. They have a prostrate growth form with an average height of less than 2 feet. Utilization estimated as moderate to heavy use, but vigor has remained good. Percent decadence is low with a fair amount of seedling and young recruitment. There are small numbers of serviceberry and snowberry scattered throughout the site. Serviceberry shows moderate use.

The herbaceous understory is diverse and abundant. Grasses and forbs accounted for 46% of the total vegetation cover in 1995. It increased to 54% in 2000, then returned to 46% by 2005. Grasses make up the majority of the herbaceous cover at 69% in 1995, 81% in 2000, 79% in 2005. The dominant grasses consist of needle-and-thread, oniongrass, Letterman needlegrass, and thickspike wheatgrass. It was reported in 1988 that the Poa species were identified to genus only because of the difficulty identifying grasses that year. Forbs are also very diverse but none are very abundant. Important species include silver lupine and low penstemon.

1982 APPARENT TREND ASSESSMENT

This site appears stable. Soil loss is not currently a serious problem. However, roadways and vehicle tracks are a source for erosion. Off-road vehicle use should be discouraged if possible. The soil is fairly shallow and has a high erosion potential if disturbed. Shrubs, especially mountain big sagebrush, are the dominant species on the site and will continue to be so. The more preferred species, such as bitterbrush and serviceberry, occur in relatively low numbers compared to sagebrush. Hopefully, ways can be found to encourage their expansion.

1988 TREND ASSESSMENT

Ground cover is almost unchanged from 1982. There is adequate litter cover (57%) and basal vegetation cover (12%). Although there is 25% bare ground with some soil movement occurring, especially along trails, the canopy and basal vegetation cover minimize the erosion hazard. Trend for the key browse species, mountain big sagebrush, is stable. Even though the population density has increased, percent decadence has also increased to 52%. The herbaceous understory trend is slightly up due to an increase in the quadrat frequency of perennial grasses and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

Ground cover characteristics have improved since 1988. Percent litter cover has declined slightly due to prolonged drought, but percent relative bare soil has also declined from 25% to 15%. The high nested frequency values of vegetation and litter indicate well dispersed cover which protects the soil from serious erosion. The browse trend for mountain big sagebrush is mixed. Population density has declined from 4,866 plants/acre in 1988 to 2,480 by 1995. Much of this decrease can be attributed to the much larger sampling size utilized in 1995 that gives better estimates of shrub populations. The proportion of plants displaying heavy use and poor vigor have both increased. In addition, no seedlings or young plants were encountered in 1995. On the favorable side, percent decadency has declined from 52% to 33%. Trend is considered slightly down at this time, but by the time of the next reading this population may likely be smaller but healthier. Trend for the herbaceous understory is stable with an increase in sum of nested frequency of perennial forbs and a decrease of nested frequency values for perennial grasses. The Desirable Components Index rated this site as good to fair with a score of 66 due to good perennial grass cover, low recruitment of shrubs, and low to moderate shrub decadence.

TREND ASSESSMENT

soil - slightly up (+1)

browse - slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - good to fair (66) Moderate Potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable. Relative percent cover of vegetation increased slightly, while cover of bare ground has declined. As a result, the proportion of protective cover (vegetation, litter and cryptogams) to bare ground has increased slightly. Erosion is currently not a problem on this site. These changes were small enough that the trend did not change. Trend for the key browse species mountain big sagebrush and

bitterbrush is stable. Both have similar population densities compared to 1995. Use is lighter than 1995 levels and vigor is normal on most plants. Percent decadency on sagebrush is stable as is the number of decadent plants that are classified as dying (361 plant/acre in 1995 and 320 in 2000). However, reproduction of sagebrush is poor and there are currently not enough young plants to replace all the plants classified as decadent and dying. This may lead to a slight decline in the sagebrush population in the future if drought conditions continue. Some of the vigor problems on sagebrush are obviously due to the dry conditions of the past few years. Trend for the herbaceous understory is up for perennial grasses, but slightly down for perennial forbs. Overall, the herbaceous trend is considered slightly up since perennial grasses provide the majority of the herbaceous cover. Needle-and-thread and Letterman needlegrass both declined significantly in nested frequency, while oniongrass increased significantly. Thickspike wheatgrass remained stable. The Desirable Components Index rated this site as excellent with a score of 80 due to good perennial grass cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - slightly up (+1)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - excellent to good (80) Moderate Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. The proportion of protective cover (vegetation, litter and cryptogams) to bare ground has remained unchanged. Erosion does not appear to be a problem on this site. Trend for key species, mountain big sagebrush, is slightly down. The population has decreased by 14%, while percent dying remains fairly high. Percent decadence decreased, but remains moderate at 26%. Seedling and young recruitment is not enough to compensate for the dying plants. Trend for herbaceous understory is stable. Sum of nested frequency has slightly increased and forbs have remained fairly stable. Onion grass and Columbia needlegrass both decreased significantly, but are not the most abundant species. The Desirable Components Index rated this site as excellent with a score of 83 due to good perennial grass cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - excellent (83) Moderate Potential scale

HERBACEOUS TRENDS --

Management unit 08B, Study no: 2

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	136	144	150	183	1.06	2.82	2.24
G	Agropyron spicatum	a-	c37	b14	bc25	.42	.63	.26
G	Agropyron trachycaulum	-	-	6	-	-	.30	-
G	Bromus carinatus	-	-	6	-	-	.18	-
G	Bromus tectorum (a)	-	2	-	5	.00	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Carex sp.	22	32	31	43	.88	.75	1.12
G	Dactylis glomerata	-	1	-	-	.00	-	.00
G	Danthonia unispicata	14	4	3	2	1.01	.00	.03
G	Koeleria cristata	_b 11	_a -	_{ab} 2	_a -	-	.03	-
G	Leucopoa kingii	-	3	7	7	.06	.44	.44
G	Melica bulbosa	_a 86	_a 102	_b 156	_a 121	2.94	3.74	1.61
G	Poa sp.	171	-	-	-	-	-	-
G	Poa bulbosa	-	3	22	15	.03	.17	.69
G	Poa fendleriana	-	_a 38	_a 87	_b 128	.45	2.25	3.28
G	Poa pratensis	-	_a 5	_b 43	_b 53	.06	1.37	1.06
G	Poa secunda	-	_a 25	_{ab} 38	_b 56	.09	.36	1.33
G	Sitanion hystrix	_b 63	_a -	_a -	_a 1	-	-	.00
G	Stipa columbiana	_b 89	_a 7	_b 86	_a 22	.07	2.58	1.06
G	Stipa comata	_a 118	_b 190	_a 139	_a 137	4.46	7.60	5.60
G	Stipa lettermani	_{ab} 54	_b 89	_a 34	_b 64	1.57	.68	1.50
Total for Annual Grasses		0	2	0	5	0.00	0	0.00
Total for Perennial Grasses		764	680	824	857	13.11	23.96	20.29
Total for Grasses		764	682	824	862	13.12	23.96	20.30
F	Achillea millefolium	_b 15	_a -	_a -	_a 4	-	-	.15
F	Agoseris glauca	_a -	_b 53	_b 64	_c 89	.28	1.06	.54
F	Allium sp.	_a 21	_b 139	_a 35	_a 41	.81	.12	.11
F	Antennaria rosea	_b 14	_a 3	_{ab} 9	_{ab} 5	.00	.07	.03
F	Arabis sp.	3	3	2	2	.00	.00	.01
F	Arenaria sp.	_a 1	_b 20	_b 31	_{ab} 16	.20	.33	.12
F	Astragalus argophyllus	_a 3	_a 5	_b 15	_{ab} 6	.01	.13	.06
F	Aster chilensis	_b 16	_b 16	_{ab} 7	_a -	.06	.07	-
F	Chaenactis douglasii	-	3	-	3	.00	-	.03
F	Collomia linearis (a)	-	_b 151	_a 37	_a 37	.75	.25	.14
F	Comandra pallida	-	-	1	-	-	.00	-
F	Collinsia parviflora (a)	-	_c 234	_a 22	_b 92	1.48	.09	.41
F	Crepis acuminata	3	5	3	7	.04	.03	.07
F	Cymopterus longipes	_a -	_b 19	_b 12	_b 8	.05	.10	.09
F	Delphinium nuttallianum	-	1	2	1	.00	.00	.00
F	Descurainia pinnata (a)	-	5	6	-	.01	.01	-
F	Erigeron eatonii	_a -	_a 7	_b 28	_a 3	.04	.11	.06
F	Erigeron flagellaris	_b 94	_a 11	_a 5	_a 7	.06	.06	.07

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Eriogonum umbellatum</i>	_b 46	_a 3	_a 14	_a 8	.02	.25	.30
F	<i>Gilia inconspicua</i> (a)	-	4	-	-	.00	-	-
F	<i>Heterotheca villosa</i>	_a -	_a -	_b 8	_{ab} 3	.03	.06	.18
F	<i>Lomatium</i> sp.	-	4	-	-	.01	-	-
F	<i>Lupinus argenteus</i>	35	44	37	28	.51	.80	1.21
F	<i>Lychnis drummondii</i>	-	-	-	8	-	-	.02
F	<i>Mertensia</i> sp.	_a -	_a -	_a -	_b 17	-	-	.18
F	<i>Microsteris gracilis</i> (a)	-	31	29	24	.15	.07	.07
F	<i>Penstemon humilis</i>	-	7	5	7	.16	.06	.07
F	<i>Petrorhiza pumila</i>	-	-	1	2	-	.03	.15
F	<i>Phlox longifolia</i>	_b 117	_a 73	_a 70	_a 77	.36	.40	.71
F	<i>Polygonum douglasii</i> (a)	-	_b 71	_a 33	_a 25	.17	.06	.07
F	<i>Schoenocrambe linifolia</i>	-	-	-	3	-	-	.00
F	<i>Senecio integerrimus</i>	_a -	_{bc} 13	_{ab} 2	_c 24	.09	.00	.12
F	<i>Senecio multilobatus</i>	-	4	-	4	.03	-	.03
F	<i>Taraxacum officinale</i>	_{ab} 4	_c 36	_b 13	_a -	.25	.22	.00
F	<i>Tragopogon dubius</i>	-	3	5	2	.00	.06	.01
F	<i>Trifolium gymnocarpon</i>	_a 8	_b 57	_b 63	_b 32	.15	.80	.32
F	Unknown forb-perennial	_b 33	_a -	_a -	_a -	-	-	-
F	<i>Viola</i> sp.	_a -	_a -	_b 12	_a -	-	.24	-
F	<i>Zigadenus paniculatus</i>	8	2	-	1	.00	-	.00
Total for Annual Forbs		0	496	127	178	2.57	0.50	0.69
Total for Perennial Forbs		421	531	444	408	3.21	5.09	4.71
Total for Forbs		421	1027	571	586	5.78	5.59	5.41

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

BROWSE TRENDS --

Management unit 08B, Study no: 2

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	3	4	3	.30	1.54	1.54
B	Artemisia tridentata vaseyana	72	72	64	13.53	12.76	14.56
B	Chrysothamnus viscidiflorus lanceolatus	7	7	4	.42	.18	.41
B	Eriogonum heracleoides	51	54	60	3.26	1.81	4.44
B	Gutierrezia sarothrae	3	0	3	.15	-	.03
B	Mahonia repens	12	5	4	.48	.15	.30
B	Purshia tridentata	15	20	21	3.13	5.00	6.25
B	Symphoricarpos oreophilus	10	8	8	.72	2.87	3.29
Total for Browse		173	170	167	22.01	24.33	30.83

CANOPY COVER, LINE INTERCEPT --

Management unit 08B, Study no: 2

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	-	1.68
Artemisia tridentata vaseyana	-	17.98
Chrysothamnus viscidiflorus lanceolatus	-	.13
Eriogonum heracleoides	-	4.93
Juniperus scopulorum	1.60	1.20
Mahonia repens	-	.23
Purshia tridentata	-	5.56
Symphoricarpos oreophilus	-	3.01

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 08B, Study no: 2

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	1.3
Purshia tridentata	2.2

BASIC COVER --

Management unit 08B, Study no: 2

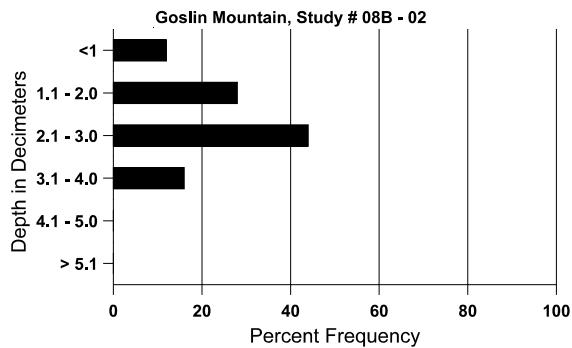
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	0	12.00	41.94	57.47	55.04
Rock	0	2.00	3.28	5.05	4.00
Pavement	0	3.00	.84	2.42	.80
Litter	0	57.50	50.97	58.79	34.59
Cryptogams	0	.25	.10	.38	.07
Bare Ground	27.50	25.25	16.86	12.69	17.82

SOIL ANALYSIS DATA --

Herd Unit 8B, Study # 2, Study Name: Goslin Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
12.4	53.0 (14.0)	6.2	69.3	16.2	14.6	2.6	4.6	121.6	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 08B, Study no: 2

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	-	1	5
Grouse	-	-	3
Elk	3	1	4
Deer	7	4	8
Cattle	5	3	6

Days use per acre (ha)	
'00	'05
-	-
-	61/acre
3 (8)	4 (10)
15 (36)	56 (139)
-	9 (22)

BROWSE CHARACTERISTICS --
Management unit 08B, Study no: 2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	80	-	-	60	20	-	50	25	25	-	0	17/37
00	80	-	-	80	-	-	0	0	0	-	0	30/50
05	80	-	-	80	-	20	0	100	0	-	0	35/56
Artemisia tridentata vaseyana												
82	2332	-	133	2133	66	-	0	0	3	-	0	27/33
88	4866	733	1000	1333	2533	-	38	1	52	-	4	27/39
95	2480	-	-	1660	820	800	52	27	33	15	15	51/59
00	2500	220	180	1420	900	640	12	2	36	13	18	23/36
05	2160	140	140	1460	560	380	28	4	26	16	17	24/38
Chrysothamnus viscidiflorus lanceolatus												
82	200	-	-	200	-	-	0	0	0	-	0	9/7
88	199	-	-	133	66	-	0	0	33	-	0	15/7
95	200	-	-	200	-	-	0	0	0	-	0	12/21
00	220	-	-	220	-	-	0	0	0	-	0	9/13
05	120	-	20	100	-	-	0	0	0	-	0	10/17
Eriogonum heracleoides												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	3000	-	480	2500	20	-	0	.66	1	.66	.66	7/18
00	2620	-	120	2500	-	-	0	0	0	-	0	5/15
05	2660	-	100	2420	140	-	8	0	5	.75	.75	7/20
Gutierrezia sarothrae												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	180	-	-	180	-	-	0	0	-	-	0	4/7
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	100	-	-	100	-	-	0	0	-	-	0	8/12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Mahonia repens												
82	600	-	-	600	-	-	0	0	-	-	0	5/4
88	1933	-	1933	-	-	-	14	0	-	-	0	-/-
95	2900	-	1000	1900	-	-	0	0	-	-	0	4/6
00	560	-	240	320	-	-	0	0	-	-	0	4/4
05	200	-	160	40	-	-	0	0	-	-	0	4/6
Purshia tridentata												
82	533	-	133	400	-	-	25	63	0	-	0	11/21
88	799	-	266	533	-	-	42	50	0	-	25	14/22
95	400	-	60	340	-	-	45	45	0	-	0	13/45
00	420	-	40	340	40	20	67	0	10	5	5	20/63
05	560	-	80	480	-	20	11	57	0	-	0	20/60
Ribes sp.												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	31/37
Symphoricarpos oreophilus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	400	20	140	260	-	-	0	0	-	-	0	15/41
00	160	-	-	160	-	-	0	0	-	-	13	24/63
05	320	-	20	300	-	-	0	0	-	-	0	18/41

Trend Study 8B-3-05

Study site name: Bear Top Mountain .

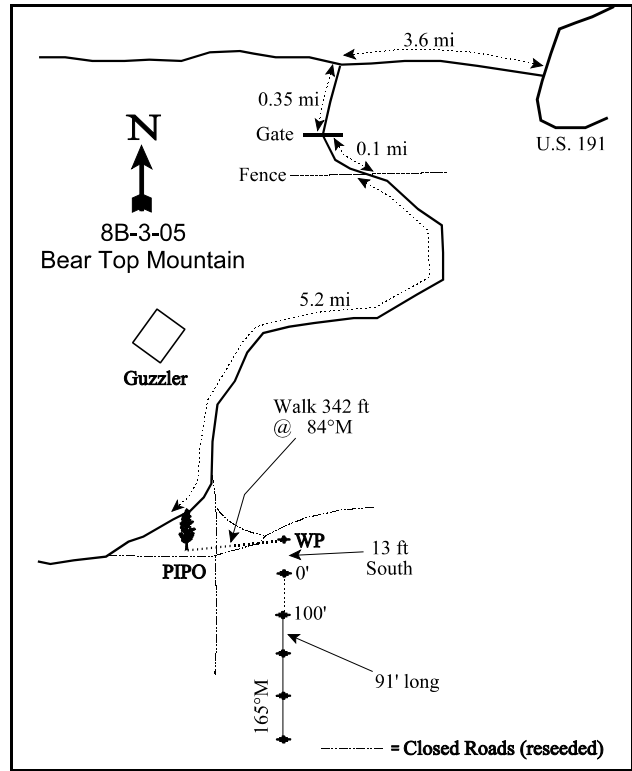
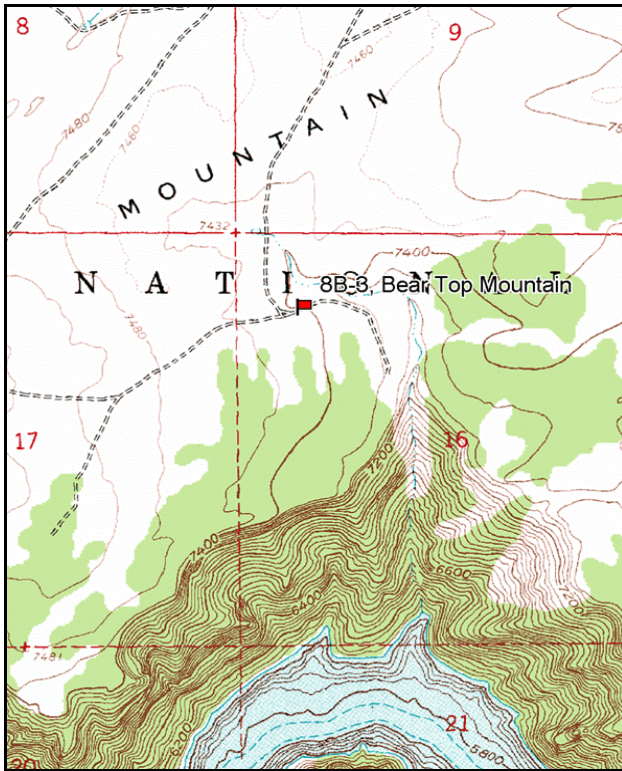
Vegetation type: Mountain Big Sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of Highway U-260 and U.S. 191 northwest of Dutch John, proceed west towards Antelope Flat campground for 3.6 miles. Turn left, and proceed on the dirt road towards Bear Top Mountain for 0.35 miles to a locked gate. Go through the gate and continue 0.1 miles to a new fence. Continue up the mountain approximately 5.2 miles to a large Ponderosa pine. From the pine, the witness post is 342 feet at 84°M. The 0-foot stake is 13 feet south of the witness post. It is marked with a red browse tag #7095.



Map Name: Flaming Gorge

Diagrammatic Sketch

Township 2N, Range 21E, Section 16

GPS: NAD 27, UTM 12T 4530104 N, 620961 E

DISCUSSION

Bear Top Mountain - Trend Study No. 8B-3

The Bear Top Mountain study is at an elevation of 7,400 feet. The site is on nearly level terrain with a slight northeast aspect and lies about 1/4 mile from the cliffs overlooking Flaming Gorge Reservoir. The area is classified as a sagebrush-grass type, which normally demonstrates great diversity in both vegetation composition and wildlife use. The area was burned in 1998 as part of a prescribed fire to clear the rim of Bear Top Mountain for bighorn sheep habitat, which eliminated most of the shrubs. Antelope, mule deer, elk, bighorn sheep, and sage grouse have been observed in close proximity to the site during past readings. Rocky Mountain bighorn sheep were transplanted in the early 1980's and utilize the area as summer range. Two nearby guzzlers provide water for wildlife. Livestock have been excluded since the early 1960's. Pellet group data collected in 2000 estimated 7 elk days use/acre (18 edu/ha). Pellet group data in 2005 estimated 29 elk and 7 deer days use/acre (71 edu/ha and 18 ddu/ha). In addition, sage grouse, coyote, and marmot droppings were all sampled in the pellet group transect.

Soil is moderately shallow and very rocky. Effective rooting depth was estimated at just over 10 inches with most of the rock found in the top 8 inches of the soil profile. Bed rock is also exposed in many places on the surface; rock and pavement provided an average of 12% cover. Soil texture is a sandy loam with a neutral pH. Phosphorus was measured at 4.5 ppm. Values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Due to the levelness of the terrain, erosion has not been a problem. Between 1995 and 2000, vegetation and litter both decreased sharply, while bare ground tripled. These drastic changes were due mostly to the loss of vegetation cover, especially browse cover, following the burn that occurred between the two sampling periods. However, this effect was also made more severe by the drought that occurred during the fall of 1999, and the winter and spring of 2000. The vegetation and litter cover both increased between 2000 and 2005 while the bare ground cover decreased to 1995 levels. This recovery in vegetation ground cover was due to a large increase in perennial grass cover, despite a continued decline in browse cover. The erosion condition class determined soil movement as stable in 2005.

The key browse species prior to the fire was a moderately dense stand of mountain big sagebrush which made up 81% of the browse cover in 1995. Other browse species include bitterbrush, mountain low rabbitbrush, gray horsebrush, and low numbers of broom snakeweed. Mountain big sagebrush cover was estimated at 19% in 1988, 15% in 1995, and 1% in 2000 and 2005. Density decreased from 9,065 plants/acre in 1988 to 5,200 in 1995, 320 in 2000, and 240 in 2005. The number of young and decadent sagebrush fluctuated between 1982 and 1995, but the number of mature plants remained stable at around 4,000 individuals/acre. After 1998, the number of mature sagebrush dropped below 200 individuals/acre. Percent decadency was low at 11% in 1995, increased to 44% in 2000, and dropped to 33% in 2005. Since the 1998 fire, the number of young sagebrush has increased from 0% in 2000 of the population to 33% in 2005. Use was light to moderate in 1982 and 1988, heavy in 1995, moderate in 2000, and moderate to heavy in 2005.

Antelope bitterbrush was picked up in the larger sample used starting in 1995. Density estimated 120 mature plants/acre in 1995 and decreased to 20 in 2000 and 2005. In 1995 and 2005, the bitterbrush shrubs were heavily hedged, while they were only lightly hedged in 2000. Even at this moderately low density, bitterbrush made up 14% of the total browse cover in 1995, but decreased to zero by 2005.

Grasses and forbs are abundant and diverse. In 1995, 10 perennial grasses were encountered and provided 20% of the vegetation cover. This percentage increased to 58% in 2000 and 92% in 2005, 12 grass species were identified both years. Grasses increased in the overall percent ground cover from 8% in 1995 to 36% in 2005. The most numerous species included: mutton bluegrass, needle-and-thread, Sandberg bluegrass, bluebunch wheatgrass, and thickspike wheatgrass. Forbs provided 36% of the vegetation cover with 27 perennial and 7 annual species sampled in 1995. Sulfur eriogonum was numerous and provided good forage

for summering big game animals in 1995. After the burn, the forb cover drastically decreased from 36% of the vegetation cover in 1995 to 4% in 2005. Sulfur eriogonum, silvery lupine, rock goldenrod and phlox were the dominant perennial species previous to 2005. Much of the lupine was heavily utilized in 2000. In 2005, all forb cover had decreased with the exception of pinnate tansymustard, an annual species of draba, and branchy groundsmoke, all of which had increased significantly.

1982 APPARENT TREND ASSESSMENT

The overall range trend appears stable. Soil trend may even be improving as a result of level terrain and the withdrawal of livestock grazing. The area supports a fair density of rather low-growing mountain big sagebrush with a strong grass understory which may be equally dominant. At this point, it is difficult to judge which vegetation is gaining dominance. Future readings of the study should provide some useful data in this regard.

1988 TEND ASSESSMENT

Basal vegetation cover has remained stable, although protective ground cover of litter and cryptogams has increased only slightly. Percent bare ground is currently estimated at 19%. Due to the level terrain and abundant vegetation and litter cover, erosion is not a problem. Trend for soil is considered stable. The browse trend is up with an increase in population density of the key browse species, mountain big sagebrush. Percent decadency has increased, but 28% of the population is classified as young. The herbaceous trend is also up with an increase in the quadrat frequency of grasses and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - up (+2)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Ground cover characteristics have changed somewhat since 1988. Percent cover of rock has increased while litter cover has declined. Much of this can be attributed to the prolonged drought experienced since the late 1980's. Percent bare ground has remained low and is currently 17%. Trend for soil is considered stable. Trend for browse is also currently stable. The number of young and decadent plants have fluctuated considerably over the past readings, but the number of mature plants has remained constant at about 4,000 plants/acre. Percent decadency is currently low at 11% with vigor being generally good. The only negative aspect is the high number of heavily hedged sagebrush (60%) and the number of decadent plants (560 plants/acre) in which 36% were classified as dying. Trend for the herbaceous understory is down due to a decline in the sum of nested frequency for perennial grasses and forbs. The Desirable Components Index rated this site as good with a score of 69 due to good perennial grass cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - good (69) Moderate Potential scale

2000 TREND ASSESSMENT

Trend for soil is currently down. Since the fire in 1998, percent cover of vegetation and litter have declined considerably, while percent cover for bare ground has increased from 17% to 50%. Herbaceous vegetation is still abundant. However, erosion is minimized due to the level terrain. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil decreased from 3.4:1 to 2:1 in 2000. Trend for browse is also down with some sagebrush and bitterbrush surviving the fire. Use on the surviving sagebrush shrubs is light to moderate with percent decadence increasing to 44%. Vigor is normal on most plants. Currently, there is no recruitment of young plants. The resprouting mountain low rabbitbrush is currently the most abundant shrub at 880 plants/acre. These are small plants averaging only 4 inches in height. Trend for the herbaceous understory is mixed. The herbaceous species composition remained basically unchanged following the fire. The sum of nested frequency for perennial grasses have increased, while frequency of forbs has declined. In 1995, annual and perennial forbs accounted for 64% of the herbaceous understory. After the fire, perennial forbs account for 32% of the herbaceous cover while perennial grasses provide 63%. Some of decline in forb frequency is obviously due to the fire although drought has also greatly influenced the outcome. The herbaceous trend is considered stable. The Desirable Components Index rated this site as poor with a score of 40 due to good perennial grass cover, very poor recruitment of shrubs, low shrub cover, and a small amount of cheatgrass cover.

TREND ASSESSMENT

soil - down (-2)

browse - down (-2)

herbaceous understory - stable (0)

winter range condition (DC Index) - poor (40) Moderate Potential scale

2005 TREND ASSESSMENT

Soil trend is up. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil increased from 2:1 in 2000 to 3:1 in 2005. Percent ground cover of litter and vegetation cover increased substantially and the percent cover of bare ground decreased greatly.

This is due to the drastic increase of perennial grass cover. The browse trend is slightly down. The estimated number of mountain big sagebrush individuals has decreased from 320 to 240 plants/acre, a 25% decrease. The estimated number of decadent sagebrush individuals has decreased, but still makes up 33% of the sagebrush community (compared with 44% in 2000). The number of dying sagebrush individuals remains 20 plants/acre, and the number of young has increased from 0 to 80 plants/acre, a net recruitment of around 60 plants/acre. Browse trend for bitterbrush is stable, although it continues to be a very minor component of the shrub community. The herbaceous understory trend is slightly down. The sum of the nested frequencies for perennial forbs decreased 88%. The sum of the nested frequencies of perennial grasses and perennial forbs decreased 27%. However, the nested frequency of perennial grasses increased slightly with an increase in percent ground cover from 13% to 36%. As well, the nested frequency and percent cover of cheatgrass also decreased. The Desirable Components Index rated this site as poor with a score of 33 due to very poor recruitment of shrubs, low shrub cover, poor perennial forb cover, a small amount of cheatgrass percent cover. However, the site has excellent perennial grass cover.

TREND ASSESSMENT

soil - up (+2)

browse - slightly down (-1)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - very poor to poor (33) Moderate Potential scale

HERBACEOUS TRENDS --
Management unit 08B, Study no: 3

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Agropyron dasystachyum</i>	a-	b118	c191	c174	1.03	2.88	3.44
G	<i>Agropyron spicatum</i>	b208	a77	a68	a49	.96	1.82	3.37
G	<i>Bromus inermis</i>	-	-	-	7	-	.00	.53
G	<i>Bromus tectorum</i> (a)	-	a26	b55	ab44	.21	.65	.11
G	<i>Carex</i> sp.	b72	a17	a16	a8	.15	.52	.37
G	<i>Koeleria cristata</i>	c119	ab13	a9	b29	.09	.04	1.47
G	<i>Poa fendleriana</i>	111	128	129	84	2.51	2.37	4.01
G	<i>Poa secunda</i>	b166	a105	ab136	ab132	1.27	1.12	4.26
G	<i>Sitanion hystrix</i>	a14	ab41	ab34	b57	.45	.82	1.69
G	<i>Sporobolus cryptandrus</i>	-	7	-	-	.15	-	-
G	<i>Stipa comata</i>	bc129	a82	ab111	c176	1.50	3.74	16.06
G	<i>Stipa lettermani</i>	c39	a-	ab2	bc21	-	.15	1.10
Total for Annual Grasses		0	26	55	44	0.20	0.65	0.10
Total for Perennial Grasses		858	588	696	737	8.15	13.49	36.33
Total for Grasses		858	614	751	781	8.36	14.14	36.44
F	<i>Agoseris glauca</i>	a-	b27	c63	a-	.05	.48	-
F	<i>Allium</i> sp.	a-	b10	a-	a-	.03	-	-
F	<i>Antennaria rosea</i>	c124	b41	ab30	a4	.86	.33	.06
F	<i>Androsace septentrionalis</i> (a)	-	2	-	-	.01	-	-
F	<i>Arabis</i> sp.	11	3	2	1	.00	.00	.00
F	<i>Arenaria</i> sp.	ab7	b17	a3	ab6	.23	.15	.02
F	<i>Astragalus convallarius</i>	ab7	b14	a-	ab1	.10	-	.00
F	<i>Aster</i> sp.	a-	b23	a-	a2	.12	-	.03
F	<i>Astragalus</i> sp.	-	-	-	2	-	-	.03
F	<i>Balsamorhiza sagittata</i>	ab5	b9	b11	a-	.69	.68	-
F	<i>Calochortus nuttallii</i>	-	3	-	-	.00	-	-
F	<i>Comandra pallida</i>	a-	b13	b14	a-	.25	.09	-
F	<i>Collinsia parviflora</i> (a)	-	b148	b100	a39	2.28	.30	.13
F	<i>Crepis acuminata</i>	a-	b9	a-	a-	.03	-	-
F	<i>Cymopterus</i> sp.	a-	b10	a-	a-	.05	-	-
F	<i>Descurainia pinnata</i> (a)	-	a-	a1	b55	-	.00	.20
F	<i>Draba</i> sp. (a)	-	ab12	a1	b20	.02	.00	.04
F	<i>Erigeron flagellaris</i>	-	2	5	-	.00	.06	-
F	<i>Erigeron pumilus</i>	c83	b20	ab6	a-	.19	.04	-
F	<i>Eriogonum umbellatum</i>	c79	c78	b30	a4	2.25	1.48	.78

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Gayophytum ramosissimum(a)	-	_a 8	_a 7	_b 32	.02	.01	.07
F	Heterotheca villosa	_{bc} 31	_c 50	_b 20	_a -	.83	.22	-
F	Lepidium sp. (a)	-	_b 9	_a -	_a -	.02	-	-
F	Linum lewisii	_b 38	_a 4	_a 6	_a 3	.01	.01	.01
F	Lithospermum ruderales	_b 18	_{ab} 4	_{ab} 8	_a -	.19	.04	-
F	Lupinus argenteus	_c 176	_b 100	_b 91	_a 1	1.97	1.92	.00
F	Lychnis drummondii	-	-	-	1	-	-	.03
F	Machaeranthera canescens	7	-	-	-	-	-	-
F	Mertensia fusiformis	-	-	1	-	-	.00	-
F	Orthocarpus tolmiei (a)	-	_b 35	_a 7	_a -	.15	.04	-
F	Penstemon humilis	_b 11	_a -	_a 1	_a -	-	.03	-
F	Petrorhiza pumila	_b 7	_c 31	_{bc} 17	_a -	1.41	.86	-
F	Phlox longifolia	_b 59	_a 3	_a 7	_a 2	.01	.04	.00
F	Phlox multiflora	_c 66	_c 66	_b 30	_a -	2.30	.26	-
F	Polygonum douglasii (a)	-	_c 60	_a -	_b 5	.13	-	.02
F	Senecio integerrimus	-	-	6	-	-	.01	-
F	Sedum lanceolatum	_b 76	_b 100	_a 24	_a 12	.42	.10	.03
F	Trifolium gymnocarpon	18	16	7	6	.03	.01	.04
F	Zigadenus sp.	4	-	-	-	-	-	-
Total for Annual Forbs		0	274	116	151	2.65	0.37	0.47
Total for Perennial Forbs		827	653	382	45	12.10	6.86	1.05
Total for Forbs		827	927	498	196	14.75	7.24	1.52

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

BROWSE TRENDS --

Management unit 08B, Study no: 3

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Artemisia tridentata vaseyana</i>	88	9	8	14.65	1.29	.80
B	<i>Ceanothus fendleri</i>	0	1	1	-	.18	-
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	25	21	13	.75	.20	.15
B	<i>Gutierrezia sarothrae</i>	3	4	9	-	.21	.36
B	<i>Juniperus osteosperma</i>	0	0	0	.15	-	-
B	<i>Pediocactus simpsonii</i>	10	6	1	.01	.02	-
B	<i>Purshia tridentata</i>	6	1	1	2.59	.01	-
B	<i>Tetradymia canescens</i>	4	1	4	.03	.00	.33
Total for Browse		136	43	37	18.19	1.91	1.64

CANOPY COVER, LINE INTERCEPT --

Management unit 08B, Study no: 3

Species	Percent Cover
	'05
<i>Artemisia tridentata vaseyana</i>	.43
<i>Chrysothamnus viscidiflorus lanceolatus</i>	.30
<i>Gutierrezia sarothrae</i>	.23
<i>Purshia tridentata</i>	.06
<i>Tetradymia canescens</i>	.08

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 08B, Study no: 3

Species	Average leader growth (in)
	'05
<i>Artemisia tridentata vaseyana</i>	1.8

BASIC COVER --

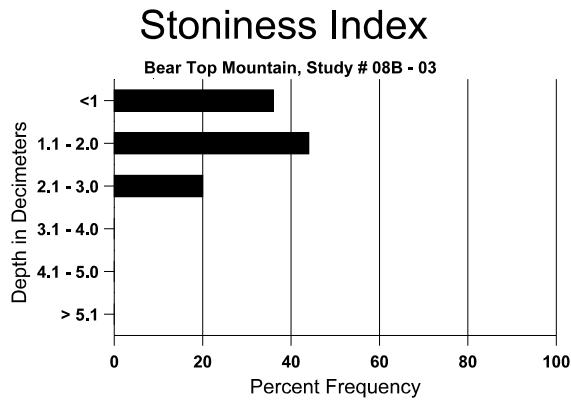
Management unit 08B, Study no: 3

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	12.00	12.00	38.31	27.03	42.22
Rock	1.00	4.75	11.07	13.54	11.35
Pavement	0	0	.04	.57	.02
Litter	58.25	59.75	46.33	23.65	38.11
Cryptogams	2.25	4.50	3.25	.76	.18
Bare Ground	26.50	19.00	16.85	49.63	16.60

SOIL ANALYSIS DATA --

Herd Unit 8B, Study # 3, Study Name: Bear Top Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
10.4	57.2 (10.9)	6.8	65.4	19.7	14.9	2.2	4.5	201.6	0.9



PELLET GROUP DATA --

Management unit 08B, Study no: 3

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	3	6	26
Moose	-	15	-
Grouse	-	2	2
Elk	7	5	14
Deer	16	5	5
Cattle	-	-	1
Marmot	-	-	-
Antelope	-	4	1

Days use per acre (ha)	
'00	'05
-	-
16 (39)	-
9/acre	9/acre
7 (18)	29 (71)
-	7 (18)
-	-
-	200/acre
24 (60)	-

BROWSE CHARACTERISTICS --
Management unit 08B, Study no: 3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	13/21
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Artemisia tridentata vaseyana</i>												
82	6266	66	1533	4200	533	-	21	1	9	-	2	15/24
88	9065	-	2533	4266	2266	-	42	1	25	-	2	16/18
95	5200	40	640	4000	560	380	33	60	11	4	4	15/29
00	320	20	-	180	140	60	38	0	44	6	6	12/29
05	240	140	80	80	80	1060	17	50	33	8	8	12/26
<i>Ceanothus fendleri</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	0	0	-	-	0	8/18
05	20	-	-	20	-	-	0	0	-	-	0	5/18
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
82	2332	66	1066	866	400	-	0	0	17	-	17	8/12
88	3533	-	2000	1133	400	-	8	2	11	-	9	9/11
95	940	-	40	880	20	-	0	0	2	-	0	10/15
00	880	-	300	580	-	-	0	0	0	-	0	4/5
05	360	-	-	360	-	-	0	0	0	-	0	9/14
<i>Gutierrezia sarothrae</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	66	-	-	66	-	-	0	0	0	-	0	5/6
95	60	-	20	40	-	-	0	0	0	-	0	4/4
00	140	-	-	140	-	-	0	0	0	-	0	6/13
05	520	-	100	400	20	-	0	0	4	-	0	7/12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	220	-	20	200	-	-	0	0	0	-	0	2/3
00	160	20	40	100	20	-	0	0	13	13	13	2/16
05	20	-	-	20	-	-	0	0	0	-	0	1/2
Purshia tridentata												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	120	-	-	120	-	-	33	50	-	-	0	20/78
00	20	40	-	20	-	-	0	0	-	-	0	4/9
05	20	-	-	20	-	-	0	100	-	-	0	11/39
Tetradymia canescens												
82	199	-	-	66	133	-	0	0	67	-	67	17/8
88	133	-	-	133	-	-	100	0	0	-	0	13/18
95	120	-	-	100	20	-	0	0	17	-	0	10/13
00	80	-	-	80	-	20	0	0	0	-	0	-/-
05	80	-	20	60	-	-	0	0	0	-	0	8/16

Trend Study 8B-4-05

Study site name: Greendale.

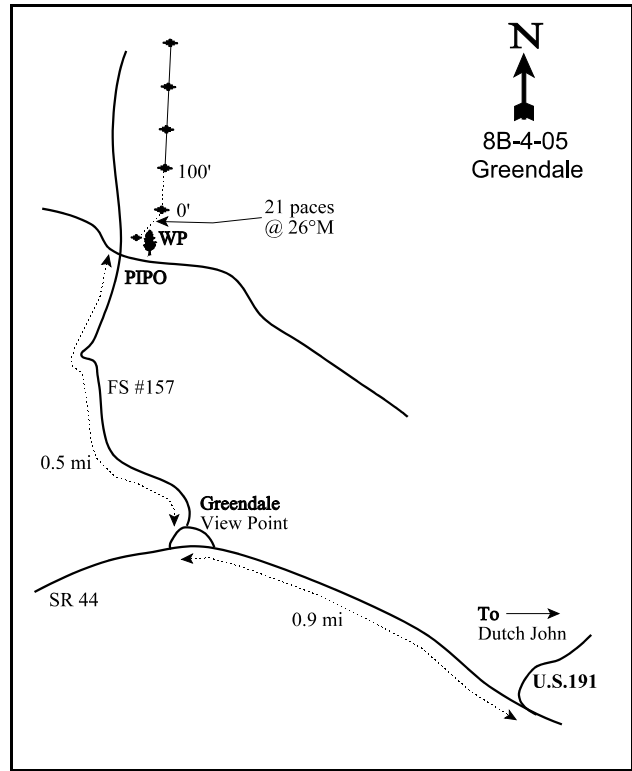
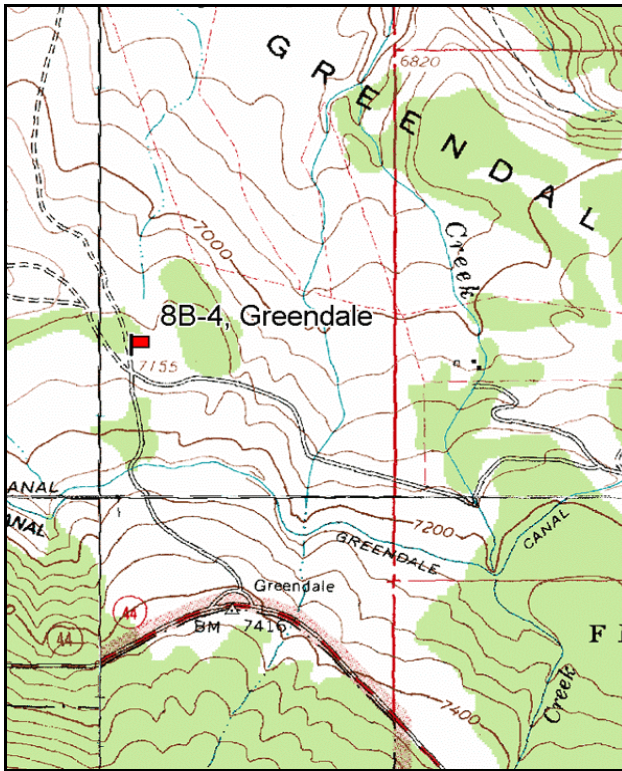
Vegetation type: Mountain Big Sagebrush.

Compass bearing: frequency baseline 347 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of Highways U-44 and U.S. 191, proceed towards Manilla for 0.9 miles. Turn off at the Greendale view point. Take the dirt road (FS 157) to the north which goes to the Canyon Rim trail. Go 0.5 miles to an intersection. From the Ponderosa pine northeast of the intersection, walk 21 paces at 26°M to the 0' stake.



Map Name: Dutch John

Diagrammatic Sketch

Township 2N, Range 21E, Section 25

GPS: NAD 27, UTM 12T 4526160 N, 626500 E

DISCUSSION

Greendale - Trend Study No.8B-4

The Greendale study samples a sagebrush/grass park surrounded by ponderosa pine forest at 7,100 feet in elevation. The site has a slope of 5-8% with a north aspect. The area is classified as deer and elk winter range, but depending on the weather, it actually receives year-round use by big game. Pellet group data from 2000 estimated 62 elk and 28 deer days use/acre (153 edu/ha and 69 ddu/ha). In 2005, pellet group data estimated 25 elk and 96 deer days use/ acre (61 edu/ha and 237 ddu/ha). This area is also used by rabbits and a few moose (see pellet group table). Cattle also graze the area at a level of 13.4 suitable acres per AUM from June 1 to September 30. Livestock use was estimated at 10 cow days use/acre (25 cdu/ha) in 2000, and decreased to 4 cow days use/acre (9 cdu/ha) in 2005.

Soil on the site is relatively deep with gravel and rock uncommon on the surface and evenly dispersed throughout the profile. The effective rooting depth is estimated at nearly 20 inches. It has a sandy clay loam texture and is slightly acidic (pH of 6.3). Phosphorus was measured at 3.3 ppm. Values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Erosion is minimal due to the level terrain and the abundance of vegetation and litter cover. Percent cover for bare ground has remained fairly stable since 1995. The erosion condition class determined soil movement as stable in 2005.

The key browse species on the site are mountain big sagebrush and antelope bitterbrush. Sagebrush is more numerous and provides the majority of the browse cover. Sagebrush density has remained above 4,000 plants/acre since 1995. Use has varied from light to moderate. Percent decadency was relatively low before 2000 (19% in 1982 to 6% in 1995), but increased to 29% in 2000 and 2005 due to drought conditions. Approximately 6% of the plants sampled in 2000 were classified as dying, which increased to 10% by 2005. Previous to 2005, the percentage of young individuals (11%) was higher than the number dying (6%), but in 2005 the number of plants classified as dying (10%) outnumbered the number of young recruits (5%).

Bitterbrush contributed 15% of the total browse cover in 1995, increased to 23% in 2000, and decreased slightly to 20% in 2005. Bitterbrush density has remained stable since 1995 between 1,200 and 1,600 plants/acre. Use was moderate in 1995 and 2000 and heavy in 2005. Percent decadence has remained low and vigor normal on most plants from 1982 until 2000. The estimated percentage of dying individuals has increased from 3% in 2000 to 10% 2005. The percentage of plants classified as dying was slightly higher than the number of young for the first time in 2005.

The low growing Fendler ceanothus is also abundant and contributed 25% of the total browse cover in 1995, 15% in 2000, and 10% in 2005. Although the percent of total browse has decreased, the number of plants has increased. It increased from 780 plants/acre in 1995 to 900 plants/acre in 2000, to 2,560 in 2005. It is a short statured plant with an average height between 5 and 9 inches, yet it has a crown of 3½ to 4 feet. It is capable of producing good quantities of forage in the winter if the snows are not too deep. There appeared to be light to light-moderate use on this shrub. In 2005, when the stature of the shrub was at its shortest average height, there had been an increase in the use of this shrub.

Other browse growing on the site include: mountain low rabbitbrush, snakeweed, Oregon grape, Wood's rose and snowberry. These species show little or no utilization. Ponderosa pine surrounds the site and a few mature and young trees are scattered through the open sagebrush park. Point-center quarter data from 2000 estimated 21 trees/acre with an average diameter of 3.4 inches and had increased to 35 trees/acre with an average diameter of 5.9 inches in 2005. Overhead canopy cover of averaged 2% directly on the site in 2000 and increased to 3% in 2005.

The herbaceous understory is diverse and abundant with grasses and forbs combining to produce 49% of the total vegetation cover in 1995, 58% in 2000, and 50% in 2005. The dominant grass is Kentucky bluegrass which provided 37% of the total grass cover in 1995, 60% in 2000, and 22% in 2005. It forms a dense sod over much of the area which tends to exclude other native grass and forb species. The only other common grass species is needle-and-thread, which made up 21% of the herbaceous understory in 2005.

Forbs are diverse and produced as much cover as grasses in 1995, with 32 perennial and 4 annual species being encountered. Forb cover decreased in 2000 while grasses increased, then returned to near 1995 percentages in 2005. Sum of nested frequency for forbs and grasses both declined in 2000, due primarily to drought, but increased somewhat in 2005. The most numerous perennial forbs include: arrowleaf balsamroot, pussytoes and rock goldenrod. Two annual forbs, slenderleaf collomia and littleflower collinsia were abundant in 1995, but due to the dry conditions in 2000, they declined significantly and remained low in 2005.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable with little evidence of extensive soil movement. The vegetation cover is irregular and somewhat unevenly spaced but quite dense where it occurs. Vegetation trend also appears stable, although open to more question. Shrub density could be better, especially among the more preferred species which show relatively heavy levels of use. Undesirable shrubs are not currently abundant and show few signs of rapid increase. Grasses and forbs are fairly dense and may inhibit, to some extent, shrub reproduction.

1988 TREND ASSESSMENT

Vegetation and litter cover remain excellent, providing adequate ground cover, yet the data shows an increase in the proportion of pavement and rock cover. As a result, bare soil decreased from 36% to 25%. Aside from rather significant soil loss from the roads and a nearby large gully, soil erosion is not a problem on the well-vegetated study site. Trend for soil is slightly improved. The browse trend is also up for the preferred species, mountain big sagebrush and bitterbrush. Densities have increased, percent decadency is low, vigor is generally good, and reproduction is excellent. Trend for the herbaceous understory is up with an increase in the quadrat frequency of perennial grasses and forbs.

TREND ASSESSMENT

soil - slightly up (+1)

browse - up (+2)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Ground cover characteristics continue to improve with percent bare ground declining from 25% to 17%. Litter cover has also increased slightly. Herbaceous plants make up 50% of the vegetation cover, further protecting the soil from erosion. Soil trend is slightly up. The browse trend is improving for mountain big sagebrush due to increased density, good vigor, low percent decadency, and good recruitment. Trend for bitterbrush is stable due to reduced use, good vigor, and a reduction in an already low percent decadency. Overall, trend for browse is stable. Trend for the herbaceous understory is also up due to a large increase in sum nested frequency for perennial grasses and forbs. The Desirable Components Index rated this site as excellent with a score of 83 due to good perennial grass cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - slightly up (+1)

browse - stable (0)

herbaceous understory - up (+2)

winter range condition (DC Index) - excellent (83) Moderate Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Percent cover of vegetation and litter have moderately increased while percent cover of bare ground continues to slightly decrease. This has resulted in an improvement in the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground from 2.9:1 to 4.1:1. Herbaceous cover has also increased from 27% to 35% since 1995. There is no significant erosion occurring on the site. Trend for the key browse species, mountain big sagebrush and bitterbrush, are stable. Sagebrush shows only light to moderate use but percent decadence has increased from 6% to 29% due to drought. Vigor continues to be normal on most plants and recruitment from young plants is currently relatively good at 11%. Bitterbrush is moderately browsed, in good vigor, and has low decadency. Trend for the herbaceous understory is down and still dominated by Kentucky bluegrass. Sum of nested frequency for perennial grasses and forbs have declined. Kentucky bluegrass currently provides 85% of the grass cover and 60% of the herbaceous cover. It actually increased significantly in nested frequency and nearly doubled in cover. Nested frequency of thickspike wheatgrass, orchardgrass, prairie Junegrass, Sandberg bluegrass, and bottlebrush squirreltail declined significantly, but they were never very abundant. Nested frequency of perennial forbs declined slightly while frequency of the annual forbs, slenderleaf collomia and littleflower collinsia, declined significantly due to the dry conditions. The Desirable Components Index rated this site as excellent to good with a score of 82 due to good perennial grass cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - excellent to good (82) Moderate Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. Percent vegetation and litter cover are down and bare ground has increased. This resulted from a decrease in the ratio of protective ground cover (vegetation, litter, and cryptogamic crust) to bare soil from 4.1:1 to 3.2:1. This decrease is due to decreases in the nested frequencies of litter and cryptogamic crust and increases in bare soil. Despite this decline in vegetation and evidences of minor erosion, the soil condition on the site has only decreased slightly. Browse trends for mountain big sagebrush and bitterbrush are stable overall. The sagebrush population is slightly down in numbers in 2005 (4800 plants/acre in 2000 to 4040 plants/acre in 2005, a 15% decrease), which includes the population of young plants (from 520 to 200 plants per acre, a 62% decrease). A slight increase of dying plants from 6% to 10% also contributes to the decrease in trend. The decrease in sagebrush numbers was countered by an increase in average crown size and an increase in total cover from 13 to 17%. The sagebrush contributes to over 60% of the palatable browse cover for the site. The browse trend for bitterbrush is slightly up, although percent decadency increased to 25%. Herbaceous understory trend is slightly up. The sum of the nested frequencies for perennial grasses and perennial forbs increased 13%. This increase came with substantial increases in nested frequency for both perennial grasses and forbs. The decrease in the percent cover of perennial grasses was a sole product of a decrease in Kentucky bluegrass, which decreased significantly. This bluegrass decrease allowed the increase of cover of every other species sampled on the site. The Desirable Components Index rated this site as excellent to good with a score of 80 due to good perennial grass cover, fair recruitment of shrubs, and low shrub decadence.

TREND ASSESSMENT

soil - slightly down (-1)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - excellent to good (80) Moderate Potential scale

HERBACEOUS TRENDS --

Management unit 08B, Study no: 4

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	_a 37	_b 110	_a 19	_a 22	.88	.12	.08
G	Agropyron spicatum	-	4	3	-	.03	.00	-
G	Agropyron trachycaulum	-	-	4	-	-	.03	-
G	Bromus tectorum (a)	-	5	-	3	.15	-	.03
G	Carex sp.	20	17	18	23	.08	.16	.65
G	Dactylis glomerata	_a -	_c 25	_{ab} 4	_{bc} 11	.07	.18	.22
G	Danthonia unispicata	-	-	1	-	-	.00	-
G	Koeleria cristata	_{ab} 18	_{ab} 18	_a 3	_b 28	.11	.03	1.07
G	Poa fendleriana	_a -	_b 28	_b 11	_c 66	.25	.08	.65
G	Poa pratensis	_b 303	_b 287	_c 352	_a 203	10.21	21.30	6.65
G	Poa secunda	_{ab} 8	_b 33	_a 11	_{ab} 23	.26	.04	.15
G	Sitanion hystrix	_b 54	_b 40	_a 3	_b 41	.28	.00	.51
G	Stipa comata	_a 36	_b 82	_b 82	_c 154	.97	3.17	6.43
G	Stipa lettermani	1	-	-	11	-	-	.05
Total for Annual Grasses		0	5	0	3	0.15	0	0.03
Total for Perennial Grasses		477	644	511	582	13.18	25.17	16.48
Total for Grasses		477	649	511	585	13.33	25.17	16.52
F	Achillea millefolium	_a -	_a 1	_b 11	_{ab} 9	.00	.09	.18
F	Agoseris glauca	_a -	_b 27	_a -	_b 41	.09	-	.23
F	Allium sp.	_a -	_c 46	_a -	_b 15	.18	-	.04
F	Antennaria rosea	_a 6	_b 37	_b 35	_b 38	1.11	.92	1.43
F	Arabis sp.	_a -	_{ab} 5	_a 2	_b 13	.01	.00	.03
F	Artemisia ludoviciana	-	-	4	-	-	.18	-
F	Aster chilensis	_a 4	_{ab} 24	_{ab} 17	_b 26	.26	.32	.93
F	Astragalus sp.	-	-	2	-	-	.00	-
F	Balsamorhiza sagittata	_a 8	_b 57	_b 59	_b 62	3.67	3.95	5.40
F	Calochortus nuttallii	-	7	-	3	.01	-	.00
F	Castilleja sp.	-	1	-	-	.00	-	-
F	Collomia linearis (a)	-	_b 195	_a 3	_a 18	1.56	.00	.05
F	Comandra pallida	54	72	66	67	.39	.65	.66

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Collinsia parviflora</i> (a)	-	_c 255	_a 3	_b 67	2.95	.01	.21
F	<i>Crepis acuminata</i>	-	-	-	2	-	-	.03
F	<i>Cymopterus longipes</i>	8	16	19	20	.66	.07	.05
F	<i>Eriogonum alatum</i>	_b 45	_a 6	_a 4	_a 6	.07	.01	.31
F	<i>Erigeron divergens</i>	_b 28	_a -	_a -	_a -	-	-	-
F	<i>Erigeron eatonii</i>	_a 12	_a 11	_b 28	_{ab} 8	.02	.45	.04
F	<i>Erigeron flagellaris</i>	_a -	_a 3	_b 36	_b 38	.03	.93	1.16
F	<i>Eriogonum umbellatum</i>	6	6	4	6	.03	.15	.21
F	<i>Gayophytum ramosissimum</i> (a)	-	2	-	1	.00	-	.00
F	<i>Heterotheca villosa</i>	_c 110	_b 39	_{ab} 17	_a 4	.29	.46	.48
F	<i>Holosteum umbellatum</i> (a)	-	-	1	2	-	.03	.00
F	<i>Ipomopsis aggregata</i>	-	-	7	2	.00	.01	.03
F	<i>Lepidium</i> sp. (a)	-	_{ab} 5	_a -	_b 15	.01	-	.05
F	<i>Linum lewisii</i>	40	35	35	39	.10	.24	.21
F	<i>Lithospermum ruderales</i>	_a -	_{ab} 2	_b 12	_b 9	.03	.10	.37
F	<i>Lupinus argenteus</i>	1	-	-	-	-	-	-
F	<i>Lychnis drummondii</i>	-	-	-	5	-	-	.01
F	<i>Microsteris gracilis</i> (a)	-	_a -	_a -	_b 15	-	-	.04
F	<i>Oenothera pallida</i>	_b 26	_a 6	_a -	_a 5	.01	-	.03
F	<i>Penstemon humilis</i>	_a 2	_b 18	_{ab} 9	_a -	.14	.04	-
F	<i>Penstemon</i> sp.	-	-	-	1	-	-	.03
F	<i>Petrorhiza pumila</i>	_b 40	_{ab} 27	_{ab} 23	_a 17	.92	1.00	1.19
F	<i>Phlox hoodii</i>	_a -	_b 8	_{ab} 3	_a -	.51	.00	-
F	<i>Phlox longifolia</i>	-	7	6	-	.01	.04	-
F	<i>Phlox</i> sp.	_a -	_b 21	_a -	_a -	.03	-	-
F	<i>Polygonum douglasii</i> (a)	-	_b 51	_a 14	_b 36	.19	.03	.11
F	<i>Sedum lanceolatum</i>	_c 23	_{bc} 13	_a -	_{ab} 7	.02	-	.04
F	<i>Solidago sparsiflora</i>	_b 17	_b 27	_b 10	_a -	.51	.24	-
F	<i>Taraxacum officinale</i>	_a -	_b 11	_{ab} 6	_a -	.05	.01	-
F	<i>Tragopogon dubius</i>	5	8	5	6	.02	.04	.03
F	<i>Trifolium gymnocarpon</i>	_a -	_{bc} 10	_{ab} 6	_c 22	.03	.02	.13
F	<i>Zigadenus paniculatus</i>	-	3	-	6	.00	-	.06
Total for Annual Forbs		0	508	21	154	4.72	0.08	0.48
Total for Perennial Forbs		435	554	426	477	9.28	10.01	13.39
Total for Forbs		435	1062	447	631	14.00	10.09	13.88

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

BROWSE TRENDS --

Management unit 08B, Study no: 4

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	0	1	1	-	.38	.85
B	Artemisia tridentata vaseyana	84	90	86	14.17	13.44	16.73
B	Ceanothus fendleri	23	32	38	6.81	3.92	3.00
B	Chrysothamnus viscidiflorus lanceolatus	26	21	23	.71	.33	.72
B	Gutierrezia sarothrae	3	1	3	.03	.15	.15
B	Mahonia repens	10	13	13	.45	.16	.22
B	Pinus ponderosa	0	2	3	-	1.23	2.11
B	Purshia tridentata	52	46	49	3.98	6.00	5.82
B	Rosa woodsii	2	0	0	-	-	-
B	Symphoricarpos oreophilus	4	2	3	.79	.21	.21
Total for Browse		204	208	219	26.97	25.85	29.83

CANOPY COVER, LINE INTERCEPT --

Management unit 08B, Study no: 4

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	-	.68
Artemisia tridentata vaseyana	-	19.70
Ceanothus fendleri	-	4.50
Chrysothamnus viscidiflorus lanceolatus	-	.91
Gutierrezia sarothrae	-	.01
Mahonia repens	-	.26
Pinus ponderosa	2.40	2.83
Purshia tridentata	-	7.59
Symphoricarpos oreophilus	-	1.04

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 08B, Study no: 4

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	2.3
Purshia tridentata	2.8

POINT-QUARTER TREE DATA --
Management unit 08B, Study no: 4

Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Pinus ponderosa	21	35	3.4	5.9

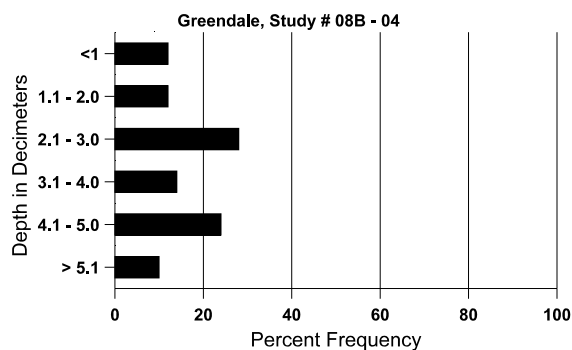
BASIC COVER --
Management unit 08B, Study no: 4

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	9.25	10.75	46.69	59.22	53.50
Rock	2.25	4.00	2.57	1.79	1.85
Pavement	0	7.00	1.43	1.28	1.60
Litter	51.25	53.25	55.45	65.27	36.88
Cryptogams	1.25	0	.57	.75	.12
Bare Ground	36.00	25.00	16.99	11.93	21.40

SOIL ANALYSIS DATA --
Herd Unit 8B, Study # 4, Study Name: Greendale

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
19.9	56.2 (18.1)	6.3	61.4	21.7	16.9	2.5	3.3	227.2	0.6

Stoniness Index



PELLET GROUP DATA --
 Management unit 08B, Study no: 4

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	-	11	20
Elk	2	6	8
Deer	8	35	56
Cattle	1	3	2

Days use per acre (ha)	
'00	'05
-	-
62 (152)	25 (61)
28 (69)	96 (236)
10 (25)	4 (9)

BROWSE CHARACTERISTICS --
 Management unit 08B, Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	29/45
00	20	-	-	20	-	-	0	0	-	-	0	26/35
05	20	-	-	20	-	-	0	100	-	-	0	32/41
<i>Artemisia tridentata vaseyana</i>												
82	1733	133	-	1400	333	-	12	0	19	-	0	24/31
88	4400	866	1400	2400	600	-	38	5	14	-	0	26/26
95	4440	20	520	3660	260	220	60	12	6	1	1	19/30
00	4800	-	520	2880	1400	400	35	2	29	6	6	19/27
05	4040	780	200	2660	1180	660	38	23	29	10	10	23/34
<i>Ceanothus fendleri</i>												
82	66	-	66	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	780	-	-	780	-	-	0	0	0	-	0	9/49
00	900	-	80	820	-	-	0	0	0	-	0	8/37
05	2560	-	360	2180	20	-	34	5	1	-	0	5/12
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
82	400	-	-	400	-	-	0	0	0	-	0	10/9
88	466	-	-	466	-	-	0	0	0	-	0	12/10
95	840	-	40	800	-	20	2	0	0	-	0	14/16
00	620	-	20	580	20	-	0	0	3	-	0	10/12
05	620	-	100	500	20	-	0	0	3	-	0	12/15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	66	-	-	66	-	-	0	0	-	-	0	6/10
95	80	-	-	80	-	-	0	0	-	-	0	7/7
00	40	-	-	40	-	-	0	0	-	-	0	-/-
05	120	-	-	120	-	-	0	0	-	-	0	8/9
Mahonia repens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	4880	-	-	4880	-	-	0	0	-	-	0	3/4
00	1740	-	1420	320	-	-	0	0	-	-	0	2/2
05	1020	-	340	680	-	-	0	0	-	-	0	3/4
Pinus ponderosa												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	60	-	20	40	-	-	0	0	-	-	0	-/-
05	60	20	-	60	-	-	0	0	-	-	0	-/-
Purshia tridentata												
82	1399	-	66	1333	-	-	86	14	0	-	0	22/26
88	2198	-	466	1466	266	-	42	27	12	-	12	19/25
95	1240	40	100	1140	-	40	81	8	0	-	0	14/33
00	1380	20	120	1120	140	-	51	1	10	3	3	17/35
05	1580	40	180	1000	400	20	15	81	25	10	10	15/34
Rosa woodsii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	180	20	160	20	-	-	0	0	-	-	0	7/8
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	13/13
Symphoricarpos oreophilus												
82	66	-	-	66	-	-	0	0	-	-	0	9/17
88	66	-	-	66	-	-	0	0	-	-	0	10/19
95	100	-	-	100	-	-	0	0	-	-	0	17/53
00	40	-	20	20	-	-	0	0	-	-	0	20/66
05	80	-	-	80	-	-	0	0	-	-	0	20/50

Trend Study 8B-5-05

Study site name: Bennett Ranch .

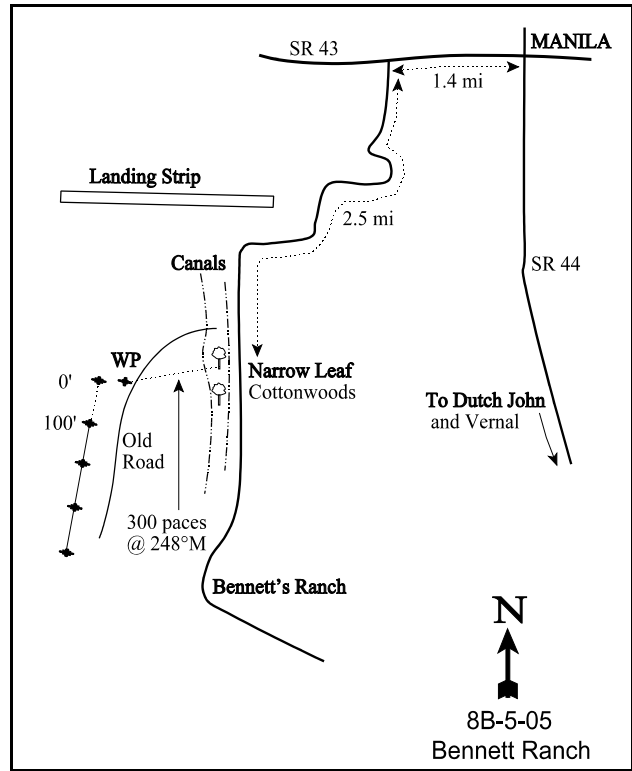
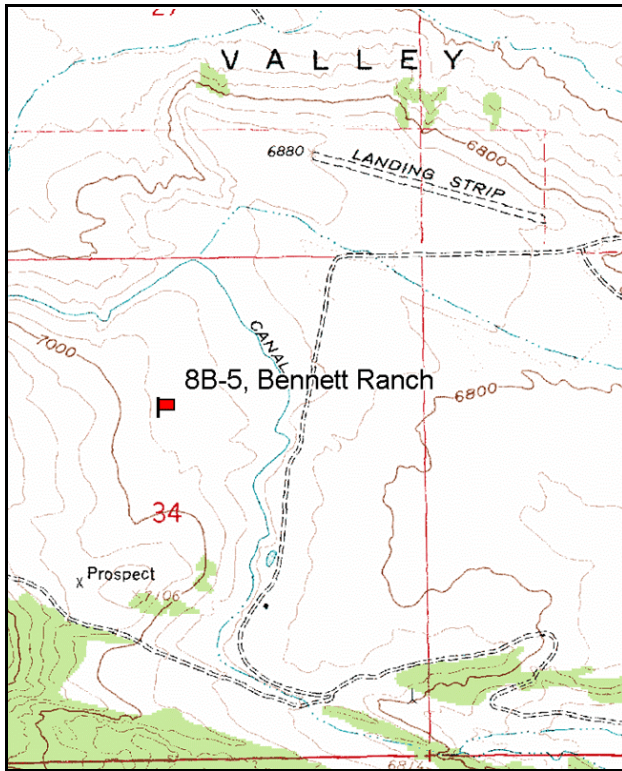
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 200 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of Highway U-43 and Main Street in Manila, proceed west on U-43 for 1.4 miles to a dirt road (Bennion Lane) on the left. Turn south and go 2.5 miles to a narrowleaf cottonwood on the right (west) side of the road. From the cottonwood, the 0-foot baseline stake is 300 paces away at a bearing of 234°M.



Map Name: Jessen Butte

Diagrammatic Sketch

Township 3N, Range 19E, Section 34

GPS: NAD 27, UTM 12T 4534195 N, 603525 E

DISCUSSION

Bennett Ranch - Trend Study No. 8B-5

This trend study is located on Bennett Ranch property which is privately owned. It samples a Wyoming big sagebrush community, located at the base of Jessen Butte and above the irrigated hay fields and pastures near Manila. The slope is 5-10% with a northeast-facing aspect and an elevation of approximately 6,920 feet. The area is used by cattle and wintering deer and elk. Pellet group data from 2000 estimated 14 elk, 9 deer, and 6 cow days use/acre (35 edu/ha, 22 ddu/ha and 15 cdu/ha). In 2005, pellet group data estimated 31 elk, 22 deer, and 11 cow days use/acre (78 edu/ha, 55 ddu/ha, and 27 cdu/ha). Deer and cattle use appears to have been much heavier in 1995, due to the substantially higher quadrat frequencies of pellet groups (see pellet group table). The site is located about 400 yards from an irrigation ditch.

Soils are relatively shallow, alluvially deposited, and rocky on the surface and throughout the profile. Rooting depth is restricted in some areas as evidenced by the abundance of black sagebrush. Effective rooting depth is estimated at less than 9 inches. Soil texture is a sandy clay loam with a neutral pH (7.1). Phosphorus was 6 ppm, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Ground cover is typical for a Wyoming big sagebrush site with a moderately high percentage of bare ground. Some erosion has been occurring on the site but it is not serious due to the shallow slope. The erosion condition class determined soil movement as stable in 2005.

The key browse included Wyoming big sagebrush and black sagebrush, which together have provided over 84% of the browse cover since 1995. Wyoming big sagebrush provided 63% of the shrub cover with density estimates of 6,080 plants/acre in 1995, 68% of the shrub cover with 5,260 plants/acre in 2000, and 58% of the shrub cover with 4,960 plants/acre in 2005. These shrubs have been moderately to heavily utilized since the readings in the 1980's. Poor vigor has fluctuated from 4% of the population to the high of 32% in 2005. Decadence increased from 7% in 1995 to 39% in 2000, and 40% in 2005. No seedlings were encountered in 2000 with young plants accounting for only 2% of the population. In 2005, only 40 seedlings/acre were estimated and only 3% of the population was classified as young. As a result, the population of Wyoming big sagebrush appeared to be in a state of decline. Due to the limited effective rooting depth of the soil, this is a marginal site for Wyoming big sagebrush. Sagebrush sampled during the very dry summers from 1999 to 2004 produced very small leaves with few seed heads. Many of the plants were dropping leaves to conserve water.

Black sagebrush population has fluctuated some as well over the years. In 1995, the population was estimated to be 2,760 plants/acre, 4,060 in 2000, and 3,720 in 2005. The plants are relatively small, averaging only about 7 inches in height with a crown diameter of about 17 inches. Use has been light to moderate since 1982 with normal vigor for most plants. Other preferred browse encountered on the site included small numbers of winterfat, white rubber rabbitbrush and slenderbush eriogonum. Pinyon pine and Utah juniper are in early stages of encroachment on the site.

Grasses and forbs were quite diverse for a Wyoming big sagebrush site. Grasses combined to produce about 8% total cover in 1995 and 2000, while forbs made up about 5% cover. In 2005, grasses had increased slightly to 6% total cover and forbs made up 4%. Dominant grasses included: thickspike wheatgrass, muttongrass, Sandberg bluegrass, bottlebrush squirreltail and needle-and-thread grass. The only abundant forbs included Hood's phlox and scarlet globemallow. Utilization of the grasses has been heavy in the past but there was no apparent use observed in 2000 and 2005.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable to declining. It is fortunate that this site occurs on nearly level terrain, otherwise erosion and soil loss could be much greater. The condition of vegetation is rather poor due to heavy browsing. Trend is difficult to judge but it is considered slightly downward at this time. The herbaceous understory is obviously depleted but it is not immediately apparent if the shrub density is also declining.

1988 TREND ASSESSMENT

An increase in most ground cover components was noted in 1988. The percentage of bare soil decreased from 34% in 1982 to 24%. There is some soil movement in the bare interspaces. A healthier herbaceous understory would do much to help limit erosion on the gentle slope. Trend for soil is slightly up. Trend for black sagebrush and Wyoming big sagebrush is up with increased densities, reduced heavy use, and improved vigor. Trend for the herbaceous understory is also up slightly due to increased quadrat frequency of grasses and forbs.

TREND ASSESSMENT

soil - slightly up (+1)

browse - up (+2)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

Percent litter cover has declined slightly as has percent bare ground. The soil trend is considered stable at this time. Trend for Wyoming big sagebrush is slightly up due to decreased heavy use, improved vigor, good recruitment, and a low decadency rate of only 7%. The population density has declined since 1988 but this decline came mostly from the decadent age class. The number of mature plants has increased. Black sagebrush is of secondary importance on this site. It displays a stable trend but produces little forage due to its small size. The herbaceous understory has a slightly downward trend. Sum of nested frequency of perennial grasses and forbs declined slightly. The Desirable Components Index rated this site as excellent with a score of 75 due to good perennial grass cover, excellent browse cover, and good shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - excellent (75) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil continues to be stable. Percent cover of bare ground increased slightly while cover from litter declined slightly. However, percent cover of vegetation has increased and the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground has improved. Trend for the key browse species, Wyoming big sagebrush, is slightly down. Density has declined and poor vigor and percent decadence have increased. In addition, 21% of the population was classified as dying. Reproduction is poor with no seedlings sampled and young plants account for only 2% of the population. It appears that the restricted rooting depth of the shallow soil makes this a marginal site for Wyoming big sagebrush at these densities during dry years. In contrast, black sagebrush, which is adapted to more shallow soils, has a stable trend. It displays light to moderate use, good vigor and low decadence. Since Wyoming big sagebrush provides 68% of the browse cover and the majority of the available forage (with winter snow cover), the browse trend is considered slightly down at this time. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial

grasses and forbs declined slightly but not enough to warrant a downward trend. The most dominant grasses, thickspike wheatgrass, mutton bluegrass and needle-and-thread, did not change significantly in nested frequency. The Desirable Components Index rated this site as good to excellent with a score of 75 due to good perennial grass cover, excellent browse cover, and fair shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - good to excellent (64) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained virtually unchanged. The overall trend for the key browse species Wyoming big sagebrush and black sagebrush is stable. Both Wyoming big sagebrush and black sagebrush decreased slightly in density, but these changes in density were not enough to bring down the trend. The percentage of dying individuals increased from 21% to 32% and the recruitment of young individuals is only 3%. The trend for herbaceous understory is stable. The low average total cover of forbs and grasses are down slightly, but the sum of the nested frequency of perennial grasses and perennial forbs has slightly increased. The dominant grasses and forbs all showed a decrease in cover, but the nested frequency for these species remained stable. The decrease in grass and forb growth may be due to a slow recovery from the drought which ended in 2004. The Desirable Components Index rated this site as good to excellent with a score of 58 due to fair perennial grass cover, excellent browse cover, and fair shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - good (58) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 08B, Study no: 5

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	1	-	-	-	-	-	-
G	Agropyron dasystachyum	_a 209	_{ab} 220	_b 247	_a 201	2.75	3.98	1.40
G	Agropyron intermedium	-	-	3	5	-	.03	.09
G	Hilaria jamesii	-	-	3	-	-	.00	-
G	Koeleria cristata	_b 47	_a 19	_a 7	_b 42	.11	.07	.55
G	Oryzopsis hymenoides	_{ab} 24	_b 35	_a 14	_{ab} 31	.43	.19	.26
G	Poa fendleriana	_b 177	_a 47	_a 81	_a 46	.88	1.50	.45
G	Poa secunda	68	71	61	92	.74	.46	1.13
G	Sitanion hystrix	_a 40	_b 81	_a 17	_a 20	1.36	.38	.14
G	Stipa comata	_{ab} 111	_{ab} 104	_a 87	_b 142	1.99	1.93	1.87

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
	Total for Annual Grasses	0	0	0	0	0	0	0
	Total for Perennial Grasses	677	577	520	579	8.27	8.57	5.92
	Total for Grasses	677	577	520	579	8.27	8.57	5.92
F	<i>Agoseris glauca</i>	a-	a-	b12	a-	-	.02	-
F	<i>Arabis</i> sp.	ab4	b16	a-	ab9	.03	-	.02
F	<i>Astragalus</i> sp.	3	-	1	-	-	.00	-
F	<i>Calochortus nuttallii</i>	ab7	ab6	a-	b8	.01	-	.02
F	<i>Castilleja</i> sp.	-	-	4	-	-	.04	-
F	<i>Chaenactis douglasii</i>	a-	a1	b17	a5	.00	.09	.04
F	<i>Chenopodium leptophyllum</i> (a)	-	b47	a-	a-	.10	-	-
F	<i>Cirsium</i> sp.	-	-	3	-	-	.00	-
F	<i>Crepis acuminata</i>	b16	ab12	a1	ab10	.04	.00	.07
F	<i>Cryptantha</i> sp.	a-	a-	a-	b12	-	-	.29
F	<i>Descurainia pinnata</i> (a)	ab13	b32	a2	a3	.16	.00	.01
F	<i>Erigeron pumilus</i>	-	4	3	4	.02	.01	.04
F	<i>Haplopappus acaulis</i>	-	-	3	6	-	.03	.18
F	<i>Hackelia patens</i>	-	-	-	3	-	-	.15
F	<i>Hymenoxys richardsonii</i>	b17	a1	ab7	ab8	.03	.09	.15
F	<i>Lesquerella alpina</i>	-	4	2	-	.03	.00	-
F	<i>Leucelene ericoides</i>	ab23	a5	b31	a15	.04	.38	.06
F	<i>Linum lewisii</i>	ab37	b62	a26	ab44	.21	.13	.28
F	<i>Machaeranthera canescens</i>	1	3	8	4	.18	.09	.06
F	<i>Penstemon humilis</i>	7	-	1	-	-	.03	-
F	<i>Physaria acutifolia</i>	-	-	1	-	-	.00	-
F	<i>Phlox hoodii</i>	c146	ab94	bc124	a91	2.59	2.97	1.78
F	<i>Senecio multilobatus</i>	-	-	4	-	-	.03	.00
F	<i>Sphaeralcea coccinea</i>	a80	b119	ab98	ab85	1.36	1.22	.90
F	<i>Townsendia incana</i>	7	-	-	-	-	-	-
F	Unknown forb-perennial	8	-	-	-	-	-	-
	Total for Annual Forbs	13	79	2	3	0.26	0.00	0.01
	Total for Perennial Forbs	356	327	346	304	4.57	5.19	4.08
	Total for Forbs	369	406	348	307	4.84	5.19	4.09

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

BROWSE TRENDS --

Management unit 08B, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia nova	46	51	55	5.64	4.62	6.93
B	Artemisia tridentata wyomingensis	97	94	92	16.11	16.09	15.63
B	Ceratoides lanata	8	7	5	.60	.04	.00
B	Chrysothamnus nauseosus hololeucus	1	0	0	.15	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	9	19	10	.33	.39	.56
B	Eriogonum microthecum	3	4	3	.03	.01	-
B	Gutierrezia sarothrae	25	61	70	.04	1.34	2.72
B	Juniperus osteosperma	0	0	0	.93	-	-
B	Opuntia sp.	30	41	41	1.58	1.11	1.14
B	Pediocactus simpsonii	0	0	1	-	-	-
B	Pinus edulis	0	0	0	-	.00	-
Total for Browse		219	277	277	25.44	23.62	27.01

CANOPY COVER, LINE INTERCEPT --

Management unit 08B, Study no: 5

Species	Percent Cover '05
Artemisia nova	10.71
Artemisia tridentata wyomingensis	16.35
Chrysothamnus viscidiflorus viscidiflorus	.26
Gutierrezia sarothrae	1.29
Opuntia sp.	.50

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 08B, Study no: 5

Species	Average leader growth (in) '05
Artemisia nova	0.7
Artemisia tridentata wyomingensis	0.9

POINT-QUARTER TREE DATA --
 Management unit 08B, Study no: 5

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	24	-
Pinus edulis	7	-

Average diameter (in)	
'00	'05
3.1	-
1.8	-

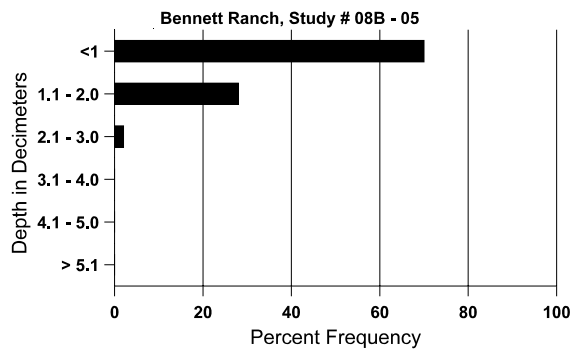
BASIC COVER --
 Management unit 08B, Study no: 5

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	3.00	6.75	32.09	41.79	32.27
Rock	5.50	9.00	9.55	5.67	6.74
Pavement	11.50	14.25	5.40	8.54	7.50
Litter	45.25	41.25	39.65	36.47	29.86
Cryptogams	.75	5.25	3.51	6.07	3.90
Bare Ground	34.00	23.50	21.24	29.50	35.99

SOIL ANALYSIS DATA --
 Herd Unit 8B, Study # 5, Study Name: Bennett Ranch

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
8.8	73.6 (10.2)	7.1	61.4	16.0	22.6	2.1	6.0	92.8	0.9

Stoniness Index



PELLET GROUP DATA --
 Management unit 08B, Study no: 5

Type	Quadrat Frequency		
	'95	'00	'05
Sheep	-	-	1
Rabbit	3	2	12
Elk	10	9	21
Deer	32	7	18
Cattle	10	3	3

Days use per acre (ha)	
'00	'05
-	-
-	-
14 (35)	32 (78)
9 (23)	22 (55)
6 (14)	11 (27)

BROWSE CHARACTERISTICS --
 Management unit 08B, Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	532	-	66	466	-	-	13	13	-	-	0	5/0
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia nova												
82	1933	-	133	1800	-	-	7	0	0	-	0	6/12
88	5466	800	1066	3200	1200	-	44	12	22	.73	5	7/14
95	2760	-	520	2220	20	20	27	4	1	.72	.72	7/20
00	4060	40	260	3480	320	20	11	4	8	3	3	6/15
05	3720	-	220	3200	300	160	0	0	8	6	6	8/23
Artemisia tridentata wyomingensis												
82	3932	-	66	3533	333	-	5	88	8	2	29	11/17
88	7133	666	933	3800	2400	-	43	31	34	3	17	13/16
95	6080	40	620	5020	440	280	56	25	7	2	4	14/27
00	5260	-	80	3120	2060	200	44	27	39	21	21	12/25
05	4960	40	160	2800	2000	840	37	49	40	32	32	16/27
Ceratoides lanata												
82	266	-	-	266	-	-	0	0	0	-	0	4/6
88	466	-	-	466	-	-	43	57	0	-	0	4/5
95	220	-	20	200	-	-	64	9	0	-	0	5/8
00	160	-	80	80	-	-	50	0	0	-	0	4/6
05	120	-	-	100	20	-	0	100	17	17	17	2/5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus hololeucus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	-	20	-	-	0	0	-	-	0	17/13
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	19/19
Chrysothamnus viscidiflorus viscidiflorus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	240	-	-	240	-	20	17	0	0	-	0	9/14
00	500	-	40	400	60	-	4	0	12	8	8	9/15
05	340	-	40	260	40	20	71	0	12	6	12	9/14
Eriogonum microthecum												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	140	-	-	140	-	-	0	0	-	-	0	4/7
00	80	-	20	60	-	-	0	0	-	-	0	4/7
05	80	-	-	80	-	-	0	0	-	-	0	3/3
Gutierrezia sarothrae												
82	3133	-	-	3133	-	-	0	0	0	-	0	5/5
88	7865	66	3533	4266	66	-	0	0	1	.25	.84	5/4
95	680	-	-	680	-	-	0	0	0	-	0	12/14
00	3300	20	80	3180	40	-	0	0	1	.60	.60	5/7
05	4060	60	40	3920	100	60	0	0	2	1	1	7/8
Opuntia sp.												
82	1000	-	-	1000	-	-	0	0	0	-	0	4/6
88	2132	66	666	1333	133	-	0	0	6	.93	13	3/5
95	860	-	20	840	-	-	9	0	0	-	0	4/15
00	1320	20	80	1220	20	-	0	0	2	-	0	4/11
05	1320	-	60	1060	200	-	2	0	15	3	3	4/10
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	2/3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	20	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 8B-6-05

Study site name: Death Valley .

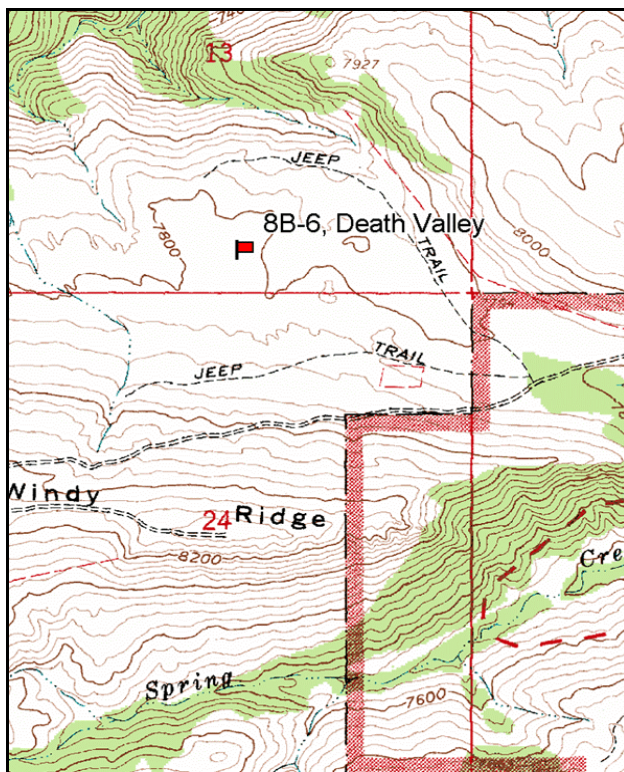
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 0'-100' 15 degrees magnetic and 100'-400' 289 degrees magnetic.

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

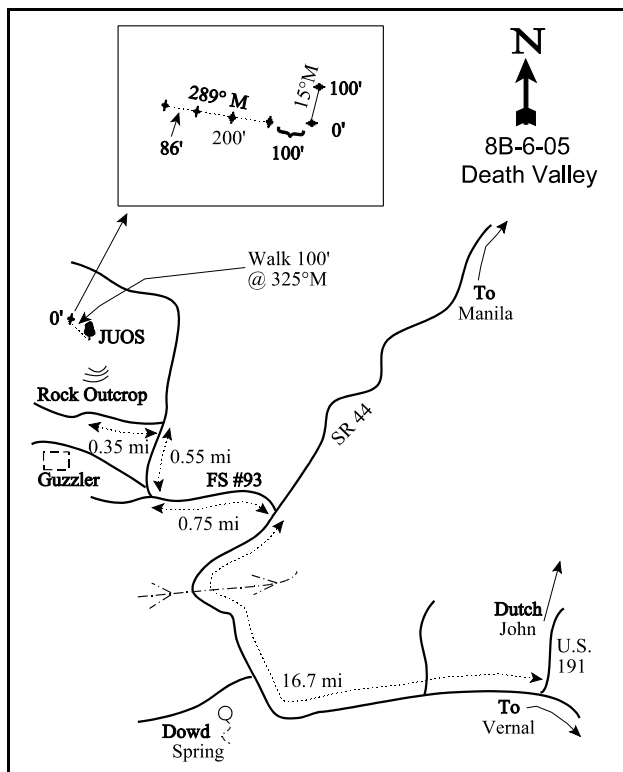
LOCATION DESCRIPTION

From the Dutch John turnoff on Highway U-44, proceed 16.7 miles north towards Manila. As you reach the summit before dropping down into Sheep Creek, there will be a dirt road to the left. Turn left on FS road #93 and drive west for 0.75 miles until you pass a grove of ponderosa pines. Turn to the right. The road forks again almost immediately, keep to the right and proceed 0.55 miles to another faint fork. Turn left and drive west 0.35 miles to the top of a small knoll. To the north, two rock outcroppings mark the highest point of the knoll. From the juniper on top, the 0-foot baseline stake is 100 feet away at a bearing of 325 °M.



Map Name: Manila

Township 2N, Range 19E, Section 13



Diagrammatic Sketch

GPS: NAD 27, UTM 12T 4528502 N, 606944 E

DISCUSSION

Death Valley - Trend Study No. 8B-6

This trend study is located on critical deer and elk winter range in Death Valley. Death Valley is a broad bench that drops off very rapidly towards Death Valley Creek to the north. It samples a sagebrush-mixed mountain brush range type at an elevation of 7,860 feet. The site has a gentle slope (3%-5%) with a west-northwest aspect. Deer and elk use the area heavily in the winter. Pellet group data estimated 48 elk and 58 deer use days/acre (143 ddu/ha and 119 edu/ha) in 2000. In 2005, pellet group data estimated 44 elk, 13 deer, 4 cow and 1 moose use days/acre (107 edu/ha, 33 ddu/ha, 9 cdu/ha, and 1 mdu/ha). Most of the pellet groups encountered appeared to be from winter use.

Soils are sandy and shallow with some rock outcrops in the area. Effective rooting depth was estimated at nearly 10 inches. Soil texture is a loamy sand with a neutral pH (6.9). Phosphorus was measured to be 2.5 ppm, when values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Erosion is not a problem due to the lack of slope, abundant well dispersed vegetation, and litter cover. The erosion condition class determined soil movement as stable in 2005.

The most important feature of this site is the browse composition. Ten species of shrubs were identified during the 1995 reading and 11 in 2000 and 2005. The key species are true mountain mahogany and mountain big sagebrush. Mahogany provided 59% of the total browse cover in 1995, 55% in 2000, and 51% in 2005. In the 1982 and 1988 samplings, the shrub density was underestimated. With the new, larger sample used in 1995, estimated mahogany density was 1,680 plants/acre. Vigor was generally good and percent decadence was low (2%), even though use was moderate to heavy. Density was estimated at 1,060 plants/acre in 2000 and increased to 1,200 in 2005. Use was moderate to heavy in 2000, but showed heavy use in 2005. Decadence had increased to 23% in 2000, then decreased to 12% in 2005. The percent of the population classified as dying increased from 1% in 1995 to 11% in 2000, then decreased to 3% in 2005. Until 2005, there were no dead plants in the study area, but 60 dead plants/acre were sampled in 2005. Recruitment on the site was poor in 2000, a decline after 1995, and was moderate in 2005.

Mountain big sagebrush accounted for 20% of the total browse cover in 1995, increased to 31% in 2000, and increased slightly again to 34% in 2005. Mountain big sagebrush had a fairly stable population of about 2,200 plants/acre until 2000, but the population declined in 2005 due to a decrease in decadent and young plants. Most plants were classified with light use in 1988, 1995, 2000, and 2005, with some plants exhibiting moderate and heavy use. Vigor was normal on most plants over the years. The decadence was moderately high all years (27-37%), except in 1995 when it was only 18%. In 2000, decadence was 37% with poor vigor displayed by 19% of the population. In addition, 17% of the population were classified as dying (380 plants/acre). In 2005, these conditions improved slightly with a decrease in decadent plants to 29% and those with poor vigor to 19% of the population. However, the percentage of the population dying increased from 6% in 1995 to 19% by 2005. Until 2005, no seedlings had been sampled on the site since 1988. Recruitment of new sagebrush is low with a small number of young plants and a larger number of dying plants. Other important browse include a few large serviceberry, black sagebrush, and antelope bitterbrush. Some fringed sage, rabbitbrush, Oregon grape, snowberry and gray horsebrush were also sampled in low numbers.

The herbaceous understory is abundant and diverse. Grasses are dominated by alpine fescue and Sandberg bluegrass which combined to produce 67% of the grass cover in 1995, 84% in 2000, and 81% in 2005. Forbs are very diverse (around 30 species), but only a few species produced more than 1% cover.

1982 APPARENT TREND ASSESSMENT

This is one of the better winter range sites on the unit. Overall range condition appears good and trend appears stable. From a trend monitoring point of view, one of the more important items will be to keep track of the key species, especially reproduction. The field observers saw few established seedlings or young plants but also no decadent plants. A fairly large number of seedlings-of-the-year were observed but were not sampled.

1988 TREND ASSESSMENT

Trend for soil is slightly up. Increases in the measured percentages of vegetation and cryptogamic ground cover led to a significant decrease in the amount of bare soil. Percent bare ground has decreased from 29% in 1982 to 14% in 1988. The browse trend is stable. Trend for one of the key species, mountain mahogany, is slightly down due to a slight decrease in population density. Trend for the other key species, mountain big sagebrush, is up due to a 54% increase in the population, excellent reproductive potential and a slight decrease in percent decadency. Trend for the herbaceous understory is also up due to a dramatic increase in the quadrat frequency of grasses and forbs.

TREND ASSESSMENT

soil - slightly up (+1)

browse - stable (0)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

The soil trend is stable. The browse trend is mixed. Trend for mountain big sagebrush is slightly down, but it only contributes 20% of the total browse cover. The density of mature plants is stable, yet 32% of the decadent plants were classified as dying. This condition appears to be caused by heavy use, as 41% of the mature and decadent plants display heavy hedging (>60% of twigs browsed). Continued heavy use combined with prolonged drought will cause a downward trend in sagebrush. Another downward indicator for the population is the ratio of dead to live plants which is quite high at 1:9. True mountain mahogany shows a slightly upward trend. Population density increased, but much of this difference would mostly be due to the greatly increased sample size used in 1995. Vigor is generally good and percent decadence is low at 2%. Heavy use has continually increased since 1982. Currently, 35% of the population displays heavy hedging. However, this is not excessive. According to Shepherd (1971), shrubs from the Rosaceae family like serviceberry, bitterbrush, and mountain mahogany, can withstand heavy use for many years without causing reduced vigor. Overall, trend for browse is stable. The herbaceous understory trend is stable. Sum of nested frequency for grasses declined slightly while frequency of perennial forbs increased slightly. Nested frequency of alpine fescue, which accounts for 45% of the grass cover, increased significantly. Other dominant grasses are thickspike wheatgrass and Sandberg bluegrass which declined significantly in nested frequency. The Desirable Components Index rated this site as fair to good with a score of 69 due to fair perennial grass cover, excellent browse cover, and good shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair to good (69) Higher Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Percent cover of bare ground increased slightly, while litter cover declined. However, vegetation cover increased and perennial grass cover increased three-fold from 6% to 19%. Erosion is minimal due to the abundant and well dispersed protective ground cover combined with the gentle terrain. Trend for the key browse species, true mountain mahogany, is down slightly. Use is similar to 1995 estimates, but density has declined, decadence has increased from 2% to 23% and half of the decadent plants sampled appear to be dying. However, this only accounts for about 120 plants/acre. Few seedlings were encountered and no young plants were sampled. The very dry conditions of this season are mostly responsible for the trend on mahogany. A return to normal precipitation patterns will reverse this trend on this long lived shrub. Mountain big sagebrush, the other key browse on the site, displays many of the same trends as mahogany. Use is actually more moderate compared to 1995, but decadence has doubled and 17% of the population was classified as dying. No seedlings were encountered and recruitment from young plants was poor. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses increased slightly and cover increased three-fold. The nested frequency of the dominant grass, sheep fescue, increased significantly. Nested frequency of perennial forbs remained fairly stable. The Desirable Components Index rated this site as good with a score of 77 due to excellent perennial grass cover, excellent browse cover, and excellent forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - good (77) Higher Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained stable. The browse trend is stable. The browse trend for mountain big sagebrush is down slightly. The density of sagebrush decreased 23% with an increase of dying individuals from 17% to 19%. Only 1% of the population is made of young individuals, so recruitment is low. However, percent decadence decreased from 37% to 29% and mature plants increased in size which increased the percent cover from 7% to 9%. The trend for true mountain mahogany is up slightly. The overall mahogany population has increased by 13% from 2000; young individuals alone increased from 0% to 17%. The number of individuals classified as dying in the population decreased from 11% to 3%. Now, the percentage of young plants in the population is five times greater than the number of plants classified as dying. The number of decadent individuals has decreased from 23% of the population in 2000 to 12% in 2005. Herbaceous trend is stable. The sum of the nested frequency of perennial grasses was stable, but perennial forbs decreased slightly, but not enough to change the trend. Perennial grasses are much more abundant with much greater production. The cover of the perennial species also decreased slightly. The Desirable Components Index rated this site as good with a score of 84 due to excellent perennial grass cover, excellent browse cover, and excellent forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - good (84) Higher Potential scale

HERBACEOUS TRENDS --
Management unit 08B, Study no: 6

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Agropyron dasystachyum</i>	_b 153	_a 114	_b 162	_{ab} 128	.79	2.04	.93
G	<i>Bouteloua gracilis</i>	-	-	3	3	-	.15	.15
G	<i>Bromus tectorum</i> (a)	-	-	-	1	-	-	.00
G	<i>Carex</i> sp.	_b 42	_{ab} 31	_{ab} 23	_a 15	.45	.26	.11
G	<i>Festuca ovina</i>	_a 62	_b 118	_c 226	_c 232	2.84	10.77	12.55
G	<i>Koeleria cristata</i>	28	26	13	17	.12	.10	.42
G	<i>Oryzopsis hymenoides</i>	-	5	-	4	.21	-	.07
G	<i>Poa secunda</i>	_b 221	_a 132	_a 120	_a 114	1.36	5.42	.83
G	<i>Sitanion hystrix</i>	-	-	6	-	-	.06	-
G	<i>Stipa comata</i>	_{ab} 28	_{bc} 57	_a 23	_c 64	.52	.39	1.40
Total for Annual Grasses		0	0	0	1	0	0	0.00
Total for Perennial Grasses		534	483	576	577	6.31	19.22	16.47
Total for Grasses		534	483	576	578	6.31	19.22	16.47
F	<i>Agoseris glauca</i>	-	-	2	1	-	.00	.00
F	<i>Allium</i> sp.	70	78	64	55	.36	.57	.73
F	<i>Antennaria rosea</i>	_b 15	_a 3	_{ab} 6	_a 5	.03	.06	.03
F	<i>Androsace septentrionalis</i> (a)	-	1	-	6	.00	-	.04
F	<i>Arabis</i> sp.	_b 35	_a 6	_a 3	_a 13	.01	.01	.04
F	<i>Aster</i> sp.	_c 72	_a -	_b 10	_b 9	-	.09	.25
F	<i>Balsamorhiza sagittata</i>	3	-	-	-	-	-	-
F	<i>Calochortus nuttallii</i>	_a -	_b 13	_a -	_{ab} 7	.03	-	.02
F	<i>Chenopodium fremontii</i> (a)	-	8	-	-	.04	-	-
F	<i>Collomia linearis</i> (a)	-	_c 74	_a -	_b 16	.43	-	.05
F	<i>Comandra pallida</i>	_a 19	_{ab} 30	_b 55	_a 26	.19	.45	.22
F	<i>Collinsia parviflora</i> (a)	-	_b 143	_a 20	_b 113	.91	.05	.37
F	<i>Cryptantha</i> sp.	22	13	30	31	.33	.55	.31
F	<i>Delphinium nuttallianum</i>	-	4	-	-	.01	-	-
F	<i>Descurainia pinnata</i> (a)	-	_a 12	_a -	_b 22	.04	-	.05
F	<i>Draba</i> sp. (a)	-	_{ab} 87	_b 104	_a 64	.59	1.08	.35
F	<i>Erigeron eatonii</i>	_b 43	_b 43	_a 5	_a 1	.92	.09	.03
F	<i>Eriogonum racemosum</i>	-	-	-	5	-	-	.03
F	<i>Erigeron speciosus</i>	_a -	_b 13	_c 56	_c 17	.22	1.09	.34
F	<i>Eriogonum umbellatum</i>	_a 24	_{ab} 47	_b 57	_{ab} 43	1.33	1.27	.91
F	<i>Heterotheca villosa</i>	17	14	26	11	.23	.78	.40
F	<i>Hymenoxys acaulis</i>	19	37	21	28	.23	.29	.13

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Ipomopsis aggregata</i>	a-	a-	b ¹¹	a ²	-	.05	.00
F	<i>Lepidium</i> sp. (a)	-	a ²	a-	b ¹⁶	.01	-	.14
F	<i>Lithospermum ruderale</i>	-	-	2	1	.00	.03	.18
F	<i>Lupinus argenteus</i>	-	2	1	1	.00	.01	.00
F	<i>Machaeranthera canescens</i>	6	-	6	2	.00	.02	.00
F	<i>Microsteris gracilis</i> (a)	-	c ⁹⁶	a ⁵	b ⁴⁷	.53	.01	.13
F	<i>Phacelia sericea</i>	b ⁶	c ³⁴	ab ¹	a-	.08	.03	-
F	<i>Polygonum douglasii</i> (a)	-	b ⁴⁵	a ⁸	b ⁵⁴	.10	.01	.16
F	<i>Senecio integerrimus</i>	-	-	-	5	-	-	.02
F	<i>Sedum lanceolatum</i>	a ⁵⁰	b ¹⁰³	ab ⁸⁵	b ⁹⁵	.79	.68	.70
F	<i>Senecio multilobatus</i>	1	6	3	2	.04	.01	.03
F	<i>Taraxacum officinale</i>	-	3	-	-	.01	-	-
F	<i>Townsendia incana</i>	1	-	-	-	-	-	-
F	Unknown forb-perennial	-	3	-	-	.03	-	-
F	<i>Zigadenus paniculatus</i>	-	-	3	1	-	.03	.00
Total for Annual Forbs		0	468	137	338	2.67	1.16	1.31
Total for Perennial Forbs		403	452	447	361	4.90	6.14	4.43
Total for Forbs		403	920	584	699	7.58	7.31	5.75

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

BROWSE TRENDS --

Management unit 08B, Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	4	1	1	.91	.21	.03
B	Artemisia frigida	0	2	7	-	-	.19
B	Artemisia nova	3	0	0	-	-	-
B	Artemisia tridentata vaseyana	63	61	54	5.65	6.80	8.67
B	Cercocarpus montanus	61	43	44	16.22	12.24	13.01
B	Chrysothamnus viscidiflorus viscidiflorus	44	48	53	1.65	1.72	2.16
B	Gutierrezia sarothrae	0	2	4	-	-	-
B	Juniperus osteosperma	0	1	1	-	-	-
B	Mahonia repens	9	9	10	.69	.19	.25
B	Opuntia sp.	22	23	31	.57	.24	.58
B	Pediocactus simpsonii	3	8	3	-	.33	-
B	Purshia tridentata	4	3	3	1.38	.30	.18
B	Symphoricarpos oreophilus	2	0	0	.21	-	-
B	Tetradymia canescens	6	10	9	.30	.18	.60
Total for Browse		221	211	220	27.61	22.24	25.68

CANOPY COVER, LINE INTERCEPT --

Management unit 08B, Study no: 6

Species	Percent Cover '05
Amelanchier utahensis	1.51
Artemisia frigida	.03
Artemisia tridentata vaseyana	8.19
Cercocarpus montanus	13.64
Chrysothamnus viscidiflorus viscidiflorus	2.43
Mahonia repens	.18
Opuntia sp.	.56
Purshia tridentata	.60
Tetradymia canescens	.60

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 08B, Study no: 6

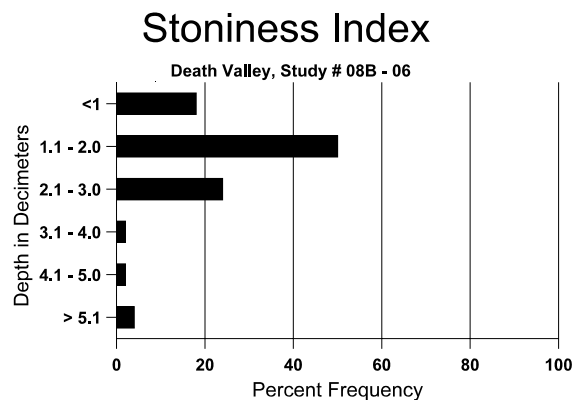
Species	Average leader growth (in)
	'05
Amelanchier utahensis	3.7
Artemisia tridentata vaseyana	1.8
Cercocarpus montanus	3.0
Purshia tridentata	3.1

BASIC COVER --
Management unit 08B, Study no: 6

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	7.00	12.00	35.36	48.55	43.59
Rock	4.00	5.25	2.33	3.81	3.57
Pavement	0	.25	.47	.39	.11
Litter	59.25	58.75	60.37	53.99	49.13
Cryptogams	1.00	9.50	2.96	5.01	2.58
Bare Ground	28.75	14.25	18.35	20.98	22.71

SOIL ANALYSIS DATA --
Herd Unit 8B, Study # 6, Study Name: Death Valley

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
10.0	66.8 (11.3)	6.9	85.4	5.7	8.9	1.5	2.45	76.8	0.7



PELLET GROUP DATA --
Management unit 08B, Study no: 6

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	12	26	72
Moose	-	1	-
Elk	17	19	21
Deer	37	14	18
Cattle	-	-	2

Days use per acre (ha)	
'00	'05
-	-
0.5 (1)	1 (1)
48 (117)	44 (108)
58 (144)	13 (33)
-	4 (9)

BROWSE CHARACTERISTICS --
Management unit 08B, Study no: 6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	80	-	-	80	-	-	75	0	-	-	0	64/69
00	20	-	-	20	-	-	0	0	-	-	0	49/58
05	20	-	-	20	-	-	0	0	-	-	0	52/59
Artemisia frigida												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	332	-	66	266	-	-	0	0	-	-	0	4/5
95	0	-	-	-	-	-	0	0	-	-	0	4/7
00	40	-	-	40	-	20	0	0	-	-	0	4/4
05	240	40	40	200	-	-	33	8	-	-	0	13/12
Artemisia nova												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	60	-	-	40	20	-	33	67	33	-	0	11/20
00	0	-	-	-	-	-	0	0	0	-	0	-/-
05	0	-	-	-	-	-	0	0	0	-	0	11/24
Artemisia tridentata vaseyana												
82	1599	66	333	800	466	-	54	0	29	-	4	14/25
88	3465	200	1066	1466	933	-	44	8	27	-	0	11/15
95	2140	-	180	1580	380	240	22	38	18	6	6	14/26
00	2220	-	120	1280	820	520	44	5	37	17	19	16/28
05	1720	340	20	1200	500	660	36	28	29	19	19	20/31

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
82	933	-	-	933	-	-	29	0	0	-	0	34/8
88	533	-	200	333	-	-	50	13	0	-	0	36/44
95	1680	60	140	1500	40	-	58	35	2	1	1	34/51
00	1060	20	-	820	240	-	58	21	23	11	11	38/62
05	1200	140	200	860	140	60	12	63	12	3	3	38/54
Chrysothamnus viscidiflorus viscidiflorus												
82	1333	-	400	933	-	-	0	0	0	-	0	7/8
88	1866	-	333	1400	133	-	0	0	7	-	11	10/11
95	1520	-	40	1480	-	-	1	0	0	-	0	10/15
00	2040	-	100	1800	140	-	.98	.98	7	.98	17	9/11
05	2120	-	160	1920	40	-	8	5	2	.94	.94	11/14
Gutierrezia sarothrae												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	599	-	-	466	133	-	0	0	22	-	0	7/7
95	0	-	-	-	-	-	0	0	0	-	0	5/4
00	40	-	-	20	20	-	0	0	50	50	100	-/-
05	80	-	-	80	-	-	0	0	0	-	0	6/8
Juniperus osteosperma												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	20	-	-	-	0	0	-	-	0	-/-
05	20	-	20	-	-	-	0	0	-	-	0	-/-
Mahonia repens												
82	2133	266	800	1333	-	-	0	0	0	-	0	7/2
88	2066	-	1666	400	-	-	0	0	0	-	0	2/2
95	1360	20	-	1360	-	-	0	0	0	-	0	3/6
00	1200	-	180	1020	-	-	0	0	0	-	0	3/6
05	900	-	20	780	100	20	0	0	11	11	11	2/3
Opuntia sp.												
82	532	-	66	466	-	-	0	0	0	-	0	2/7
88	666	-	333	333	-	-	0	0	0	-	0	3/9
95	1180	20	20	1140	20	-	0	0	2	2	2	3/9
00	1260	-	300	920	40	-	2	0	3	2	2	2/7
05	1000	-	100	900	-	-	0	0	0	-	0	3/11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	60	-	-	60	-	-	0	0	0	-	0	2/5
00	180	20	-	160	20	-	0	0	11	11	22	5/9
05	60	-	-	60	-	-	33	0	0	-	0	2/4
Purshia tridentata												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	140	-	-	140	-	-	57	0	-	-	0	19/50
00	60	-	-	60	-	-	33	0	-	-	0	16/41
05	80	-	20	60	-	-	25	50	-	-	0	20/54
Rosa woodsii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	333	-	333	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	20	20	-	-	0	0	-	-	0	15/25
00	0	-	-	-	-	-	0	0	-	-	0	21/71
05	0	-	-	-	-	-	0	0	-	-	0	17/33
Tetradymia canescens												
82	932	-	266	666	-	-	0	0	0	-	0	8/13
88	1532	-	666	333	533	-	13	0	35	-	0	9/10
95	320	-	40	280	-	-	13	0	0	-	0	10/15
00	260	-	40	180	40	-	0	0	15	8	62	9/14
05	240	-	20	220	-	-	25	8	0	-	0	7/16

Trend Study 8B-7-05

Study site name: Antelope Flat .

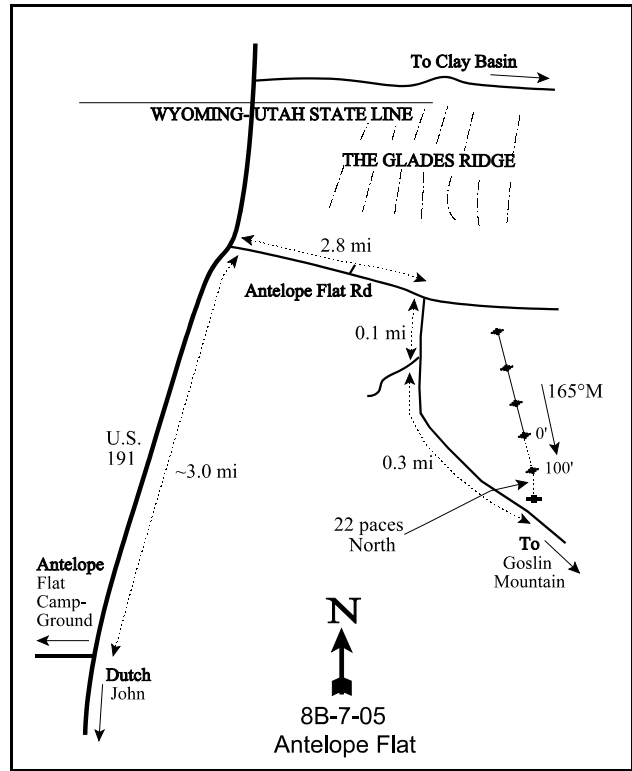
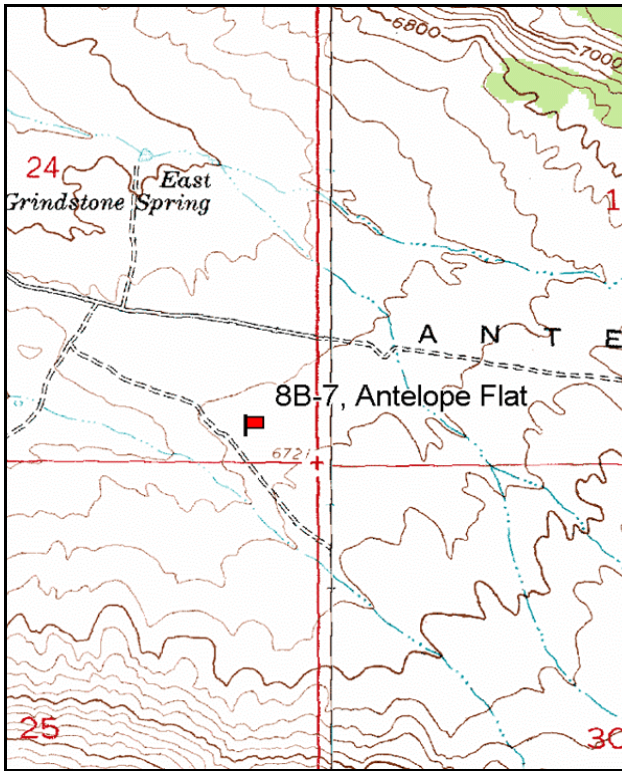
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From Dutch John, proceed north towards Antelope Flat on Highway U.S. 191 for approximately 8 miles. Before the Wyoming border, turn east on the Antelope Flat Road towards Goslin Mountain. Go 2.8 miles and turn right towards Goslin Mountain. Go 0.1 miles to a fork. Bear left on the main fork towards the mountain and proceed 0.3 miles to a witness post on the north side of the road. From the witness post walk approximately 100 feet (22 paces) north into the sagebrush to the 100-foot end of the baseline. The 0-foot end of the frequency baseline is 100 feet north.



Map Name: Dutch John

Diagrammatic Sketch

Township 3N, Range 22E, Section 24

GPS: NAD 27, UTM 12T 4537316 N, 636375 E

DISCUSSION

Antelope Flat - Trend Study No. 8B-7

This trend study was established on Antelope Flat in September of 1988. The long sagebrush-covered valley stretches from Flaming Gorge Reservoir, east to Goslin Mountain. The study is located at the base Dutch John Mountain and Goslin Mountain at an elevation of 6,700 feet. The slope is gentle (2-3%) with a northwest aspect. Deer and antelope can be found in the valley year round, while elk from Goslin Mountain also utilize the lower valleys as winter range. Cattle graze this allotment on a deferred rotation system. They are on the unit either early (May 1 to July 20) or late (September 5-November 20) in the season. Pellet group data estimated 22 elk, 7 deer, and 9 cow days use/acre (54 edu/ha, 17 ddu/ha, and 22 cdu/ha) in 2000.

Approximately half of the elk pellet groups appeared to be from the previous fall, while the other half were from the spring of 2000. Deer pellet groups were all from winter use. Approximately 90% of the cattle pats were from the previous fall while about 10% were fresh. In 2005, pellet group data estimated 9 elk, 8 deer, and 16 cow days use/acre (21 edu/ha, 20 ddu/ha, and 39 cdu/ha). Since antelope frequent the site, it is possible that some of the deer pellet groups were antelope. There were also 9 sage-grouse pellet groups/acre estimated in 2005 and many more were observed around the site. Cattle use was light in 1995, 2000, and 2005. Rabbits appeared to be abundant on this site.

The soil appears to be moderately deep, but compacted below in the sub-surface horizons. A clay hardpan was found at approximately 9-10 inches in depth. As a result, effective rooting depth was estimated at only about 10 inches. The surface layer is a sandy loam with a neutral pH (7.0). Very little rock or gravel are on the surface or within the profile. Consequently, it is more susceptible to wind and water erosion. Phosphorus is limited at only 4.9 ppm. Values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Percent cover of bare ground is moderately high with most occurring in the shrub interspaces. Cover is a relatively high for cryptogams which covered 6% of the soil surface in 1988, increased to nearly 8% by 1995, and decreased to 5% in 2000 and 2005. The cryptogam cover, vegetation and litter cover, and the gentle terrain adequately protect the soil from severe erosion. The erosion condition class determined soil movement as stable in 2005.

The site supports a moderately dense stand of Wyoming big sagebrush, which had an estimated density of 5,620 in 1995. In 1995, 35% of the sagebrush displayed heavy use. Vigor was generally good with decadence at 22%. Density remained stable in 2000, but percent decadence increased to 46% with about 16% of the sagebrush classified as dying. Use was only light to moderate, indicating that the increase in decadence was primarily due to drought. Because of the dry conditions in 2000, many of the sagebrush were already dropping their leaves during the first week of July. In 2005, density decreased slightly due to a decrease in decadent plants to 26% of the population, but the number of mature plants increased from 46% in 2000 to 66% by 2005. Individuals classified as dying also decreased to 14%. Use continued to be light in 2005. The decreasing trends were primarily being driven by the prolonged drought in conjunction with intraspecific competition which began to improve after increased precipitation in 2004.

Mountain low rabbitbrush is also numerous with an estimated density which continually decreased from 7,199 plants/acre in 1988 to 4,700 in 2005. These shrubs are mostly not utilized and in good vigor. Small numbers of slenderbush eriogonum, snakeweed, and prickly pear were also encountered on the site.

Grasses and forbs are diverse and fairly abundant for a Wyoming big sagebrush site. Most are found growing in close proximity to sagebrush plants. The most abundant grasses include Sandberg bluegrass, muttongrass and thickspike wheatgrass. A variety of forbs are found on the site but most are uncommon. The most numerous perennial forbs include hoods phlox and longleaf phlox. Several annual forbs are also found on the site.

1988 APPARENT TREND ASSESSMENT

The site has 46% litter cover and 10% vegetation cover. Although the shrub interspaces are well vegetated for this range type, there is a significant amount of bare ground (37%). The browse trend appears to be declining due to heavy use and a high decadency rate (47%). Recruitment appears good, however, with abundant seedlings and young. The herbaceous understory is fairly abundant for a Wyoming sagebrush site.

1995 TREND ASSESSMENT

Basic ground cover characteristics have improved since 1988. Even though percent litter cover declined slightly, cover of cryptogams increased, and percent cover for bare ground decreased to 26%. Trend for soil is up slightly. The browse trend is stable. The key browse species, Wyoming big sagebrush, has declined in overall density but shows less heavy use and an improving rate of decadence (47% to 22%). The population could decline further because 7% of the population was classified as dying. However, there appears to be a sufficient number of young plants (10% of the population) to replace them. The herbaceous trend is slightly down due to a decline in the sum of nested frequency of perennial grasses and forbs. Annual forbs were sampled in 1995. They dominated the forb composition by providing 71% of the forb cover. The Desirable Components Index rated this site as good with a score of 54 due to good perennial grass cover, good browse cover, and fair browse decadence.

TREND ASSESSMENT

soil - slightly up (+1)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - good (54) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Relative percent cover of bare ground has increased slightly, while cover of cryptogams has declined slightly. Relative percent cover of litter has declined slightly with relative cover for vegetation increasing slightly since 1995. In addition, the proportion of protective ground cover (vegetation, litter and cryptogams) to bare ground has declined slightly from 2.9:1 to 2.7:1. Trend for browse is stable, but decadence of Wyoming big sagebrush increased from 22% to 46%. This may have been partly due to leaf drop during a dry year. In addition, 16% or 960 plants/acre of the population were classified as dying. Recruitment from young plants is currently marginal at 8% of the population. Use is actually more moderate compared to 1995, indicating that these trends are being driven more by drought. A return to normal precipitation patterns should reverse these downward browse trends. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs have remained similar to 1995. Nested frequency for cheatgrass, an annual, increased significantly while frequency of all annual forbs declined. The Desirable Components Index rated this site as good to excellent with a score of 62 due to good perennial grass cover, excellent browse cover, and excellent perennial forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - good to excellent (62) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is down slightly. The proportion of protective ground cover (vegetation, litter and cryptogams) to bare ground has declined slightly. Percent bare soil has increased from 26 to 37% (relative values). Vegetation and cryptogam cover is stable, but the percent cover of litter is down 11%. The biggest cause of this change was a 13% increase in the nested frequency of bare ground. The trend for browse is slightly down. The preferred browse species on the site is Wyoming big sagebrush. The density of sagebrush decreased by 14%. However, the percent decadence decreased from 46% to 26% and the percent dying remained at about 14%. Despite the decrease in density, the percent cover of sagebrush increased. The herbaceous understory trend is stable. Cheatgrass has substantially increased over a ten year period (quadrat frequency has increased the last 3 sampling periods from 27% to 58%), but is not overly abundant. The sum of the nested frequencies for perennial grasses remained stable, but perennial forbs decreased. Grasses are much more abundant and important on this winter range site, as they contribute to over 80% of the herbaceous cover. The Desirable Components Index rated this site as good to excellent with a score of 70 due to good perennial grass cover, excellent browse cover, and fair browse decadence.

TREND ASSESSMENT

soil - slightly down (-1)

browse -slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - excellent (70) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 08B, Study no: 7

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	238	190	158	200	.83	2.54	2.62
G	Agropyron spicatum	_a 18	_b 110	_a 22	_a 36	.61	.32	.61
G	Bromus tectorum (a)	-	_a 66	_b 120	_b 147	.50	2.74	.84
G	Carex sp.	9	-	3	-	-	.03	-
G	Koeleria cristata	_c 55	_a -	_b 36	_a 7	-	.62	.21
G	Oryzopsis hymenoides	13	20	12	14	.20	.25	.29
G	Poa fendleriana	_a 5	_a 32	_c 113	_b 74	.43	2.86	2.31
G	Poa secunda	184	159	173	165	3.00	1.90	4.47
G	Sitanion hystrix	_b 67	_a 34	_a 35	_{ab} 41	.30	1.06	.73
G	Stipa comata	_c 87	_b 31	_a 5	_{ab} 24	.28	.03	.66
G	Vulpia octoflora (a)	-	1	3	9	.00	.01	.02
Total for Annual Grasses		0	67	123	156	0.50	2.75	0.85
Total for Perennial Grasses		676	576	557	561	5.65	9.63	11.93
Total for Grasses		676	643	680	717	6.17	12.39	12.79
F	Agoseris glauca	_a -	_b 22	_a 1	_a 6	.05	.01	.02
F	Allium sp.	_{ab} 4	_b 11	_a -	_a -	.04	-	-
F	Antennaria rosea	_c 62	_a 1	_b 28	_a 2	.00	.54	.00

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Arabis sp.	9	10	7	2	.02	.01	.00
F	Astragalus convallarius	31	23	29	28	.25	.28	.54
F	Chenopodium leptophyllum(a)	-	-	-	1	-	-	.00
F	Collinsia parviflora (a)	-	_b 57	_a 24	_b 72	.25	.14	.25
F	Cordylanthus ramosus (a)	-	_c 187	_b 57	_a 16	6.05	.27	.26
F	Crepis acuminata	-	3	-	-	.00	-	-
F	Cymopterus longipes	_a 15	_a 15	_b 39	_b 38	.03	.32	.13
F	Descurainia pinnata (a)	-	3	-	-	.00	-	-
F	Erigeron eatonii	_a 7	_a 19	_b 47	_a 11	.08	.51	.05
F	Eriogonum umbellatum	-	-	3	1	-	.03	.03
F	Gayophytum ramosissimum(a)	-	_b 17	_a -	_a 2	.03	-	.01
F	Gilia inconspicua (a)	-	10	1	2	.02	.00	.00
F	Lepidium sp. (a)	-	3	-	-	.00	-	-
F	Machaeranthera canescens	-	5	-	-	.03	-	-
F	Microsteris gracilis (a)	-	_b 118	_a 40	_a 105	.42	.08	.38
F	Penstemon humilis	_b 60	_b 54	_a 24	_a 18	.45	.11	.25
F	Phlox hoodii	_c 139	_b 95	_b 90	_a 41	1.23	2.40	.63
F	Phlox longifolia	_c 153	_b 97	_b 82	_a 41	.22	.31	.15
F	Polygonum douglasii (a)	-	_b 45	_a 7	_a -	.09	.01	-
F	Ranunculus testiculatus (a)	-	_a -	_a 3	_b 36	-	.00	.10
F	Schoenocrambe linifolia	_a -	_b 12	_{ab} 5	_{ab} 1	.02	.04	.00
F	Sphaeralcea coccinea	40	26	26	27	.18	.31	.39
F	Trifolium gymnocarpon	_a -	_b 55	_c 74	_c 76	.15	.49	.45
F	Zigadenus paniculatus	-	-	-	-	-	-	.00
Total for Annual Forbs		0	440	132	234	6.88	0.51	1.01
Total for Perennial Forbs		520	448	455	292	2.79	5.37	2.68
Total for Forbs		520	888	587	526	9.67	5.89	3.69

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

BROWSE TRENDS --

Management unit 08B, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	97	100	96	16.13	19.50	22.42
B	Chrysothamnus viscidiflorus viscidiflorus	90	89	87	5.16	6.06	5.94
B	Eriogonum microthecum	2	4	1	.01	.04	.03
B	Gutierrezia sarothrae	1	8	5	-	.09	.00
B	Opuntia sp.	18	20	17	.36	.84	.45
Total for Browse		208	221	206	21.67	26.54	28.85

CANOPY COVER, LINE INTERCEPT --

Management unit 08B, Study no: 7

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	21.91
Chrysothamnus viscidiflorus viscidiflorus	4.63
Gutierrezia sarothrae	.05
Opuntia sp.	.16

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 08B, Study no: 7

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	1.4

BASIC COVER --

Management unit 08B, Study no: 7

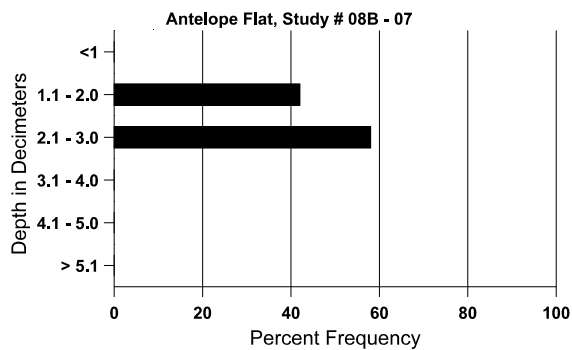
Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	10.25	36.86	47.01	37.95
Rock	0	.19	.01	.06
Pavement	1.00	.55	.36	.88
Litter	45.50	42.59	46.87	26.57
Cryptogams	6.00	7.77	5.06	5.35
Bare Ground	37.25	26.36	35.77	42.08

SOIL ANALYSIS DATA --

Herd Unit 8B, Study # 7, Study Name: Antelope Flat

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
10.0	68.8 (9.9)	7.0	65.4	17.0	17.6	1.7	4.9	118.4	0.8

Stoniness Index



PELLET GROUP DATA --

Management unit 08B, Study no: 7

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	8	4	55
Elk	5	5	8
Deer	38	1	11
Cattle	1	1	6
Antelope	-	-	-
Sage Grouse	-	-	-

Days use per acre (ha)	
'00	'05
-	-
22 (55)	9 (22)
7 (17)	8 (20)
9 (23)	16 (39)
1 (2)	-
9 (23)	-

BROWSE CHARACTERISTICS --
 Management unit 08B, Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
88	7200	533	1000	2800	3400	-	36	43	47	1	6	15/17
95	5620	60	580	3820	1220	620	54	35	22	7	7	18/32
00	5820	20	440	2700	2680	760	22	4	46	16	20	19/31
05	5000	2940	400	3320	1280	560	5	.80	26	14	16	20/29
<i>Ceratoides lanata</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	3/7
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Chrysothamnus nauseosus</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	22/30
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
88	7199	133	1533	2600	3066	-	19	9	43	-	8	9/8
95	5840	60	720	5060	60	20	2	.34	1	.34	1	10/16
00	6000	-	300	4900	800	-	0	0	13	3	8	9/15
05	4700	-	120	4000	580	20	0	0	12	3	3	9/13
<i>Eriogonum microthecum</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	60	20	-	60	-	-	0	0	-	-	0	6/8
00	80	-	60	20	-	-	0	0	-	-	0	5/4
05	20	-	-	20	-	-	0	0	-	-	0	5/5
<i>Gutierrezia sarothrae</i>												
88	999	133	66	933	-	-	0	0	-	-	7	5/4
95	20	-	-	20	-	-	0	0	-	-	0	9/13
00	480	-	-	480	-	-	0	0	-	-	0	5/7
05	180	20	-	180	-	-	0	0	-	-	0	6/6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
88	799	133	266	333	200	-	0	0	25	3	8	4/7
95	560	-	20	540	-	40	0	0	0	-	0	3/12
00	520	20	20	440	60	-	0	0	12	12	12	4/9
05	620	-	-	520	100	-	0	0	16	-	0	5/12

Trend Study 8B-8-05

Study site name: Phil Pico Mountain .

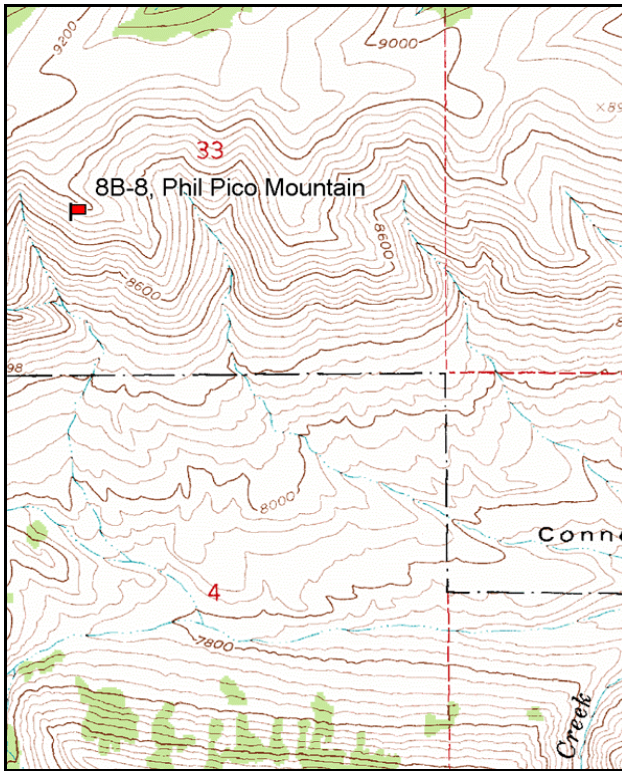
Vegetation type: True Mountain Mahogany .

Compass bearing: frequency baseline 215 degrees magnetic.

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

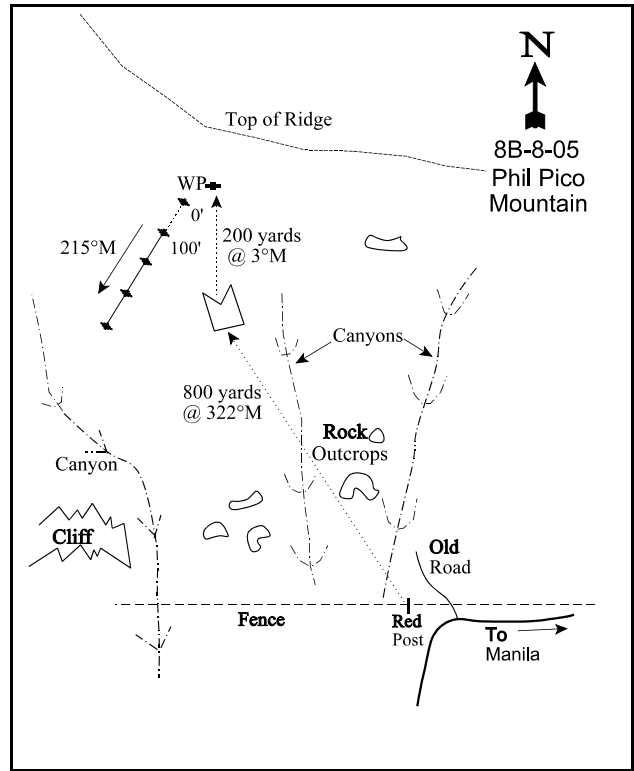
LOCATION DESCRIPTION

From the Wyoming-Utah state line, drive south on U-43 for 1.9 miles to a road on the right (south). Turn right and follow Rt. 166 for 3.6 miles to an intersection. Turn to the right and go 1.6 miles to another fork. Bear right before crossing the creek and go 0.9 miles on a fairly rough road to the FS boundary fence. Continue 0.8 miles west along the fence. Stop where the road turns left away from the fence by a red post. The study is located on the slope below the ridge to the northwest. From the red witness post along the fence, hike about 1/4 mile NNW (322°M) up across the slope to a large square rock outcrop. Continue hiking about 200 yards directly north to the study site. The 0-foot baseline stake is tagged with browse tag #9080.



Map Name: Phil Pico Mountain

Township 3N, Range 18E, Section 33



Diagrammatic Sketch

GPS: NAD 27, UTM 12T 4533433 N, 591819 E

DISCUSSION

Phil Pico Mountain - Trend Study No. 8B-8

The Phil Pico Mountain trend study site is located on the south side of Phil Pico Mountain which is steep, rocky, and covered mostly with mountain brush. There are scattered clumps of aspen and conifer in the protected drainages and an open sagebrush-grass type on the upper slopes and ridgetops. The site is located just below a narrow windswept ridge. It samples a steep (65% to 70%) southwest facing slope dominated by true mountain mahogany at an elevation of 8,800 feet. These south slopes are used mostly by wintering elk and, to a lesser extent, deer. While cattle graze this state-owned land in summer, they utilize mainly the valley bottoms and more gentle slopes. Pellet group data in 2000 estimated 40 elk and 7 deer days use/acre (99 edu/ha and 17 ddu/ha). Most of the pellet groups appeared to be from fall use. Elk appear to have used the area more heavily in 1995 since quadrat frequency of elk pellet groups was twice as high compared to 2000. In 2005, pellet group data estimated 48 elk, 19 deer, and 2 cow use days/acre (119 edu/ha, 46 ddu/ha, and 5 cdu/ha). Cattle were on the north side of the site during the 2005 reading.

Considering the harshness of the site on the dry, steep, rocky slope, there has been a surprisingly high amount of vegetation cover (40% in 1995, 57% in 2000, 43% in 2005). Sandstone and limestone rock are very common on the surface, making the slope loose and talus-like in places. Outcrops of conglomerate rock are scattered across the hillside. The soil is relatively deep for this type of site with an effective rooting depth estimated at just over 12 inches. The soil texture is sandy loam with a neutral pH (7.0). Phosphorus was measured at 5.2 ppm, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Soil penetrometer readings suggest that the majority of the rock is 4 to 8 inches below the surface. With the steep, talus slope, some erosion is expected. There is definite down slope soil movement, especially along game trails. Soil is also pedestalled on the uphill side of shrubs and bunch grasses but soil erosion does not appear to be serious. Herbaceous vegetation cover is critical for minimizing soil movement on this type of site. The erosion index measurement in 2005 rated the soil erosion as slight, mainly because of small pedestals surrounding shrubs and perennial grasses, moderate soil movement, minor litter movement, minor surface rock movement, common 3 to 6 inch deep rills, and minor flow patterns between perennial species.

True mountain mahogany provides the majority of the browse cover and the bulk of the available forage. Since 1995, mahogany density has remained fairly stable. In 1995 and 2000, the density was 3,120 plants/acre and had increased to 3,680 by 2005. Utilization has fluctuated between moderate-heavy in 1995 and 2000 to heavy in 1988 and 2005. Percent decadence has remained low (3% in 1995, 15% in 2000, and 7% in 2005). Recruitment has been good most years. The young comprised 18% of the population in 1995, 13% in 2000, and 16% in 2005. The plants classified as dying have always been low (0% in 1995, 5% in 2000, and 3% in 2005). Vigor has remained near normal all years, although some insect damage was reported in 1995.

Mountain big sagebrush occurs across the slope, which offers additional nutritional winter forage on the site. It has displayed mostly light to moderate use since 1988. Mountain big sagebrush has also been showing the effects of the prolonged drought. The sagebrush density has remained around 1,000 plants/acre since 1995. Percent decadence has been moderately low beginning with 22% in 1995, 18% in 2000, and 17% in 2005. The plants classified as dying have remained between 12% and 17% since 1995. With the exception of 2000 when the percent dying and young were equal, the number of young have been fewer than the number of those classified as dying. Other browse include: serviceberry, fringed sagebrush, black sagebrush, winterfat, mountain low rabbitbrush and slenderbush eriogonum.

The herbaceous understory is abundant, as perennial grasses produced almost 14% cover in 1995, increased to 27% by 2000, and was 17% in 2005. By far, the most abundant grass consisted of bluebunch wheatgrass, which exhibited considerable vegetation production. Other common grasses include Indian ricegrass and

cheatgrass. Forbs are diverse but have provided only about 3 to 4% cover. Forbs are represented by a variety of species which included an abundance of cryptantha, hoary aster, and Hoods phlox.

1988 APPARENT TREND ASSESSMENT

The amount of total rock cover reflects the rocky nature of the site. Rock cover is 19% and pavement cover is 24%. Together, they contribute to 43% of the surface cover, which is very high. Basal vegetation cover is good at 11%, but litter cover is unsatisfactory at only 38%. Trend for browse appears stable with adequate numbers of seedlings and young for mountain big sagebrush and true mountain mahogany. The composition of the herbaceous understory is good and dominated by native grasses. Forbs are diverse but not as numerous as the grasses.

1995 TREND ASSESSMENT

Percent bare ground has declined from 8% to only 2%. Soil movement down slope is unavoidable, but not severe due to the abundance of well dispersed vegetation and litter cover. Trend for soil is considered stable. Trend for the key species, true mountain mahogany which makes up 81% of the total browse cover, is stable. The number of mature plants increased, while the number of decadent shrubs declined from 18% to only 3%. The proportion of shrubs displaying heavy use also declined from 73% in 1988 to 54% in 1995. The number of seedlings and young plants declined, but they still appear adequate to maintain the population. Trend for the secondary browse species, mountain big sagebrush, is slightly down, but it only contributes 7% of the total browse cover. The population has declined significantly and with 12% of the population classified as dying, a further decline in population density in the future is possible. However, there are not very many dead plants within the population which indicates that most of the decrease in population is due to a much larger sample, giving a more accurate estimate of its population. This would still be considered a marginal site for mountain big sagebrush. The shallow, rocky soils coupled with drought conditions have further stressed the population. Since mountain mahogany provides 81% of the browse cover and the bulk of the forage on the site, overall browse trend is stable. It should be noted that with the increased sample size and much better sampling distribution, the population estimates for shrubs are much better. Trend for the herbaceous understory is down. Nested frequency of nearly all grass species have declined significantly. Sum of nested frequency of perennial forbs have also declined. The Desirable Components Index rated this site as good with a score of 84 due to excellent perennial grass cover, excellent browse cover, and excellent browse decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - good (84) Higher Potential scale

2000 TREND ASSESSMENT

Trend for soil appears stable. Percent cover of bare ground has increased slightly, while litter cover has declined slightly. However, vegetation cover increased and herbaceous cover rose by 64%. In addition, the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased slightly. There is still unavoidable down slope soil movement, but it is not severe. Trend for the key browse species, true mountain mahogany, is stable. Population density has remained stable and use is similar to 1995 estimates. Vigor is normal on most plants and percent decadence has risen but it is still low at 15%. Due to the dry conditions of 2000, some shrubs are displaying yellowing leaves and 5% of the population were classified as dying. No seedlings were encountered but young plants account for 13% of the population. Mountain big sagebrush also appears stable but many plants are showing the effects of drought. Trend for the herbaceous understory is stable with similar sum of nested frequency values for perennial grasses and forbs. The

Desirable Components Index rated this site as good with a score of 84 due to excellent perennial grass cover, excellent browse cover, and good browse decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - good (85) Higher Potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased substantially and bare soil has increased almost by 10%. This increase is due to an increase in the nested frequency of bare ground (a relative percent cover increase from 3 to 10%), a 31% decrease in the nested frequency of cryptogams, and a 12% decrease in the nested frequency of perennial grasses (percent cover decrease from 27 to 17%). The browse trend is up slightly. The trend for the key browse species true mountain mahogany is up. The mahogany population increased from 3,120 to 3,680 plants/acre. The percentage of mature plants increased from 72% to 78% of the population and the young individuals increased from 13% to 16%. The percentage of decadent plants decreased from 15% to 7% and the percentage of the population dying decreased from 5% to 3%. Utilization increased to 84% of the mahogany shrubs exhibiting heavy use. According to Shepherd (1971), shrubs from the Rosaceae family like serviceberry, bitterbrush, and mountain mahogany, can withstand heavy use for many years without causing reduced vigor. The trend for mountain big sage brush is down slightly. Sagebrush density declined 24% with a decrease of young individuals from 13% to 7%. There was also an increase in plants classified as dying from 13 to 17%. Utilization of this species has increased to light to moderate. The mountain big sagebrush may still be recovering from years of drought. The preferred browse species Utah serviceberry, fringed sagebrush, and winterfat have either remained stable or improved. The herbaceous understory trend is slightly down. The nested frequency for forbs increased, but the nested frequency and cover percentage for grasses decreased. Perennial forbs are much more abundant and produce more forage, so the trend is slightly down. Positively, cheatgrass was significantly less abundant in 2005. Desirable Components Index rated this site as good with a score of 87 due to excellent perennial grass cover, excellent browse cover, and excellent for low browse decadence.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly up (+1)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - good to excellent (87) Higher Potential scale

HERBACEOUS TRENDS --
Management unit 08B, Study no: 8

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Agropyron spicatum</i>	297	287	309	291	10.99	19.74	13.44
G	<i>Bromus tectorum</i> (a)	-	c152	b53	a22	2.53	.18	.05
G	<i>Carex</i> sp.	b36	ab33	a9	ab12	.50	.39	.34
G	<i>Koeleria cristata</i>	b16	ab7	a4	b17	.08	.03	.36
G	<i>Leucopoa kingii</i>	-	2	4	-	.03	.03	-
G	<i>Oryzopsis hymenoides</i>	b115	ab85	ab104	a62	2.16	6.56	2.73
G	<i>Poa fendleriana</i>	-	-	2	1	-	.03	.00
G	<i>Poa secunda</i>	b45	a23	a19	a14	.18	.18	.09
Total for Annual Grasses		0	152	53	22	2.53	0.18	0.05
Total for Perennial Grasses		509	437	451	397	13.95	26.98	16.98
Total for Grasses		509	589	504	419	16.49	27.16	17.03
F	<i>Allium</i> sp.	-	-	-	2	-	-	.00
F	<i>Arabis</i> sp.	a-	ab7	ab6	b14	.02	.01	.03
F	<i>Aster chilensis</i>	b25	a-	a2	a-	-	.00	-
F	<i>Astragalus convallarius</i>	-	7	8	3	.21	.21	.20
F	<i>Astragalus</i> sp.	8	4	3	2	.06	.15	.03
F	<i>Balsamorhiza hookeri</i>	1	-	-	-	-	-	-
F	<i>Castilleja linariaefolia</i>	b26	a-	a3	a-	-	.04	-
F	<i>Camelina microcarpa</i> (a)	-	a-	b27	b38	-	.10	.13
F	<i>Chaenactis douglasii</i>	28	24	19	23	.10	.14	.17
F	<i>Chenopodium fremontii</i> (a)	-	-	-	3	-	-	.00
F	<i>Chenopodium leptophyllum</i> (a)	-	b19	a3	a3	.05	.01	.00
F	<i>Cirsium</i> sp.	12	2	4	10	.06	.03	.33
F	<i>Comandra pallida</i>	6	-	-	3	-	-	.00
F	<i>Collinsia parviflora</i> (a)	-	a3	a2	b15	.00	.00	.07
F	Cruciferae	2	-	-	-	-	-	-
F	<i>Cryptantha</i> sp.	b81	a35	a57	b89	.48	1.06	1.24
F	<i>Delphinium nuttallianum</i>	b65	b52	a6	a19	.48	.09	.18
F	<i>Descurainia pinnata</i> (a)	-	b67	a5	a3	.39	.01	.00
F	<i>Erigeron</i> sp.	-	1	3	-	.00	.01	-
F	<i>Hymenoxys acaulis</i>	-	2	-	-	.03	-	-
F	<i>Ipomopsis aggregata</i>	-	3	-	4	.01	-	.04
F	<i>Lappula occidentalis</i> (a)	-	b8	a-	ab7	.03	-	.01
F	<i>Leucelene ericoides</i>	10	-	-	1	-	-	.00
F	<i>Lepidium</i> sp. (a)	-	3	-	-	.03	-	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Lesquerella sp.	_b 65	_{ab} 66	_a 31	_a 15	.47	.22	.11
F	Linum lewisii	6	5	2	-	.03	.03	.01
F	Lithospermum sp.	1	-	1	1	-	.00	.00
F	Lomatium sp.	-	-	3	-	-	.03	-
F	Lychnis drummondii	-	2	-	10	.00	-	.07
F	Machaeranthera canescens	_b 48	_a 15	_a 20	_a 10	.07	.49	.11
F	Microsteris gracilis (a)	-	1	-	-	.03	-	-
F	Oenothera sp.	-	-	9	-	-	.07	-
F	Oxytropis sericea	_b 12	_{ab} 2	_b 14	_a -	.19	.26	-
F	Penstemon caespitosus	_a -	_a -	_a -	_b 13	-	-	.07
F	Penstemon humilis	_b 66	_a 35	_a 21	_a 25	.37	.43	.21
F	Physaria acutifolia	_a -	_a -	_{ab} 8	_b 17	-	.07	.08
F	Phlox hoodii	_a -	_b 24	_c 41	_c 38	.22	.43	.42
F	Phlox longifolia	_b 46	_a -	_a 5	_a 2	-	.01	.03
F	Senecio multilobatus	-	9	8	5	.04	.05	.03
F	Taraxacum officinale	-	-	-	4	-	-	.01
Total for Annual Forbs		0	101	37	69	0.53	0.12	0.23
Total for Perennial Forbs		508	295	274	310	2.89	3.88	3.43
Total for Forbs		508	396	311	379	3.43	4.01	3.66

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

BROWSE TRENDS --

Management unit 08B, Study no: 8

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	2	2	2	.01	.03	-
B	Artemisia frigida	63	62	77	.91	1.03	2.89
B	Artemisia tridentata vaseyana	36	36	33	1.51	2.73	1.41
B	Ceratoides lanata	2	0	1	-	-	.15
B	Cercocarpus montanus	82	84	81	18.02	19.50	18.43
B	Chrysothamnus viscidiflorus lanceolatus	14	14	14	.07	.48	.51
B	Eriogonum microthecum	55	40	46	1.59	1.51	.86
B	Symphoricarpos oreophilus	5	6	5	.00	.30	.56
B	Tetradymia canescens	1	1	3	.06	-	.15
Total for Browse		260	245	262	22.21	25.60	24.98

CANOPY COVER, LINE INTERCEPT --

Management unit 08B, Study no: 8

Species	Percent Cover
	'05
Artemisia frigida	3.83
Artemisia tridentata vaseyana	3.20
Cercocarpus montanus	22.25
Chrysothamnus viscidiflorus lanceolatus	.63
Eriogonum microthecum	1.26
Symphoricarpos oreophilus	.71
Tetradymia canescens	.18

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 08B, Study no: 8

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	1.8
Cercocarpus montanus	3.4

BASIC COVER --

Management unit 08B, Study no: 8

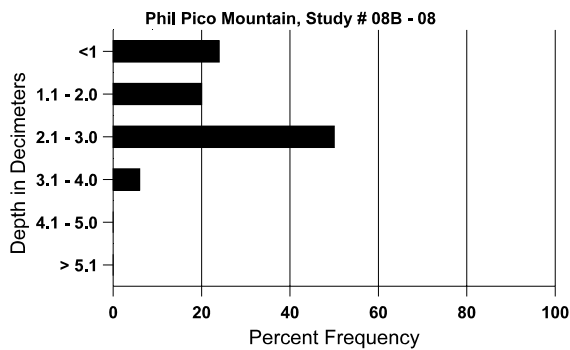
Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	11.00	39.45	57.22	43.37
Rock	19.25	23.53	19.75	18.84
Pavement	23.25	11.68	30.17	23.23
Litter	38.00	40.21	36.86	22.23
Cryptogams	.25	.02	.11	.04
Bare Ground	8.25	2.26	4.55	12.37

SOIL ANALYSIS DATA --

Herd Unit 8B, Study # 8, Study Name: Phil Pico Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
12.3	N/A	7.0	69.0	20.1	10.9	3.7	5.2	86.4	1.4

Stoniness Index



PELLET GROUP DATA --

Management unit 08B, Study no: 8

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	8	-	9
Elk	51	26	37
Deer	25	7	15
Cattle	-	-	-

Days use per acre (ha)	
'00	'05
-	-
40 (99)	48 (119)
7 (17)	19 (46)
-	2 (5)

BROWSE CHARACTERISTICS --
Management unit 08B, Study no: 8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	120	80	100	20	-	-	0	17	-	-	0	16/9
00	340	-	320	20	-	-	6	0	-	-	0	16/12
05	240	-	220	20	-	-	100	0	-	-	0	30/41
Artemisia frigida												
88	14933	400	6533	8400	-	-	3	2	0	-	.44	5/4
95	3900	160	440	3460	-	-	0	0	0	-	0	9/7
00	3440	-	280	3140	20	-	.58	0	1	.58	.58	5/7
05	5540	960	680	4860	-	-	4	.72	0	-	0	10/11
Artemisia tridentata vaseyana												
88	1999	133	333	1200	466	-	20	13	23	-	0	11/16
95	1000	20	100	680	220	160	46	10	22	12	12	11/24
00	1100	-	140	760	200	80	20	5	18	13	13	12/22
05	840	120	60	640	140	100	24	14	17	17	17	15/25
Ceratoides lanata												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	-	40	-	-	0	0	-	-	0	11/13
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	100	-	-	0	7/9
Cercocarpus montanus												
88	4132	200	1533	1866	733	-	16	73	18	-	5	27/24
95	3120	160	560	2480	80	40	34	54	3	-	6	29/39
00	3120	-	400	2240	480	-	36	40	15	5	6	29/40
05	3680	60	580	2860	240	20	9	84	7	3	4	29/38
Chrysothamnus viscidiflorus lanceolatus												
88	333	-	-	333	-	-	0	0	-	-	40	9/7
95	400	-	-	400	-	-	0	0	-	-	0	10/14
00	440	-	-	440	-	-	0	9	-	-	0	10/16
05	400	-	-	400	-	-	10	0	-	-	0	10/18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Eriogonum microthecum</i>												
88	5599	-	1066	4400	133	-	11	5	2	-	0	5/6
95	2540	40	60	2480	-	-	0	0	0	-	0	6/12
00	2060	-	20	2000	40	-	0	0	2	.97	.97	5/8
05	2100	100	20	2080	-	-	7	.95	0	-	0	5/10
<i>Gutierrezia sarothrae</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	6/8
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Pediocactus simpsonii</i>												
88	132	-	66	66	-	-	0	0	-	-	0	3/4
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	4/9
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Symphoricarpos oreophilus</i>												
88	399	-	333	66	-	-	0	0	-	-	0	9/15
95	240	40	100	140	-	-	0	0	-	-	0	9/32
00	300	-	80	220	-	-	0	0	-	-	0	7/19
05	160	20	-	160	-	-	0	38	-	-	0	12/55
<i>Tetradymia canescens</i>												
88	266	-	-	266	-	-	0	0	-	-	0	6/7
95	20	-	-	20	-	-	0	0	-	-	0	8/12
00	40	-	-	40	-	-	0	0	-	-	0	9/12
05	80	-	-	80	-	-	0	0	-	-	0	7/9

Trend Study 8B-9-05

Study site name: West Goslin .

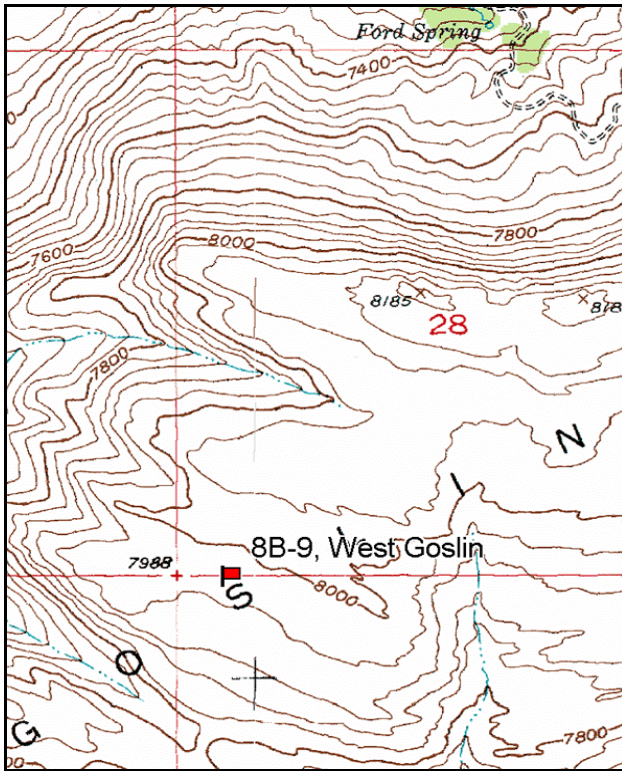
Vegetation type: Mountain Big Sagebrush .

Compass bearing: frequency baseline 264 degrees magnetic.

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

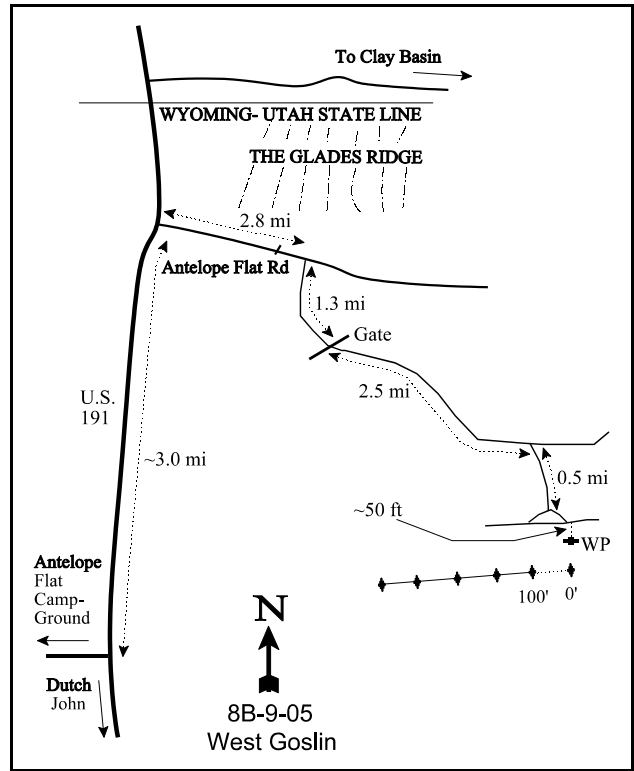
LOCATION DESCRIPTION

From Dutch John, proceed north towards Antelope Flat on Highway U.S. 191 for approximately 8 miles. Before the Wyoming border, turn east on the Antelope Flat Road towards Goslin Mountain. Go 2.8 miles and turn right towards Goslin Mountain. Turn right and drive 1.3 miles to a gate. Go through the gate and continue 2.5 miles to a fork. Go right 0.5 miles to an intersection . The witness post is located on the east side of the Y shaped intersection about 50' south of the road. Full size posts are used to mark the site. The 0-foot post is marked with a browse tag # 34.



Map Name: Goslin Mtn.

Township 3N, Range 23E, Section 28



Diagrammatic Sketch

GPS: NAD 27, UTM 12T 4535542 N, 640172 E

DISCUSSION

West Goslin - Trend Study No. 8B-9

This study samples a mountain big sagebrush-grass winter range site located on Goslin Mountain. The elevation is 8,000 feet on a southeast aspect with a gentle slope (2% to 4%). The site was burned in 2002 as part of the Mustang fire. The fire burned the west face of Goslin Mountain, but did not extend to the east side of the mountain where the Goslin Mountain (8B-2) study is located. Cows use this area for one month with 400 AUMs in June, July or August. An elk herd of about 30 individuals was encountered when setting up the study in early July of 1995. Elk pellet groups were found in 7% of the quadrats placed on the site in 1995, while deer pellet-groups were less common. A few cattle pats were also scattered through the area in small numbers, but none were encountered within a quadrat. Pellet group data from 2000 estimated 30 elk, 7 deer, and 4 cow days use/acre (104 edu/ha, 17 ddu/ha and 10 cdu/ha). Most of the deer and elk pellet groups were from spring use. All cattle pats were from the previous fall. In 2000 and 2005, antelope were seen on the site. Pellet group data in 2005 estimated 80 elk, 34 deer, and 15 cow days use/acre (197 edu/ha, 84 ddu/ha, and 36 cdu/ha), as well as 52 sage grouse pellet groups/acre. The antelope and deer pellets were not differentiated. Elk and deer pellet groups were determined to be from fall, spring, and fall.

The soil is moderately deep and rocky. Average effective rooting depth on the site is estimated at nearly 14 inches, but may be more shallow in some places as evidenced by the presence of black sagebrush. Soil texture is a sandy loam and is slightly acidic (pH of 6.1). The surface soil horizon, down to about 4 to 5 inches, is relatively rock free with large gravel and rocks common further down. There are also a few large boulders on the soil surface. Phosphorus was measured at 4.7 ppm. Values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Due to the abundant vegetation and litter cover, there was little bare ground exposed previous to 2005. Vegetation and litter cover was very well dispersed (as indicated by the very high nested frequency values) further protecting the soil from erosion. However, soil erosion might become a possible future problem as the percent ground cover has increased from 7% in 2000 to 37% in 2005 after the fire. The erosion condition class determined soil movement as stable in 2005.

The key browse species on the site historically consisted of a fairly dense stand of mountain big sagebrush, which decreased greatly after the Mustang fire. Total cover of sagebrush was 25% in 1995 and 24% in 2000, but decreased to 1% in 2005. These relatively large sagebrush accounted for over 70% of the browse cover previous to the burn, but had decreased to only 22% in 2005. Population density was estimated at 3,380 plants/acre in 1995 with 80% of the population being large mature plants. Density in 2000 was estimated at 3,600 plants/acre, then 1,880 plants/acre in 2005. Utilization has continued to be mostly light, but percent decadence rose from 14% in 1995 to 29% in 2000, then dropped to 0% in 2005. Vigor was normal on most plants all years, but some of the older mature sagebrush appeared chlorotic, with 7% of population classified as dying in 2000. Reproduction improved over time, with an increase of young plants from 7% (1995 and 2000) to 69% in 2005. This change is a product of decreased competition for seedlings after the fire.

Other less abundant preferred species included a few scattered serviceberry and true mountain mahogany, which are more heavily utilized than sagebrush. Additional browse species include a small number of black sagebrush, bitterbrush, and snowberry.

Due to the high elevation of this site (8,000 feet) and the apparent spring use by big game, the herbaceous understory is the key component on this site. The understory is diverse and abundant. Grasses and forbs combined to produce about 30% cover in 1995 and 2000 and 40% in 2005. Several species are common, but letterman needlegrass, mutton bluegrass, and onion grass are the most abundant grasses. Thirty-one species of forbs were encountered on the site in 1995, 23 in 2000, then 31 again in 2005. Silvery lupine is the dominate forb which provided nearly 7% cover in all years. Lupine accounted for 54% of the forb cover in 2000 and

decreased to 34% in 2005. Other common forbs include: sulfur eriogonum, desert and longleaf phlox and hollyleaf clover. Preferred forbs include arrowleaf balsamroot, yellow Indian paintbrush, low penstemon, lambstongue and bluebell.

1995 APPARENT TREND ASSESSMENT

Due to the abundant vegetation and litter cover, little bare ground is found on the site. The high nested frequency values for vegetation and litter also suggest well dispersed cover. This, combined with the gentle terrain, limits erosion. Trend for soil appears stable at this time. The browse trend is stable. The population of mountain big sagebrush is healthy and vigorous with low numbers of seedlings and a moderate density of young to maintain the population. Percent decadence is moderately low at 14% and use is mostly light to moderate. The herbaceous understory is abundant and diverse. There are several known increaser species on the site, including: Kentucky bluegrass, Columbia needlegrass, and letterman needlegrass. Combined, these species make up only 40% of the grass cover with the more preferred grasses accounting for 60%. The forb component also contains some increaser species but the overall composition is good. Trend for grasses and forbs appears stable. Desirable Components Index rated this site as excellent to good with a score of 81 due to good perennial grass cover, excellent browse cover, and excellent perennial forb cover.

winter range condition (DC Index) - excellent to good (81) Moderate Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. There is abundant and well dispersed protective ground cover to prevent significant erosion. Trend for the key browse species, mountain big sagebrush, is also stable. Population density has remained similar and use is mostly light. Seedlings and young are moderately abundant but decadent plants have increased to 29% of the population. Drought conditions appear to be effecting the sagebrush, even at this elevation. About 3% of the mature plants were classified as chlorotic with 7% of the population classified as dying. However, there appears to be adequate seedling and young recruitment to maintain the population. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses has declined slightly while frequency of perennial forbs declined substantially. Desirable Components Index rated this site as excellent to good with a score of 80 due to excellent perennial grass cover, excellent browse cover, and excellent perennial forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - excellent to good (80) Moderate Potential scale

2005 TREND ASSESSMENT

The trend for soil is down. The cover for bare ground increased from 5% to 34% relative cover and the nested frequency of bare ground increased 157%, a product of the fire in 2002. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 6.7:1 to 2.4:1, a 64% decrease. This is due to the large increase in bare ground as well as a 70% decrease in litter. The browse trend is also down. The fire drastically decreased the browse cover and density for all of the browse species. Mountain big sagebrush, the key preferred browse species on the site, was most drastically impacted by the fire. The total cover of sagebrush decreased from 24% to 1%. The sagebrush population decreased from 3,600 plants/acre in 2000 to 1,880 in 2005. Although the population decreased drastically, the population appears to be recovering as 1,300 young plants/acre were sampled in 2005. The herbaceous understory trend is down. The nested frequency of perennial grasses was down 31%, and perennial forbs were stable. Interestingly, the percent

cover of both perennial grasses and perennial forbs remained unchanged by the fire, although the nested frequency of grasses decreased slightly. The sum of the nested frequencies of annual forbs increased greatly. Desirable Components Index rated this site as excellent to good with a score of 42 due to very poor browse cover, but excellent perennial grass cover and excellent perennial forb cover.

TREND ASSESSMENT

soil - down (-2)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - poor (42) Moderate Potential scale

HERBACEOUS TRENDS --

Management unit 08B, Study no: 9

Type	Species	Nested Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	b180	a116	b232	.80	.96	7.42
G	Agropyron spicatum	a-	a-	b16	-	-	.50
G	Carex sp.	39	33	19	.56	.99	.34
G	Dactylis glomerata	b49	a-	a-	.31	-	-
G	Festuca ovina	c26	b17	a-	.35	.28	-
G	Koeleria cristata	-	-	3	-	-	.00
G	Melica bulbosa	c213	b80	a6	4.51	1.95	.04
G	Poa fendleriana	a43	b188	a58	.86	3.37	2.43
G	Poa pratensis	a13	b50	ab35	.06	1.43	1.74
G	Poa secunda	b15	a-	b13	.13	-	.15
G	Sitanion hystrix	28	34	11	.16	.61	.30
G	Stipa columbiana	b96	ab72	a51	1.70	1.35	2.54
G	Stipa comata	a16	b66	b50	.13	1.90	1.51
G	Stipa lettermani	b174	b141	a57	3.47	4.26	1.06
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		892	797	551	13.07	17.13	18.09
Total for Grasses		892	797	551	13.07	17.13	18.09
F	Agoseris glauca	c151	a9	b59	.90	.19	.46
F	Allium sp.	b86	a13	a29	.42	.02	.10
F	Antennaria rosea	4	-	-	.03	-	-
F	Arabis drummondii	9	6	-	.02	.01	-
F	Arenaria sp.	b16	b16	a1	.51	.11	.00
F	Astragalus convallarius	4	8	11	.18	.24	.33
F	Astragalus sp.	8	4	-	.01	.15	-
F	Balsamorhiza sagittata	4	3	-	.01	.04	-
F	Castilleja flava	4	8	-	.03	.04	-

Type	Species	Nested Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
		F	Chenopodium leptophyllum(a)	-	-	2	-
F	Collomia linearis (a)	c ₁₆₉	a ₃	b ₇₃	1.07	.00	.22
F	Collinsia parviflora (a)	c ₁₅₄	a ₅	b ₇₈	.99	.01	.36
F	Crepis acuminata	b ₃₆	a ₈	a ₄	.34	.07	.18
F	Cymopterus longipes	11	16	7	.07	.06	.04
F	Delphinium nuttallianum	b ₁₈	a ⁻	b ₆	.04	-	.02
F	Descurainia pinnata (a)	-	-	12	-	-	.19
F	Draba sp. (a)	2	-	-	.03	-	-
F	Erigeron eatonii	11	5	-	.02	.04	-
F	Eriogonum umbellatum	b ₅₂	b ₅₉	a ⁻	1.31	1.56	-
F	Gayophytum ramosissimum(a)	a ⁻	a ⁻	b ₁₂₀	-	-	1.88
F	Heterotheca villosa	a ₃	ab ₉	b ₁₃	.00	.21	.62
F	Hymenoxys sp.	2	-	-	.03	-	-
F	Lappula occidentalis (a)	a ⁻	a ⁻	b ₄₄	-	-	.99
F	Lepidium sp. (a)	a ⁻	a ⁻	b ₄₄	-	-	.76
F	Lomatium triternatum	9	-	3	.01	-	.04
F	Lupinus argenteus	b ₁₉₇	b ₁₈₄	a ₁₁₅	6.85	6.93	7.41
F	Mertensia fusiformis	3	-	2	.00	-	.03
F	Microsteris gracilis (a)	-	-	10	-	-	.07
F	Penstemon humilis	9	-	8	.04	-	.06
F	Phlox hoodii	b ₂₇	b ₃₆	a ₇	.56	1.34	.33
F	Phlox longifolia	b ₁₂₉	a ₄₇	c ₁₆₃	1.36	.41	2.54
F	Polygonum douglasii (a)	b ₆₉	a ₂₇	c ₂₉₄	.19	.26	4.40
F	Ranunculus testiculatus (a)	-	-	10	-	-	.01
F	Salsola iberica (a)	-	-	1	-	-	.00
F	Schoenocrambe linifolia	-	-	7	-	-	.01
F	Senecio integerrimus	16	13	5	.09	.06	.04
F	Sedum lanceolatum	9	11	-	.06	.09	-
F	Sphaeralcea coccinea	-	-	3	-	-	.03
F	Taraxacum officinale	b ₅₈	a ₃	a ₉	.21	.03	.20
F	Trifolium gymnocarpon	75	59	69	.73	.96	.62
F	Unknown forb-annual (a)	3	-	-	.00	-	-
F	Zigadenus paniculatus	-	-	2	-	-	.00
Total for Annual Forbs		397	35	688	2.29	0.28	8.94
Total for Perennial Forbs		951	517	523	13.90	12.60	13.11
Total for Forbs		1348	552	1211	16.19	12.88	22.05

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

BROWSE TRENDS --

Management unit 08B, Study no: 9

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	7	4	3	.21	.18	.03
B	Artemisia nova	4	0	1	.00	-	-
B	Artemisia tridentata vaseyana	82	87	46	24.90	23.68	1.22
B	Chrysothamnus viscidiflorus viscidiflorus	7	8	6	.53	.21	.53
B	Eriogonum heracleoides	67	65	26	7.47	7.94	1.88
B	Gutierrezia sarothrae	2	0	0	.15	-	-
B	Purshia tridentata	1	1	1	-	.03	.15
B	Symphoricarpos oreophilus	9	10	7	.96	1.19	1.81
Total for Browse		179	175	90	34.23	33.23	5.63

CANOPY COVER, LINE INTERCEPT --

Management unit 08B, Study no: 9

Species	Percent Cover '05
Amelanchier utahensis	.33
Artemisia tridentata vaseyana	1.73
Chrysothamnus viscidiflorus viscidiflorus	.40
Eriogonum heracleoides	2.31
Purshia tridentata	.06
Symphoricarpos oreophilus	1.08

BASIC COVER --

Management unit 08B, Study no: 9

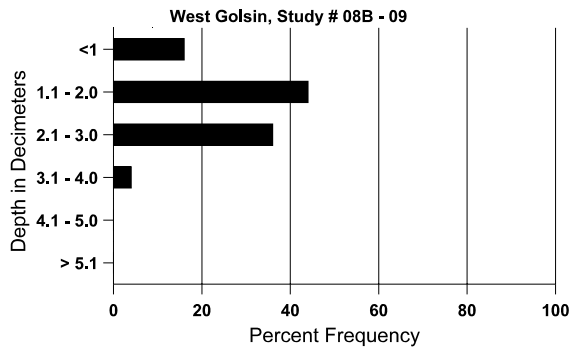
Cover Type	Average Cover %		
	'95	'00	'05
Vegetation	55.49	61.42	44.98
Rock	1.75	1.41	2.09
Pavement	.12	1.22	2.40
Litter	61.50	70.24	21.14
Cryptogams	.07	.00	.01
Bare Ground	8.76	6.59	36.85

SOIL ANALYSIS DATA --

Herd Unit 8B, Study # 9, Study Name: West Goslin

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.4	59.4 (14.1)	6.1	64.0	21.4	14.6	3.0	4.7	134.4	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 08B, Study no: 9

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	-	3	20
Grouse	-	-	1
Elk	7	7	9
Deer	3	4	6
Cattle	-	5	3
Antelope	-	-	2

Days use per acre (ha)	
'00	'05
-	-
-	52/acre
30 (74)	80 (197)
7 (17)	34 (84)
4 (11)	15 (36)
-	-

BROWSE CHARACTERISTICS --
Management unit 08B, Study no: 9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
95	260	-	60	180	20	-	23	8	8	-	0	27/41
00	80	-	-	80	-	-	25	50	0	-	0	27/33
05	80	-	40	40	-	-	0	75	0	-	0	11/17
Artemisia nova												
95	80	-	-	60	20	-	50	50	25	25	25	6/9
00	0	-	-	-	-	-	0	0	0	-	0	-/-
05	20	-	20	-	-	-	0	0	0	-	0	-/-
Artemisia tridentata vaseyana												
95	3380	20	220	2700	460	480	25	2	14	4	4	30/43
00	3600	200	240	2320	1040	660	7	1	29	7	9	28/43
05	1880	40	1300	580	-	-	3	3	0	-	1	7/11
Cercocarpus montanus												
95	0	-	-	-	-	-	0	0	-	-	0	68/84
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	15/23
Chrysothamnus viscidiflorus viscidiflorus												
95	200	-	20	180	-	-	0	0	0	-	0	8/12
00	260	-	60	180	20	-	0	0	8	-	0	9/14
05	240	20	20	220	-	-	0	0	0	-	0	12/20
Eriogonum heracleoides												
95	5440	-	40	5400	-	-	0	0	-	-	0	11/14
00	6360	-	1120	5240	-	-	0	0	-	-	0	4/10
05	1260	-	-	1260	-	-	0	0	-	-	0	7/14
Gutierrezia sarothrae												
95	40	-	-	40	-	-	0	0	-	-	0	6/7
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Mahonia repens												
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	3/9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
95	20	-	-	20	-	-	0	100	-	-	0	15/42
00	60	-	-	60	-	-	0	0	-	-	0	16/28
05	20	-	-	20	-	-	0	100	-	-	0	7/24
Symphoricarpos oreophilus												
95	340	-	-	340	-	-	41	0	-	-	0	24/47
00	320	-	20	300	-	-	0	0	-	-	0	25/53
05	220	-	20	200	-	-	0	0	-	-	0	14/45
Tetradymia canescens												
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	10/25

Trend Study 8B-14-05

Study site name: Clay Basin Bench .

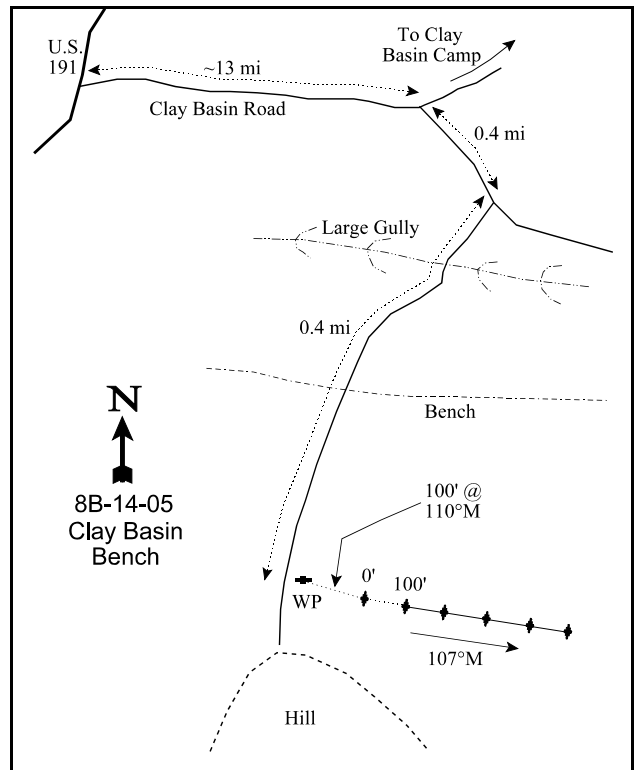
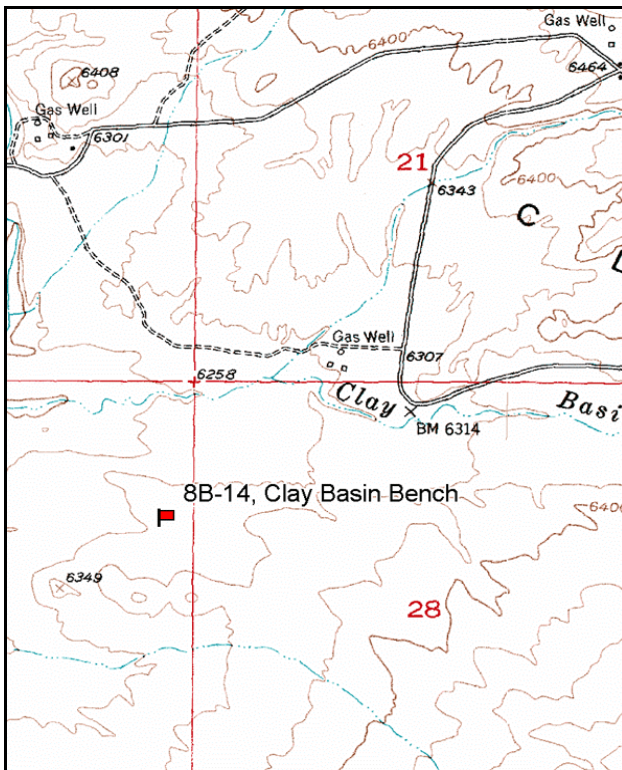
Vegetation type: Big Sagebrush .

Compass bearing: frequency baseline 107 degrees magnetic.

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

LOCATION DESCRIPTION

From Dutch John, proceed north towards Antelope Flat on Highway U.S. 191. Continue over the stateline into Wyoming and turn right just after Minnies Gap onto the Clay Basin road. Drive approximately 13 miles towards Clay Basin to the turn off to Clay Basin Camp. Turn right again and proceed 0.4 miles to another intersection. Turn right and go 0.4 miles going through the large gully and onto the bench. The witness post is on the left side of the road. The 0-foot stake is 100 feet away at a bearing of 110°M.



Map Name: Clay Basin

Diagrammatic Sketch

Township 3N, Range 24E, Section 29

GPS: NAD 27, UTM 12T 4536817 N, 649556 E

DISCUSSION

Clay Basin Bench - Trend Study No. 8B-14

The Clay Basin Bench study was established in 2000 to monitor important big game winter range. The site is on a bench about 1 mile to the south of Clay Basin Camp. It samples a Wyoming big sagebrush type with a gentle slope of 1-3% at an elevation of 6,300 feet. The aspect is to the northwest. Cattle graze this area in the summer and were in the area when the site was established. Deer and elk have used the area primarily as winter range. Pellet group data in 2000 estimated 5 elk, 56 deer, and 17 cow days use/acre (12 edu/ha, 138 ddu/ha, and 42 cdu/ha). Pellet group data in 2005 estimated 3 elk, 25 deer, and 12 cow days use/acre (8 edu/ha, 63 ddu/ha, and 30 cdu/ha) with deer and elk use in winter. No differentiation was made between deer and antelope pellets, although it is quite probable that antelope can frequent the area as well. Cows were estimated to have been on the site on the previous summer and early spring of the same year.

Soil is relatively deep and rock free but compacted with an effective rooting depth estimated at nearly 13 inches. It has a sandy loam texture with a neutral soil reaction (pH of 7.3). Phosphorus is marginal at 6.3 ppm. Values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). There are some small active gullies on the site which appear to have originally been cattle trails. Herbaceous vegetation is lacking and percent bare ground has been moderately high at 44% in 2000 and 47% in 2005. An important stabilizing factor for the soil in 2000 was the high cryptogamic cover (23%) which, combined with vegetation and litter, provided marginally sufficient protective ground cover. In 2005, this cryptogam cover had decreased to 9%, which increased the potential for soil erosion. The erosion condition class determined soil movement as stable in 2005.

The site supported an old stand of Wyoming big sagebrush with a density of 6,500 plants/acre in 2000. There was little reproduction in the form of seedlings and young. Seed production was poor and not much better the previous season. Leader growth was poor, averaging about 1 inch, which gave the sagebrush the appearance of being heavily hedged. Percent decadence was moderately high at 32% and approximately 14%, or 900 plants/acre, of the population were classified as dying. The site has been subject to years of heavy use by wildlife as well as livestock, as is evident by the mostly moderate to heavy use noted in 2005. Between the readings in 2000 and 2005, the population experienced a significantly large die-off. In 2005, the population had decreased to 1,860 plants/acre, 89% of which were classified as decadent. As well, 82% of the population were classified as dying with young only representing 2% of the population. Use increased from mostly moderate to mostly heavy. So few plants were mature healthy individuals, that no leader growth data was measured in 2005.

Additional browse forage is provided by small numbers of winterfat, stickyleaf low rabbitbrush and slenderbush eriogonum. Winterfat density increased in 2005, as did the stickyleaf low rabbitbrush, but the slenderbush eriogonum was no longer present in 2005. In 2000, broom snakeweed had a density of 12,660 plants/acre which provided 18% of the browse cover, but no individuals were sampled in 2005. This is likely due to the drought.

The herbaceous understory was lacking in 2000. Perennial grasses, consisting primarily of western wheatgrass, Indian ricegrass and needle-and-thread, produced only about 5% total cover. Forbs were also lacking and produced only 2% cover. Six species were encountered with hoods phlox, a low value, low-growing species, which dominated the composition (98% of the forb cover). In 2005, forbs had decreased to 1% total cover and perennial grasses had increased to 20%. Cheatgrass, the only annual grass on the site, decreased from a quadrat frequency of 6 to 1 by 2005.

2000 APPARENT TREND ASSESSMENT

The soil condition is poor due to a high percentage of bare ground combined with low litter and vegetation cover. Even with the slight slope, some active erosion is occurring within the shrub interspaces. Condition of the key browse species, Wyoming big sagebrush, is also poor. The stand is overly mature with no seedlings evident and poor young recruitment at only 2%. Use is mostly moderate and percent decadence is fairly high at 32%. In addition, 14% of the population are classified as dying and there are currently not enough young plants to replace those that are dead. Desirable Components Index rated this site as good to fair with a score of 45 due to good browse cover, fair perennial grass cover, and moderately high browse decadence.

winter range condition (DC Index) - good to fair (45) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is down slightly. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 2.9:1 to 2.5:1, a 14% decrease. This is mainly due to a slight increase in bare ground and a substantial decrease in cryptogram cover (26% of nested frequency and 50% of relative cover). The trend for browse is down. This is due the drastic decrease in the key browse species Wyoming big sagebrush, which decreased in density from 6,500 to 1,860 plants/acre between 2000 and 2005. The percentage of decadent plants increased from 32% to 89%, the individuals classified as dying increased from 14% to 82%, and young plants remained at 2% of the population. To make recovery more difficult, utilization appeared high, inhibiting individual growth. The herbaceous understory trend is up. The sum of the nested frequencies of perennial grasses and perennial forbs increased 14%. The increase in the sum of the nested frequencies of perennial grasses was much higher, but the sum of the nested frequencies of forbs decreased. However, the increase in grasses was much greater than the loss of forbs. Desirable Components Index rated this site as fair with a score of 35 due to very poor browse cover and excellent perennial grass cover.

TREND ASSESSMENT

soil - down slightly (-1)

browse - down (-2)

herbaceous understory - up (+2)

winter range condition (DC Index) - fair (35) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 08B, Study no: 14

T y p e	Species	Nested Frequency		Average Cover %	
		'00	'05	'00	'05
G	Agropyron smithii	134	120	1.30	1.66
G	Agropyron spicatum	-	5	-	.03
G	Bromus tectorum (a)	_b 18	_a 2	.10	.00
G	Oryzopsis hymenoides	_b 71	_a 42	1.12	.79
G	Poa fendleriana	_a 4	_b 38	.00	.76
G	Poa secunda	_a 80	_b 269	.36	10.15
G	Sitanion hystrix	14	22	.10	.38
G	Stipa comata	_a 132	_b 154	2.43	5.77
Total for Annual Grasses		18	2	0.10	0.00

T y p e	Species	Nested Frequency		Average Cover %	
		'00	'05	'00	'05
	Total for Perennial Grasses	435	650	5.33	19.56
	Total for Grasses	453	652	5.44	19.56
F	<i>Collinsia parviflora</i> (a)	-	3	-	.01
F	<i>Descurainia pinnata</i> (a)	_a -	_b 14	-	.38
F	<i>Erigeron pumilus</i>	2	-	.01	-
F	<i>Hymenoxys richardsonii</i>	4	-	.00	-
F	<i>Lappula occidentalis</i> (a)	_a -	_b 36	-	.31
F	<i>Lepidium</i> sp. (a)	-	8	-	.02
F	<i>Machaeranthera canescens</i>	-	3	-	.01
F	<i>Penstemon</i> sp.	1	-	.00	-
F	<i>Phlox hoodii</i>	_b 134	_a 12	1.92	.13
F	<i>Ranunculus testiculatus</i> (a)	-	11	-	.04
F	<i>Schoenocrambe linifolia</i>	2	1	.00	.03
F	<i>Townsendia incana</i>	4	-	.01	-
	Total for Annual Forbs	0	72	0	0.76
	Total for Perennial Forbs	147	16	1.95	0.18
	Total for Forbs	147	88	1.95	0.94

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

BROWSE TRENDS --

Management unit 08B, Study no: 14

T y p e	Species	Strip Frequency		Average Cover %	
		'00	'05	'00	'05
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	97	54	15.67	2.75
B	<i>Ceratoides lanata</i>	10	10	.21	.24
B	<i>Chrysothamnus viscidiflorus</i> <i>viscidiflorus</i>	5	6	.03	-
B	<i>Eriogonum microthecum</i>	6	0	.00	-
B	<i>Gutierrezia sarothrae</i>	82	0	3.92	-
B	<i>Opuntia</i> sp.	43	47	1.75	2.71
	Total for Browse	243	117	21.60	5.71

CANOPY COVER, LINE INTERCEPT --
 Management unit 08B, Study no: 14

Species	Percent Cover '05
Artemisia tridentata wyomingensis	1.75
Ceratoides lanata	-
Chrysothamnus viscidiflorus viscidiflorus	.05
Opuntia sp.	1.75

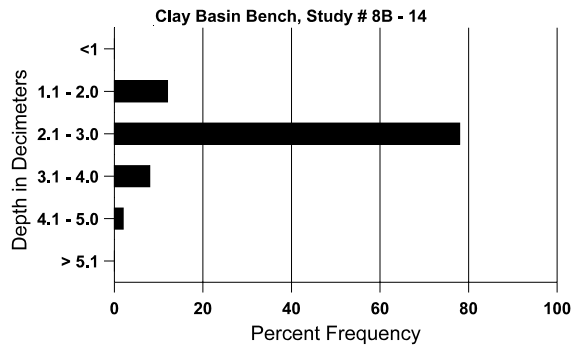
BASIC COVER --
 Management unit 08B, Study no: 14

Cover Type	Average Cover %	
	'00	'05
Vegetation	28.52	24.39
Rock	.20	.16
Pavement	.60	.12
Litter	29.68	29.11
Cryptogams	22.77	9.35
Bare Ground	43.54	46.50

SOIL ANALYSIS DATA --
 Herd Unit 8B, Study # 14, Study Name: Clay Basin Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
12.9	56 (13.09)	7.3	65.6	17.1	17.3	1.2	6.3	89.6	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 08B, Study no: 14

Type	Quadrat Frequency		Days use per acre (ha)	
	'00	'05	'00	'05
Rabbit	9	83	-	-
Elk	3	2	5 (13)	3 (8)
Deer	47	18	56 (139)	25 (63)
Cattle	4	7	17 (43)	12 (30)

BROWSE CHARACTERISTICS --

Management unit 08B, Study no: 14

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
00	6500	-	140	4300	2060	680	51	8	32	14	14	13/25
05	1860	-	40	160	1660	3860	34	65	89	82	82	12/13
<i>Ceratoides lanata</i>												
00	320	-	-	260	60	-	63	25	19	13	13	3/6
05	380	-	40	320	20	-	5	95	5	-	0	6/7
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
00	100	-	-	100	-	-	40	0	-	-	0	8/7
05	120	-	20	100	-	-	33	0	-	-	0	14/16
<i>Eriogonum microthecum</i>												
00	140	-	-	140	-	-	14	57	-	-	0	4/5
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Gutierrezia sarothrae</i>												
00	12660	80	480	11780	400	60	0	0	3	.31	.78	4/7
05	0	-	-	-	-	-	0	0	0	-	0	-/-
<i>Opuntia sp.</i>												
00	1240	-	40	1040	160	-	0	0	13	-	0	3/14
05	2160	-	-	1560	600	100	0	0	28	3	3	4/16

SUMMARY

WILDLIFE MANAGEMENT UNIT - 8B - NORTH SLOPE, DAGGETT

A total of 9 study sites were read on unit 8B in 2005. Of these, five were rereads of sites established in 1982, two were rereads of studies established in 1988, one was a reread of a site established in the Goslin Mountain area in 1995, and one was a study established in 2000 in Clay Basin. One site, Cedar Springs (8B-1) was suspended in 2000 and four more (8B-10, 8B-11, 8B-12 and 8B-13) were not read in 2005. Cedar Springs is totally dominated by pinyon and juniper leaving little browse in the understory. It is no longer considered representative of big game winter range. Sagebrush Ridge (8B-10) is very similar in vegetation to Goslin Mountain (8B-2) and is very close in proximity. This site will likely be reread in 2010. The other sites (8B-11, 8B-12, and 8B-13) showed little change in 2000 from the 1995 reading, therefore these sites will be read only on ten year intervals. Of the 9 study sites sampled, 3 were Wyoming big sagebrush, 2 were mountain brush, and 4 were mountain big sagebrush dominated sites.

Of the 9 trend studies in the 2005 trend assessments, 3 sites had stable soil trends, 1 had improving trends and 5 trend studies (Greendale, Antelope Flat, Phil Pico Mtn, West Goslin, and Clay Basin Bench) had declining trends. Of the 9 trend studies, 1 had improving browse trends, 3 were stable, and 5 had declining trends due to drought conditions and/or fire (Goslin Mtn, Bear Top Mtn, Antelope Flat, West Goslin, and Clay Basin Bench). Clay Basin Bench showed a large-scale sagebrush die-off between the 2000 and 2005 readings. Of all the sites within this unit, the Clay Basin Bench site occurs at the lowest elevation (driest site), which may explain these high losses. Herbaceous trends were stable on 4 sites, were upward on 2 sites, and were down on 3 sites (Bear Top Mountain, Phil Pico Mountain, and West Goslin).

The key browse species are principally Wyoming big sagebrush and mountain big sagebrush for this herd unit, both of which are of primary importance during the critical winter months. The exception would be mountain browse sites where the primary browse source is usually true mountain mahogany. However, there is still a significant component of sagebrush within these communities. Areas where sagebrush is the key species have shown continuing increases in decadence and loss of plants. Their respective perennial forb understories have shown similar downward trends in the last 10 years. Wyoming big sagebrush communities, with their lower site potentials, seem to be declining more severely than the mountain big sagebrush communities, which have inherently higher site potentials. The following series of values are averages listed in order of year sampled (1995, 2000, and 2005). These values help illustrate best the differences between the two species of sagebrush. These averages are as follows:

- percent decadence.. 20%, 30%, and 25% for mountain big sagebrush
- percent decadence.. 15%, 39%, and 52% for Wyoming big sagebrush
- percent dying..... 9%, 12%, and 16% for mountain big sagebrush
- percent dying..... 5%, 17%, and 43% for Wyoming big sagebrush
- population changes 2,505, 2,655, and 2,190 plants/acre for mountain big sagebrush (-13% change)
- population changes 5,850, 5,860, and 3,940 plants/acre for Wyoming big sagebrush (-33% change)

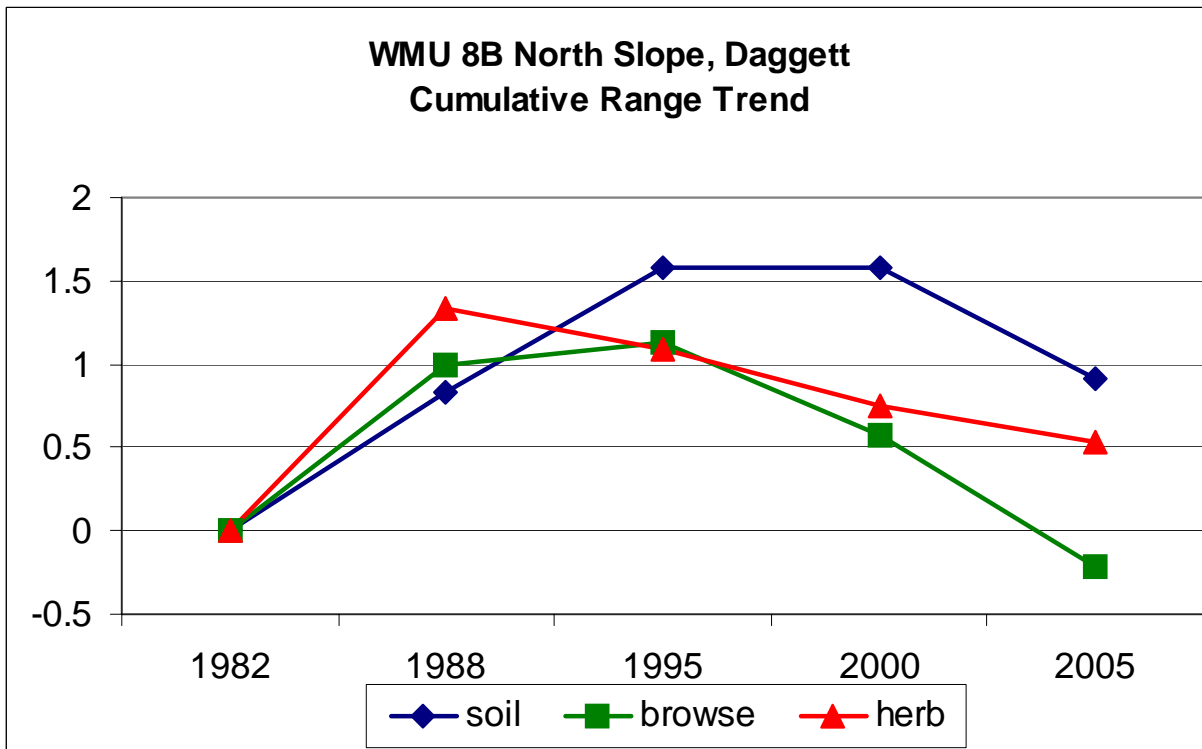
The perennial forb understories associated with mountain big sagebrush and Wyoming big sagebrush have similar downward trends, but upward trends for perennial grasses with regard to the site potentials of the two sagebrush subspecies communities. The following values show percent change in nested frequency values for perennial grasses and forbs for both sagebrush communities from 1995 and 2005.

- percent change for perennial grasses...+8% for mountain big sagebrush
- percent change for perennial grasses...+4% for Wyoming big sagebrush
- percent change for perennial forbs.....-15% for mountain big sagebrush
- percent change for perennial forbs.....-47% for Wyoming big sagebrush

Pellet group data estimated an overall increase in wildlife use on the sites in 2005. Elk pellet numbers increased on 3 sites, decreased on 2 (Greendale and Antelope Flat), remained the same on 3, and was not sampled on one site (Goslin Mtn). Deer pellet numbers increased on 6 sites, remained unchanged on 1, and decreased on 2 (Death Valley and Clay Basin Bench). Antelope pellets were not differentiated from deer pellets, but were suspected to be on the Goslin Mtn, Bear Top Mountain, Death Valley, Antelope Flat, West Goslin, and Clay Basin Bench sites. Moose pellets were sampled for the first time on the Death Valley site (8B-6). Sagegrouse pellets were sampled for the first time on Bear Top Mountain, Antelope Flat, and West Goslin.

Cumulative Range Trends—WMU 8B North Slope, Daggett

	1982	1988	1995	2000	2005
soil	0	0.5	1.0	0.9	0.5
browse	0	0.7	0.4	0.0	-0.7
herb	0	1.2	0.7	0.3	0.1



TREND SUMMARY

	Category	1982	1988	1995	2000	2005
8B-1 Cedar Springs	soil	est	0	+1	NR	NR
	browse	est	-2	-2	NR	NR
	herbaceous understory	est	-1	0	NR	NR
8B-2 Goslin Mountain	soil	est	0	+1	+1	0
	browse	est	0	-1	0	-1
	herbaceous understory	est	+1	0	+1	0
8B-3 Bear Top Mountain	soil	est	0	0	-2	+2
	browse	est	+2	0	-2	-1
	herbaceous understory	est	+2	-2	0	-1
8B-4 Greendale	soil	est	+1	+1	0	-1
	browse	est	+2	0	0	0
	herbaceous understory	est	+2	+2	-2	+1
8B-5 Bennett Ranch	soil	est	+1	0	0	0
	browse	est	+2	+1	-1	0
	herbaceous understory	est	+1	-1	0	0
8B-6 Death Valley	soil	est	+1	0	0	0
	browse	est	0	0	-1	0
	herbaceous understory	est	+2	0	+1	0
8B-7 Antelope Flat	soil		est	+1	0	-1
	browse		est	0	0	-1
	herbaceous understory		est	-1	0	0
8B-8 Phil Pico Mountain	soil		est	0	0	-1
	browse		est	0	0	+1
	herbaceous understory		est	-2	0	-1
8B-9 West Goslin	soil			est	0	-2
	browse			est	0	-2
	herbaceous understory			est	-2	-2

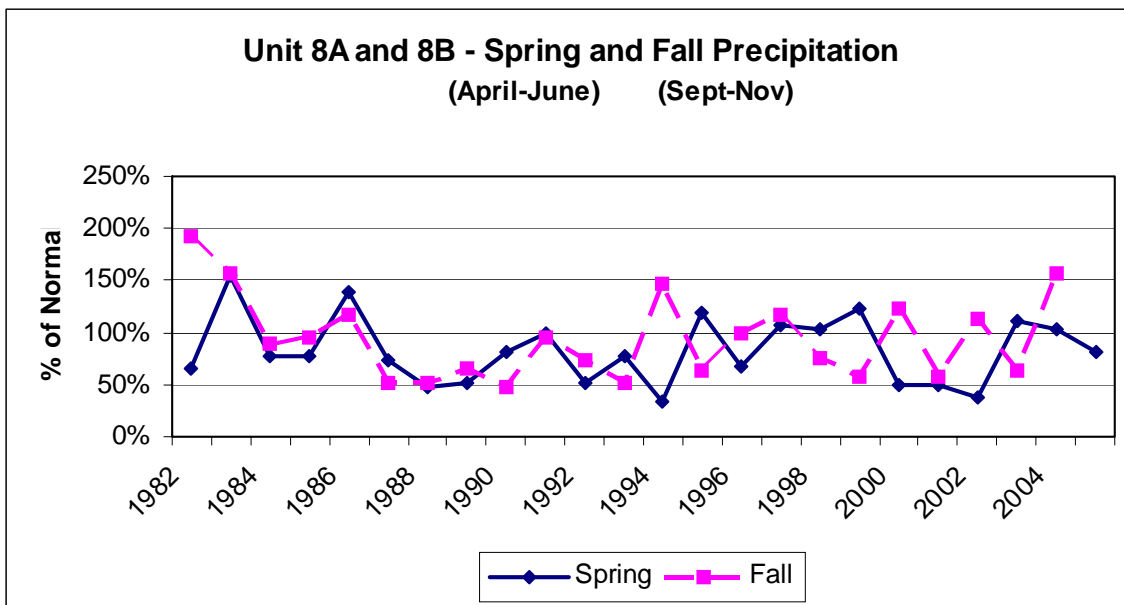
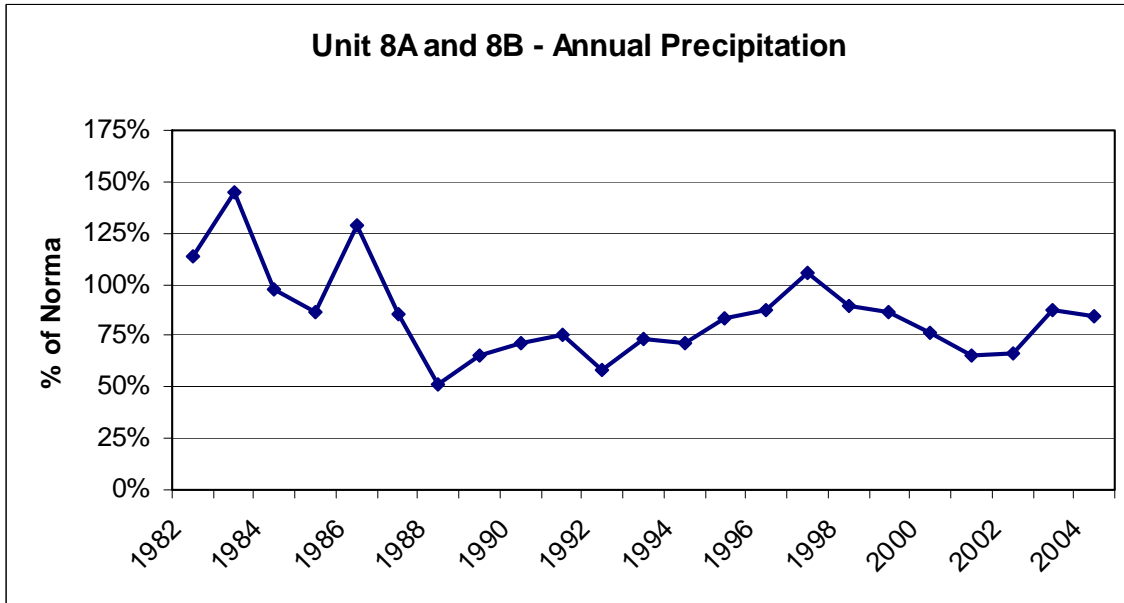
(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up
 est = site established, NA = data not available, NR = site not read

	Category	1982	1988	1995	2000	2005
8B-10 Sagebrush Ridge	soil			est	0	NR
	browse			est	0	NR
	herbaceous understory			est	-1	NR
8B-11 Triangle Meadow	soil			est	0	NR
	browse			est	NA	NR
	herbaceous understory			est	0	NR
8B-12 Big Meadow	soil			est	0	NR
	browse			est	NA	NR
	herbaceous understory			est	-1	NR
8B-13 Lower Big Meadow	soil			est	0	NR
	browse			est	NA	NR
	herbaceous understory			est	-1	NR
8B-14 Clay Basin Bench	soil				est	-1
	browse				est	-2
	herbaceous understory				est	+2

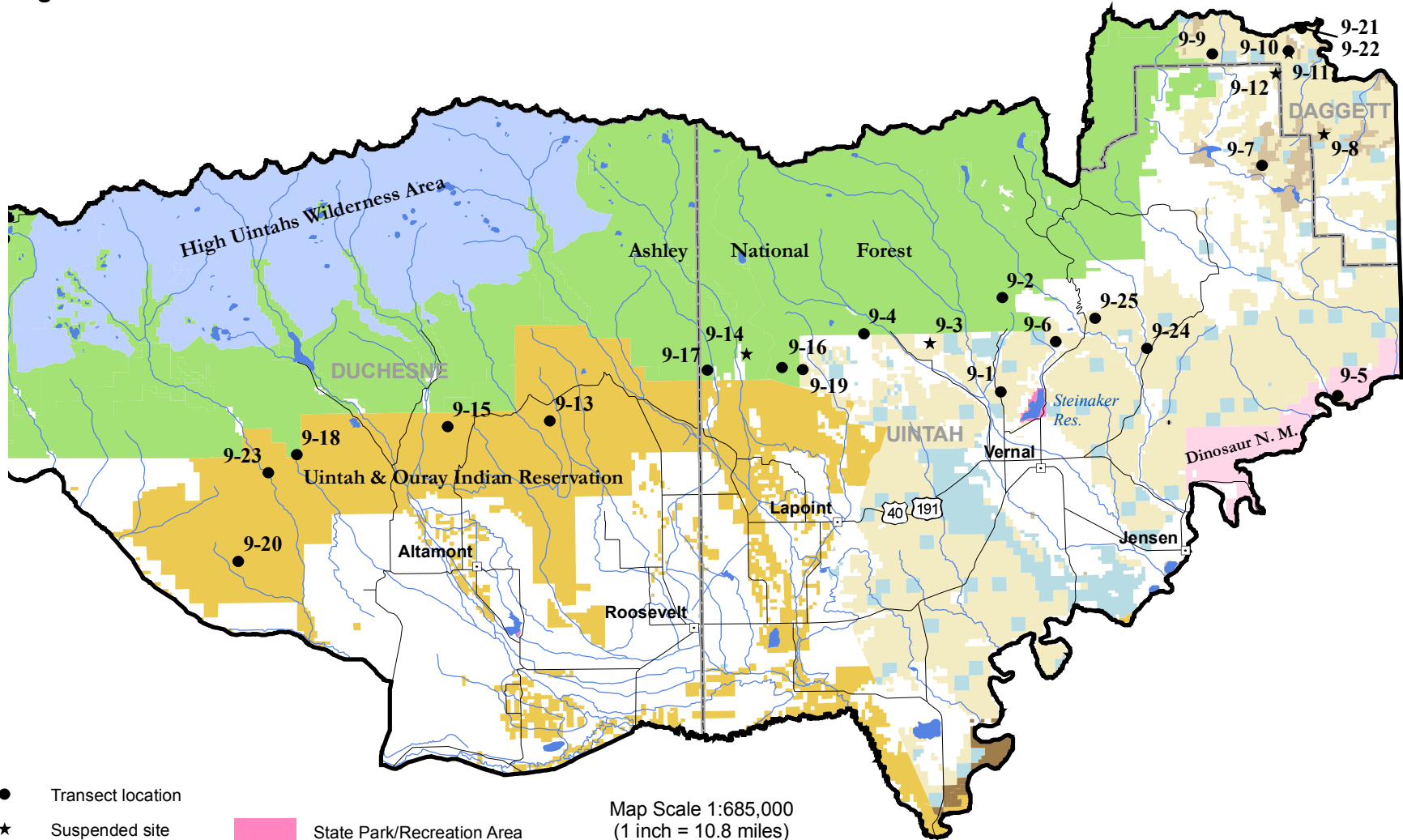
	Category	1982	1988	1995	2000	
Average Range Trend	soil	0.5	0.5	-0.1	-0.4	
	browse	0.7	-0.3	-0.4	-0.7	
	herbaceous understory	1.2	-0.5	-0.4	-0.1	
Total Number of Sites Read		6	8	13	13	9

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up
 est = site established, NA = data not available, NR = site not read

Precipitation graphs for the North Slope Summit and Daggett unit. Data is percent of normal precipitation averaged for weather stations at Manila, Flaming Gorge, Allen Ranch, and Mountain View, WY (Utah Climate Summaries 2005).



Management Unit 9

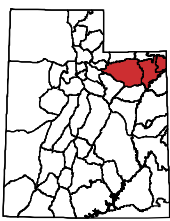


Map Scale 1:685,000
(1 inch = 10.8 miles)



- | | | | |
|---|-------------------|---|----------------------------|
| ● | Transect location | ■ | State Park/Recreation Area |
| ★ | Suspended site | ■ | State Wildlife Reserve |
| ■ | Forest Service | ■ | National Wildlife Refuge |
| ■ | BLM | ■ | National Wilderness Area |
| ■ | State of Utah | ■ | Water body |
| ■ | Native American | — | River or stream |
| □ | Private | — | Road |
| ■ | National Monument | | |

Unit Location



WILDLIFE MANAGEMENT UNIT 9 - SOUTH SLOPE

Boundary Description

Wasatch, Summit, Daggett, Uintah, Duchesne counties -- Boundary begins at the junction of Highway US-40 and Highway SR-87 in Duchesne; then north on SR-87 to Highway SR-35; then northwest on SR-35 to the Provo River; north along the Provo River to the North Fork Provo River; north along the North Fork Provo River to Highway SR-150; northerly along SR-150 to the Summit/Duchesne county line (summit of the Uinta Mountains); east along the summit of the Uinta Mountains to Highway SR-191; north along SR-191 to Cart Creek; northeast along Cart Creek to Flaming Gorge Reservoir; east along Flaming Gorge Reservoir to the Green River; east along the Green River to the Utah-Colorado state line; south along the Utah-Colorado state line to the White River; west along the White River to the Green River; north along the Green River to the Duchesne River; northwest along the Duchesne River to US-40 at Myton; west along US-40 to SR-87 in Duchesne and beginning point; excludes Dinosaur National Monument and all Indian Tribal Lands.

Management Unit Description

This management unit encompasses the land area of two former deer herd units, the Vernal unit (9) and the South Slope unit (8A & 8B). Currently, the South Slope unit contains an estimated 2.8 million acres of deer range with summer, year-long, and winter ranges making up 40%, 35%, and 25% of this area respectively. Of all the land area classified as deer range, 32% is managed by the U.S. Forest Service, 25% by the Bureau of Land Management, and 22% are privately owned lands. In addition, 13% are Native American trust lands, and 5% are State of Utah trust lands. The South Slope unit also contains about 1.7 million acres classified as elk range. Of this amount, 64% is classified as elk summer range, 32% elk winter range, and 4% year-long range. The U.S. Forest Service and Bureau of Land Management manage 53% and 13% of the acreage classified as elk range, with private and Native American trust lands each making up 15% of the area.

Winter range within the old Vernal deer herd unit (11) is comprised mainly of closely associated areas of pinyon-juniper woodlands on the south-facing slopes and foothill benches of Diamond, Blue, and Taylor Mountains. The upper limits generally follow the 8,500 foot contour. The lower limits are defined by agricultural lands and the desert below Vernal. Winter ranges within the old South Slope (12) unit are more limiting, and management is complicated in that a large portion of these lands are part of Uintah and Ouray Indian Reservations. Summer range within the new South Slope unit are plentiful, ranging from aspen and conifer communities, to mountain big sagebrush and mountain brush communities.

Key Areas

Key areas for winter range consist of the small sagebrush/grass parks found throughout the pinyon-juniper woodlands, especially on the Vernal side of the unit. The sparse pinyon-juniper type predominates the foothills where diversity and productivity of desirable browse is usually relatively low. Areas with a sagebrush understory or sagebrush/grass associations are more productive. Therefore, these areas normally receive more use by big game and livestock. Key areas that sample this type are Red Mountain, Dry Fork Mountain, Island Park, and Brown's Park. Key areas at Steinaker Draw, Toliver Creek, and Brown's Park sample winter range in the pinyon-juniper type, including areas that have either been chained or burned. Higher winter ranges in the mountain brush and mountain big sagebrush zones also provide important winter range for big game in this unit, especially along the south slope of the Uinta Mountains. Key areas within these vegetation types include: Little Hole, John Starr Flat, Red Pine Canyon, Mosby Mountain, Gooseberry Spring, and Seep Hollow. Key areas in transitional and summer ranges are sampled on Taylor, Mosby, and Diamond Mountains.

Grazing Summary

Grazing on BLM managed lands occurs under several different allotments. They are generally grazed by cattle in spring and/or summer. The Red Mountain allotment is grazed under a deferred system in either spring or fall, but not both. Dry Fork Mountain is grazed from approximately June 1 to September 15 for 470 AUM's. Actual use averages 334 AUM's per year due to a lack of water. The BLM Spring Creek allotment below Taylor Mountain has been grazed by cows in the spring (May) and late fall (November 26 to December 15) for the last 12 years. The Little Hole allotment is grazed from June 1 to October 15 for 330 AUM's. The Warren Draw allotment is permitted for 376 AUM's from May 15 to October 31. Cows use the lower areas of Browns Park on the Taylor Flat allotment in spring. The intensive annual grazing from April 1 to May 31 is planned to reduce grass-shrub competition and to promote sagebrush vigor. However, better livestock distribution is needed. Furthermore, this will not work during drought because the cattle will heavily utilize sagebrush during this grazing period when grasses are not available. There have been 1,000 AUM's permitted since 1970. The land in the drainages above Brown's Park that were burned in the 1980's are grazed only one out of every three years.

Forest Service land on Taylor Mountain is managed in a six pasture rest-rotation system with grazing occurring from June 1 to September 15. The unit in which the trend study is located supports about 500 AUM's in non-rested years for a grazing intensity of 2.9 suitable acres/AUM. The Lake Mountain allotment is grazed by 276 cows/calves from June 21 to September 30, on a four unit rest-rotation system. The Mosby Mountain allotment consists of several grazing units and has been in a rest-rotation system since 1960. Currently, this allotment is permitted for 402 cattle from June 11 to September 30. The Red Pine Canyon area is in the Whiterocks Canyon allotment and is grazed by 50 cattle on a deferred rest system. The Farm Creek allotment is on a four unit rest-rotation system permitted for 576 cattle with a season of use from June 11 to September 10. Gooseberry Spring falls in the Pigeon Water allotment which is grazed by 172 cattle on a rest-rotation system with a season of use from June 16 to September 25.

Big Game Herd Unit Management Objectives

Deer herd population management goals call for a wintering herd size of 25,000 animals, distributed in the following sub-populations: 12,000 animals in the Yellowstone sub-unit; and 13,000 animals in the Vernal, Bonanza, and Diamond Mountain sub-units combined. The desired composition of the herd in all areas except Diamond Mountain is a post-season buck to doe ratio of 15:100 with 30% of the bucks being 3-point or better. The Diamond Mountain sub-unit will be managed for a post-season buck to doe ratio of 25:100 with the southern slope being managed as a limited entry unit (DeBloois et al. 2000).

Elk population management objectives call for a target population of 6,400 wintering animals distributed in the following sub-populations: 3,900 in the Yellowstone sub-unit; 1,300 in the Vernal/Bonanza sub-units combined; and 1,200 in the Diamond Mountain sub-unit. The desired herd composition is for a bull to cow ratio of 8:100, with at least half of the bulls being 2½ years of age or older. In the Diamond Mountain sub-unit (limited entry), a 5½ year old age class is to be maintained for harvest, with the rest of the unit being managed for general open bull hunting (DeBloois et al. 2000).

Study Site Description

Currently, this management unit contains 22 trend studies. Twelve of these existed in the old Vernal unit (11), 8 existed in the old South Slope unit (12), and 2 new studies were established in 2000. Fourteen studies were established in 1982, and 3 additional studies were established in both 1988 and 1995 in addition to the 2 new studies established in 2000 already mentioned. Depending upon when they were established, sites were re-read in 1988, 1995 and 2000. In 2000, the study at Toliver Creek in the untreated pinyon-juniper was not read because it is in very poor condition and there was very little wildlife use. This study was originally established

to compare with the adjacent Toliver Creek Chaining trend study. The study at Mud Springs Draw was also not read due to road closures and lack of access. In 2005, four sites were suspended and one site that was suspended in 2000, Mud Springs Draw, was added back to the rotation. Dry Fork Canyon was suspended because it had recently burned and Red Pine Canyon was suspended because the access road had been washed out. Rye Grass and Brown's Park Burn and PJ were suspended because they had showed little big game use and were in close proximity to other sites.

Trend Study 9-1-05

Study site name: Red Mountain Allotment .

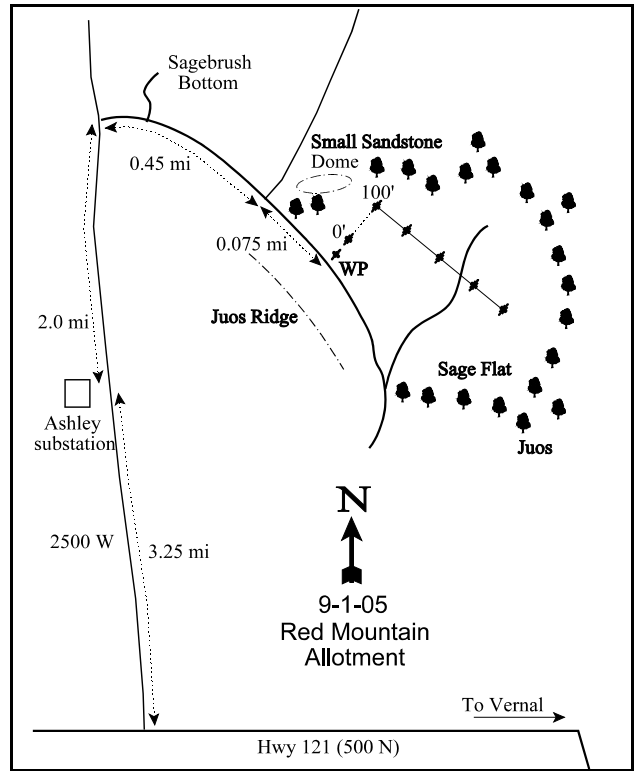
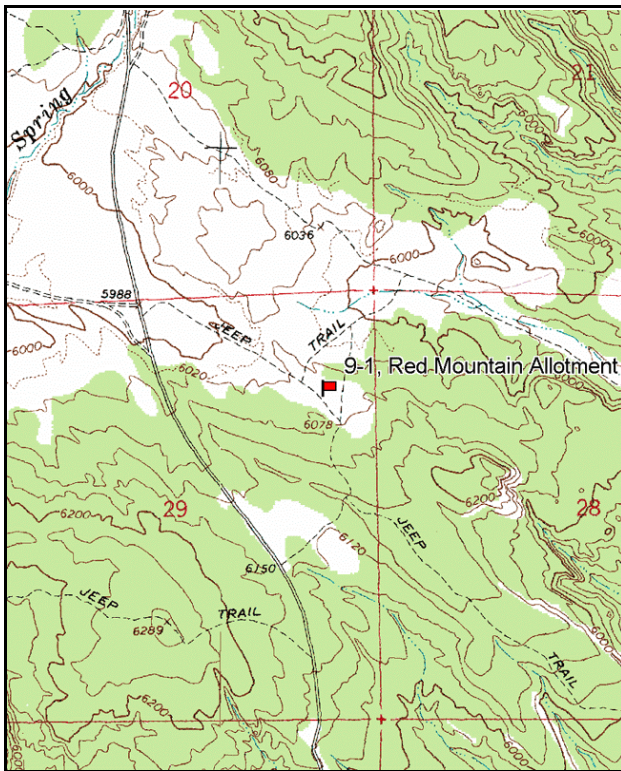
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 0'-100' is 9 degrees magnetic, 100'-500' is 105 degrees magnetic.

Frequency belt placement: line 1 (4ft), line 2 (28ft), line 3 (45ft), line 4 (77ft), line 5 (89ft).

LOCATION DESCRIPTION

From Highway 121 (500 N) west of Vernal in Maeser, go north on 2500 West for 3.25 miles to the Ashley substation. From there, continue 2.0 miles to a dirt road to the right in the sagebrush bottom. Turn and go east for 0.45 miles to a fork. Stay right and proceed less than 0.1 miles to the witness post on the left. The 0-foot stake should be visible in the sagebrush along the left side of the road. The study can also be located by walking 75 paces bearing 167°M from the east end of the sandstone dome to the 0-foot baseline stake.



Map Name: Steinaker Reservoir

Diagrammatic Sketch

Township 3S, Range 21E, Section 29

GPS: NAD 27, UTM 12T 4487663 N, 620390 E

DISCUSSION

Red Mountain Allotment - Trend Study No. 9-1

The Red Mountain Allotment trend study is located on big game winter range above Vernal. The site supports a nearly pure stand of Wyoming big sagebrush surrounded by pinyon-juniper covered rocky ridges. The terrain at the study site slopes gently to the north (3-5%) with an elevation of just over 6,000 feet. Pellet group data from 2000 estimated 47 deer and 1 cow days use/acre (116 ddu/ha and 2 cdu/ha). Pellet group data from 2005 estimated 59 deer and 2 cow days use/acre (146 ddu/ha and 5 cdu/ha). This study is in the Red Mountain cattle allotment managed by the Bureau of Land Management, which is grazed in spring or fall on a deferred system.

Soil texture is a sandy loam which is moderately deep and well drained. Estimated effective rooting depth is over 16 inches. Soils are moderately alkaline (pH of 7.9) and low in organic matter. Percent relative bare ground decreased from 22% cover in 2000 to 15% in 2005. However, this was because of the increase in cheatgrass cover. Limited soil movement is apparent in the form of soil pedestaling, although runoff is low and the terrain is relatively flat. The erosion condition class determined soil movement as stable in 2005.

Wyoming big sagebrush is the dominant browse species. Average percent cover estimated 21% in 1995, 20% in 2000, and 15% in 2005. Sagebrush density has declined over the years and estimated 4,360 in 1995, 5,440 in 2000, and 3,960 in 2005. Percent decadency has been predominantly high between sampling years since the establishment of this site in 1982. Percent decadence was 53% in 1988, 15% in 1995, 65% in 2000, and 69% in 2005. The percentage of dying plants in 1995 was 6% of the population and increased to 24% in 2000 and 33% in 2005. This suggests that 1,200 plants/acre could be lost from the 2005 population if recruitment does not increase and percent dying does not decrease. The sharp increase in percent dying and decadence can be related to the dry conditions between 2000 and 2004. Young recruitment has been low since 2000, but precipitation patterns were above normal in 2005 where a corresponding increase in seedlings were observed. Utilization has remained light to moderate with a slight increase in 2005.

All other browse species present are infrequent and include: stickyleaf low rabbitbrush, prickly pear cactus, Stansbury cliffrose, and prickly phlox.

Herbaceous vegetation occurs mainly under the canopy of sagebrush, leaving bare interspaces between individual shrubs. In 2005, much of the interspace was covered by cheatgrass. Annual species dominate both the grass and forb components. The dominant grasses have been cheatgrass and sixweeks fescue, the sum of which averaged 6-7% cover in 1995 and 2000, but increased substantially to 19% in 2005. Nested frequency of both of these species increased significantly in 2005. Sixweeks fescue sharply declined in nested frequency in 2000, but returned to previous levels in 2005. Perennial grasses have been in low abundance with 5 species sampled in 1995, 2000, and 2005. Muttongrass and Sandberg bluegrass are the most abundant, with needle-and-thread, thickspike wheatgrass, and bottlebrush squirreltail occurring in low numbers. Perennial grasses decreased in sum of nested frequency in 2005 and provided less than 1% cover. Forbs have been sparse during all sampling periods. Annual forbs were fairly abundant in 1995 after a wet spring, but were infrequent in 2000 and 2005. Perennial forbs are nearly non-existent.

1982 APPARENT TREND ASSESSMENT

Apparent vegetation trend on this site appears stable. Plant composition is less than desirable however. The key browse species, Wyoming big sagebrush, shows evidence of high utilization, which could eventually depress vigor and plant abundance. Soil trend appears to be declining. Of the seven applicable soil trend parameters on the evaluation checklist, five were judged as indicating a declining trend.

1988 TREND ASSESSMENT

Slight changes in ground cover measurements detected in 1988 are not significant. The possible exception is the increase in the cover of cryptogamic crusts. Bare soil still constitutes 30% of the ground surface, but that is a slight improvement from 1982 when percent bare ground was estimated at 35%. There are considerable areas of unprotected bare soil in the shrub interspaces, but serious erosion does not appear to be a significant problem due to the level terrain. Trend for soil is stable, yet in poor condition. Trend for the key browse species, Wyoming big sagebrush, is mixed. Population density has increased greatly, but entirely from an increase in the decadent age class which rose from 400 plants/acre in 1982 to 5,133 by 1988. Use is currently more moderate, yet vigor has declined with 2% of the population classified as dying. The data for shrub density suggests that the population has increased considerably since 1982, most likely caused by the extremely wet years of 1983 and 1984. However, sagebrush is likely poised to decline dramatically in the future if current drought conditions persist. Trend for browse is slightly down due to the high numbers of decadent individuals even though the mature population currently appears stable. The herbaceous trend is considered stable. The slight increase in quadrat frequency of perennial grasses does not warrant an improving trend. Forbs have remained stable.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - stable (0)

1995 TREND ASSESSMENT

Ground cover characteristics have improved slightly since 1988 with percent bare ground decreasing from almost 30% to 21%. Cryptogamic cover has also increased providing added soil protection. Even with this improvement, condition is still poor with large areas of bare ground in the shrub interspaces. Trend for browse is considered stable. Overall density has declined considerably but the result is a smaller, relatively healthier population. Overall use has remained about the same, vigor has slightly improved, and percent decadency has declined from 53% to 15%. Recruitment is fair with 120 seedlings and 360 young plants/acre. Trend for the herbaceous understory is slightly down with sum of nested frequency of perennial grasses declining for three of the five species encountered. Condition of the understory is poor due to the dominance of annual grasses and forbs. Cheatgrass and sixweeks fescue make up 82% of the grass cover while 8 annual forbs contribute 99% of the forb cover. These annual grasses and forbs were not included in the 1982 and 1988 samples so no comparisons can be made. The Desirable Components Index rated this site as fair with a score of 43 due to moderate annual grass cover, low percent of decadent shrubs, moderate recruitment of shrubs, and low perennial grasses cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - fair (43) Lower level Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable even with the slight increases in bare soil. These changes were not enough to warrant a change in trend. Percent bare ground slightly increased, but not excessively. Vegetation cover has declined slightly and sum of nested frequency of herbaceous vegetation has fallen due to drought. In addition, the ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil has also declined slightly. Very little protective ground cover is present in the interspaces between sagebrush plants, but erosion remains

minimal due to the level terrain. Trend for browse is slightly down as Wyoming big sagebrush has several downward characteristics. Percent decadency increased from 15% to 65% and poor vigor increased from 6% to 24% since 1995. The percentage of dying plants is moderate at 24%, representing about 1,300 plants/acre. Recruitment is low and not adequate to replace the decadent, dying portion of the population. These downward parameters are most likely the result of drought which could improve if precipitation returns to a normal level. Trend for the herbaceous understory is down and remains in poor condition. Sum of nested frequency of perennial species, which are already infrequent, decreased by half in 2000. Annual species dominate the understory at this site. The Desirable Components Index rated this site as poor with a score of 23 due to moderate annual grass cover, high percent of decadent shrubs, low recruitment of shrubs, and low perennial grasses cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - down (-2)

winter range condition (DC Index) - poor (23) Lower level Potential scale

2005 TREND ASSESSMENT

Trend for soil is slightly up. Percent bare ground decreased in nested frequency and the ratio of protective cover (vegetation, litter, and cryptograms) increased, mainly from increase in cheatgrass cover and frequency. Cheatgrass cover can vary from year to year and may not hold soil during low cover years (dry years). Trend for key browse, Wyoming big sagebrush is down. Density of sagebrush has decreased from 5,440 plants/acre in 2000 to 3,960 in 2005. Percent decadence is still high at 69% and percent dying increased from 24% in 2000 to 33% in 2005. Young recruitment is low and is not replacing the older, dying plants. Seedlings were abundant in 2005, but it is unknown if they survived the summer. Trend for herbaceous understory is down. Nested frequency of cheatgrass and six-weeks fescue increased significantly with the increased precipitation in 2005. Perennial grasses are limited on the site and Sandberg bluegrass, the most abundant, decreased significantly in nested frequency. The Desirable Components Index rated this site as very poor with a score of 4 due to high annual grass cover, high percentage of decadent shrubs, low recruitment of shrubs, and low perennial grass cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - very poor (4) Lower level Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 1

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	_b 71	_b 53	_a 15	_a 14	.33	.12	.06
G	Bromus tectorum (a)	-	_a 251	_a 290	_b 380	5.64	6.90	19.26
G	Oryzopsis hymenoides	2	-	-	-	-	-	-
G	Poa fendleriana	111	_b 51	_{ab} 45	_a 23	.66	.35	.52

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Poa secunda</i>	-	_a 17	_b 47	_a 15	.40	.61	.15
G	<i>Sitanion hystrix</i>	_c 50	_b 25	_a 4	_a 9	.23	.03	.07
G	<i>Stipa comata</i>	3	3	2	5	.06	.03	.03
G	<i>Vulpia octoflora</i> (a)	-	_b 252	_a 31	_b 251	1.82	.09	2.31
Total for Annual Grasses		0	503	321	631	7.47	6.99	21.57
Total for Perennial Grasses		237	149	113	66	1.69	1.15	0.84
Total for Grasses		237	652	434	697	9.17	8.14	22.42
F	<i>Allium</i> sp.	_b 12	_b 11	_a -	_a -	.02	-	-
F	<i>Androsace septentrionalis</i> (a)	-	4	-	-	.01	-	-
F	<i>Astragalus</i> sp.	-	-	-	2	-	-	.00
F	<i>Calochortus nuttallii</i>	1	2	-	2	.01	-	.01
F	<i>Chaenactis</i> sp.	-	2	-	-	.00	-	-
F	<i>Chenopodium leptophyllum</i> (a)	-	16	-	-	.04	-	-
F	<i>Collinsia parviflora</i> (a)	-	3	-	7	.00	-	.01
F	<i>Cryptantha</i> sp.	_a 2	_b 18	_a -	_{ab} 7	.07	-	.04
F	<i>Descurainia pinnata</i> (a)	-	_c 92	_a -	_b 11	.25	-	.07
F	<i>Eriogonum cernuum</i> (a)	-	2	-	-	.00	-	-
F	<i>Erigeron pumilus</i>	-	8	2	2	.02	.00	.00
F	<i>Gilia</i> sp. (a)	-	_b 16	_{ab} 7	_a -	.03	.01	-
F	<i>Lappula occidentalis</i> (a)	-	_a 3	_a 3	_b 22	.00	.03	.05
F	<i>Lepidium montanum</i>	_b 12	_b 13	_b 12	_a -	.06	.07	-
F	<i>Machaeranthera canescens</i>	_a 6	_b 16	_a -	_a -	.04	-	-
F	<i>Oenothera pallida</i>	-	1	-	-	.00	-	-
F	<i>Orobanche</i> sp.	3	-	-	-	-	-	-
F	<i>Phlox longifolia</i>	_{ab} 3	_b 11	_a -	_{ab} 1	.05	-	.00
F	<i>Plantago patagonica</i> (a)	-	_c 207	_a 94	_b 142	1.23	.27	.62
F	<i>Polygonum douglasii</i> (a)	-	2	-	-	.00	-	-
F	<i>Schoenocrambe linifolia</i>	-	5	6	-	.04	.01	-
F	<i>Senecio multilobatus</i>	-	-	-	-	-	.00	-
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		0	345	104	182	1.59	0.32	0.76
Total for Perennial Forbs		40	87	20	14	0.33	0.09	0.06
Total for Forbs		40	432	124	196	1.93	0.41	0.83

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

BROWSE TRENDS --

Management unit 09 , Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Artemisia tridentata wyomingensis</i>	90	96	83	21.34	20.20	14.88
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	40	34	14	4.00	2.15	.16
B	<i>Leptodactylon pungens</i>	1	0	0	.15	-	-
B	<i>Opuntia sp.</i>	2	3	5	-	-	.03
Total for Browse		133	133	102	25.50	22.36	15.08

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 1

Species	Percent Cover
	'05
<i>Artemisia tridentata wyomingensis</i>	20.06
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	.81

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 1

Species	Average leader growth (in)
	'05
<i>Artemisia tridentata wyomingensis</i>	1.9

BASIC COVER --

Management unit 09 , Study no: 1

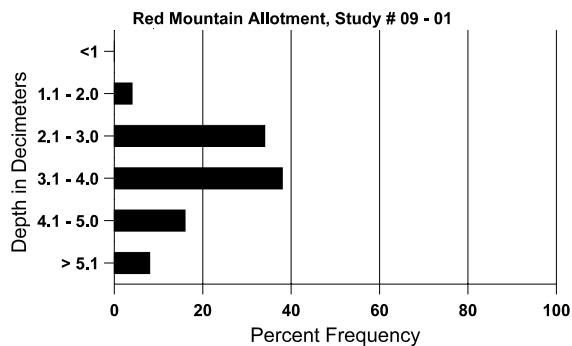
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	0	3.25	34.27	30.36	37.63
Rock	0	0	.02	0	.00
Pavement	0	0	.01	.06	.05
Litter	0	55.50	43.87	43.37	45.06
Cryptogams	0	11.75	15.97	18.43	14.35
Bare Ground	35.25	29.50	21.13	25.96	16.45

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 1, Study Name: Red Mountain Allotment

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
16.4	70.0 (17.5)	7.9	77.0	12.7	10.3	0.6	6.3	64.0	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 1

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	14	65	90
Elk	2	1	1
Deer	47	30	29
Cattle	-	1	1

Days use per acre (ha)	
'00	'05
-	-
-	-
47 (116)	59 (146)
1(2)	2 (5)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 1

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
82	5132	-	66	4666	400	-	34	52	8	.38	5	23/26
88	9665	200	266	4266	5133	-	41	17	53	2	19	24/21
95	4360	120	360	3360	640	980	39	8	15	6	6	33/42
00	5440	40	60	1840	3540	1380	28	3	65	24	25	29/31
05	3960	1420	100	1140	2720	2740	10	33	69	33	33	36/37

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	1000	-	60	860	80	60	0	0	8	2	2	23/32
00	1020	20	80	660	280	20	0	0	27	12	12	18/22
05	320	40	40	200	80	220	0	0	25	6	6	17/17
<i>Cowania mexicana stansburiana</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	30/41
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Gutierrezia sarothrae</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	12/23
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Juniperus osteosperma</i>												
82	66	-	-	66	-	-	100	0	-	-	0	36/15
88	66	-	66	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Leptodactylon pungens</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	60	-	-	60	-	-	0	0	-	-	0	5/19
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
82	66	-	-	66	-	-	0	0	0	-	0	4/16
88	399	-	66	333	-	-	0	0	0	-	0	3/6
95	40	20	-	40	-	-	0	0	0	-	0	4/13
00	100	-	-	60	40	-	0	0	40	-	0	3/7
05	100	-	20	80	-	-	0	0	0	-	0	5/6

Trend Study 9-2-05

Study site name: Taylor Mountain .

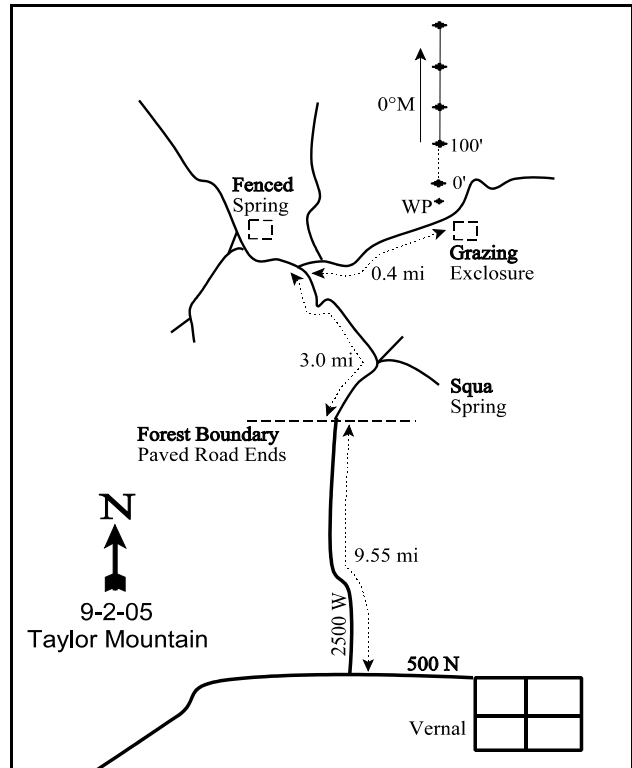
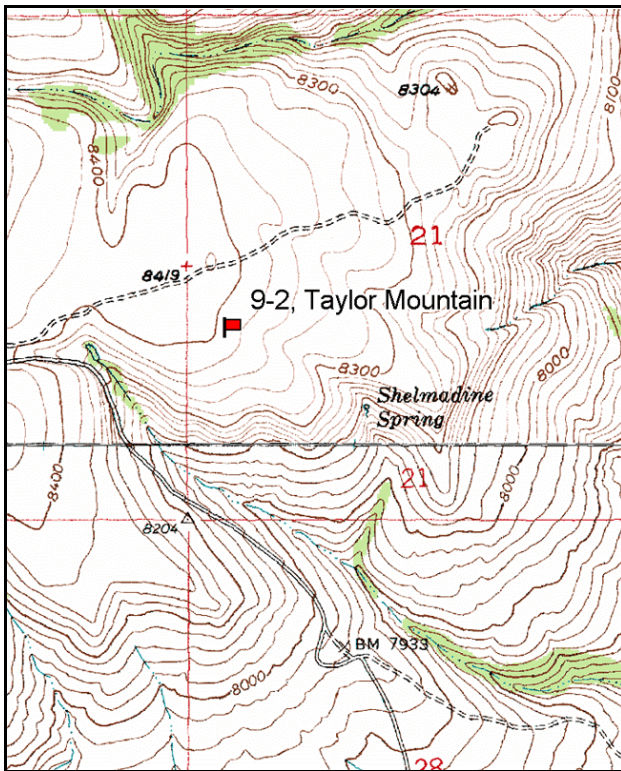
Vegetation type: Mountain Big Sagebrush .

Compass bearing: frequency baseline 0 degrees magnetic.

Frequency belt placement: line 1 (14 & 82ft), line 2 (28ft), line 3 (59ft), line 4 (77ft).

LOCATION DESCRIPTION

From Vernal, travel west on 500 North Street to 2500 West. Turn right on 2500 West and drive north 9.55 miles to the National Forest boundary. Continue north 3 miles to a fork. Turn right and go 0.4 miles towards the Taylor Mountain Exclosure. From the sign on the west side of the exclosure, walk 54 paces north to the 0-foot end of the baseline. There is also a witness post 4 feet south of the 0-foot stake. It is marked by an 18 inch tall fencepost with browse tag #7091.



Map Name: Dyer Mountain

Diagrammatic Sketch

Township 2S, Range 21E, Section 21

GPS: NAD 27, UTM 12T 4498236 N, 620581 E

DISCUSSION

Taylor Mountain - Trend Study No. 9-2

The Taylor Mountain trend study is adjacent to the Taylor Mountain Exclosure which was built in 1962. This site can best be classified as spring-fall range. Elevation on the broad open ridge top is 8,400 feet with a gentle east-facing slope of 1% to 5%. The Taylor Mountain-Oak Park allotment is managed by the Forest Service in a 6-pasture rest-rotation system with grazing occurring from June 1 to September 15. The grazing unit in which the trend study is located supports about 500 AUM's during years of use. Pellet group data from 2000 estimated 13 elk, 38 deer, and 4 cow days use/acre (31 edu/ha, 94 ddu/ha, and 9 cdu/ha). Pellet group data from 2005 estimated 3 elk, 66 deer, and 16 cow days use/acre (7 edu/ha, 164 ddu/ha, and 39 cdu/ha).

Soils are a dark clay loam to loam and are moderately shallow in depth. The estimated effective rooting depth is just over 9 inches. A profile stoniness index estimated from penetrometer readings shows nearly 90% of the rocks occur within the top 8 inches of soil. Phosphorus is low at 4.5 ppm. Values below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Active erosion is slight due to the level terrain. Vegetation and litter cover are also excellent and percent bare ground is relatively low at 8%. The erosion condition class determined soil movement as stable in 2005.

Browse is not as critical on this site since it is not true winter range, but a dense stand of essential mountain big sagebrush and antelope bitterbrush are present on this important fall-spring transition range. Mountain big sagebrush provided 23% average cover in 1995 and 26% in 2000 and 2005. Sagebrush density estimated 6,532 plants/acre in 1988, 4,620 in 1995, 5,120 in 2000, and 4,300 in 2005. Utilization has typically been moderate, although it spiked in 1995 to moderate to heavy use. In 1995, 4% of the population was decadent, this increased to 22% in 2000, and 27% in 2005. Percentage of dying plants in the population has also increased from 5% in 2000 to 10% in 2005. Young recruitment was estimated at 200 plants/acre in 2005, which would not be adequate to replace the number of dying plants (440 plants/acre).

Antelope bitterbrush is also a key forage species on this site. Density was estimated at 2,620 plants/acre in 1995, 2,500 in 2000, and 2,320 in 2005. Average percent cover was estimated 15% in 1995, 12% in 2000 and 2005. The population has a prostrate growth form that averages only 16 inches in height. In 2000, percent decadency was moderately high at 30%, but decreased to 8% in 2005. The population has generally been vigorous and healthy with moderate to heavy utilization, but increased to heavy use in 2005. The combined effects of moderate use and drought may have been responsible for the increase in decadency and poor vigor in 2000. Antelope bitterbrush is much more tolerant of heavy browsing than sagebrush (Billbrough and Richard 1993) and has appeared to have recovered with a return to normal precipitation patterns in 2005. Young recruitment in 2000 and 2005 was moderate, although no seedlings were observed in either year.

Other browse encountered on the site includes: mountain low rabbitbrush, snowberry, serviceberry, and true mountain mahogany. Both serviceberry and mahogany were heavily utilized and are not very abundant.

The herbaceous understory is diverse and moderately abundant with grasses producing 7% cover in 1995, 13% in 2000, and 6% in 2005. The dominant grasses are mutton bluegrass, Kentucky bluegrass, needle-and-thread, and bottlebrush squirreltail. Thickspike wheatgrass was abundant in 2000, but decreased significantly in 2005 along with mutton bluegrass. Perennial grasses sum of nested frequency decreased by 24% from 2000 to 2005. Forb average cover was 13% in 1995, 17% in 2000, and 21% in 2005. Forbs are exceptionally diverse with over 40 species being sampled every year since 1995. Perennial forbs dominate the herbaceous understory. The most abundant species include: ballhead sandwort, arrowleaf balsamroot, silver lupine, hollyleaf clover, and hoods phlox. The dense stand of mountain big sagebrush and previous years of drought may be suppressing the understory somewhat. However, the lack of a more abundant grass component is also effected by selective grazing by livestock and drought. As this is not critical winter range, some type of

treatment should be considered; perhaps a prescribed burn or the use of a meadow aerator could be used to decrease sagebrush density and cover. This would help improve the abundance of herbaceous species in the understory.

1982 APPARENT TREND ASSESSMENT

Both vegetative and soil trends appear stable or improving. Utilization of the key browse species is not excessive and there appears to be adequate replacement of decadent or dead plants. Herbaceous understory composition and production is fair, but there is need for improvement.

1988 TREND ASSESSMENT

An increase in percent litter cover was noted, resulting in more than 88% total ground cover in 1988. The dense vegetative cover on the site provides excellent soil protection. The slight soil movement is not significant and there is little net loss of soil. Trend for soil is up. Trend for the key browse species, mountain big sagebrush and bitterbrush, is up due to increasing population densities, good numbers of young plants, and low decadency rates. Trend for the herbaceous understory is also up due to increased quadrat frequency of grasses and forbs.

TREND ASSESSMENT

soil - up (+2)

browse - up (+2)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Soil conditions did show some slight improvement, but not enough to warrant a change in trend. Bare ground declined from 12% to 6%. Litter cover declined from 77% to 65%, but this trend is common during the statewide extended drought. The browse trend is stable overall, being stable for sagebrush and slightly improved for bitterbrush. Sagebrush density has declined since 1988, but the number of mature plants is relatively stable, percent decadency is low and vigor is good. The number of dead plants is relatively low (300), indicating that the change in density is partly due to the much larger sample used in 1995. Recruitment of young is moderate at 8%. The only negative aspect of the sagebrush population is the higher use reported in 1995. Antelope bitterbrush is also more heavily utilized but has increased in density, has a lower percent decadence, and has an adequate number of young plants. The herbaceous understory has remained fairly stable since the last reading. Grasses declined slightly in sum of nested frequency, while forbs have increased slightly. The Desirable Components Index rated this site as good with a score of 72 due to low percent of decadent shrubs, excellent browse cover, and good perennial grasses cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Good (72) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Bare ground remains relatively low. Protective ground cover from vegetation and litter are abundant and well distributed. Trend for browse is stable although sagebrush and bitterbrush display some slight increases in those individuals classified with poor vigor and decadence in 2000. Drought and competition, more than any other factors, likely combined to cause increases in decadency and poor vigor for

these species. Even with reduced health, these species remain at relatively stable densities. Some type of treatment such as a prescribed burn to decrease the dense stand of sagebrush and increase perennial herbaceous species should be considered in the future. Treatment with an aerator would be preferred to help prevent the detrimental loss of the bitterbrush and sagebrush shrub component. The weighted sum of nested frequency for forbs and grasses by abundance showed a moderate decreased in 2000. Trend would be considered slightly down. The Desirable Components Index rated this site as good with a score of 76 due to excellent browse cover, excellent perennial forb cover, and good perennial grasses cover.

TREND ASSESSMENT

- soil - stable (0)
- browse - stable (0)
- herbaceous understory - slightly down (-1)
- winter range condition (DC Index) - Good (76) Mid-level Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Bare ground remains low and protective ground cover (vegetation, litter, and cryptogams) is abundant. Trend for key browse, mountain big sagebrush and antelope bitterbrush, is slightly down. The sagebrush density has declined from 5,120 plants/acre to 4,300 in 2005. Percent decadent and dying within the population have both increased slightly. Bitterbrush has also shown a 7% decrease in its population after 30% of population was classified as decadent in 2000. The percent decadence decreased to normal levels in 2005. Use is heavy, but the population appears normal with fair leader growth. Trend for the herbaceous understory is stable. Perennial grasses nested frequency decreased significantly. However, perennial grasses on average only contribute to only 34% of the herbaceous cover, while perennial forbs provide on average 66% of the herbaceous cover. The grasses that decreased significantly were thickspike wheatgrass and mutton bluegrass. They accounted for 72% of the grass cover in 2000, but only 30% in 2005. Annual forbs increased significantly back to 1995 levels. The Desirable Components Index rated this site as fair to good with a score of 64 due to moderate decadency of shrubs, excellent perennial forb cover, and a decrease in perennial grasses cover.

TREND ASSESSMENT

- soil - stable (0)
- browse - slightly down (-1)
- herbaceous understory - stable (0)
- winter range condition (DC Index) - Fair to Good (64) Mid-level Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 2

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	a-	c157	c171	b70	1.12	2.01	.39
G	Agropyron spicatum	-	2	7	1	.03	.09	.00
G	Bouteloua gracilis	-	3	-	-	.00	-	-
G	Bromus anomalus	a-	a-	b15	b8	-	.52	.22
G	Bromus tectorum (a)	-	3	-	-	.00	-	-
G	Carex sp.	a-	ab7	b20	ab7	.02	.41	.04

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Festuca ovina</i>	3	19	15	5	.09	.17	.09
G	<i>Koeleria cristata</i>	_b 46	_a 18	_a 5	_a 2	.08	.06	.03
G	<i>Poa fendleriana</i>	_{bc} 173	_b 154	_c 206	_a 86	1.96	7.09	1.47
G	<i>Poa pratensis</i>	_{ab} 22	_b 50	_a 12	_c 89	.99	.27	1.31
G	<i>Poa secunda</i>	_c 77	_a 1	_{ab} 20	_b 27	.00	.24	.18
G	<i>Sitanion hystrix</i>	_c 177	_b 106	_a 39	_a 38	1.57	.66	1.00
G	<i>Stipa comata</i>	_c 90	_{ab} 46	_a 30	_{bc} 61	.30	.62	1.03
G	<i>Stipa lettermani</i>	_b 76	_{ab} 56	_a 28	_a 36	.39	.55	.38
Total for Annual Grasses		0	3	0	0	0.00	0	0
Total for Perennial Grasses		664	619	568	430	6.58	12.74	6.18
Total for Grasses		664	622	568	430	6.59	12.74	6.18
F	<i>Agoseris glauca</i>	_a -	_{ab} 4	_b 9	_{ab} 6	.01	.10	.18
F	<i>Antennaria rosea</i>	_b 107	_a 59	_a 54	_a 44	1.67	.99	.82
F	<i>Androsace septentrionalis</i> (a)	-	_b 20	_a 2	_a -	.04	.00	-
F	<i>Arabis</i> sp.	_b 45	_a 16	_a 9	_a 2	.06	.02	.01
F	<i>Arenaria</i> sp.	_a 112	_c 216	_c 208	_b 173	2.62	5.02	4.28
F	<i>Aster chilensis</i>	_a -	_c 16	_{bc} 15	_{ab} 2	.04	.10	.00
F	<i>Astragalus convallarius</i>	_b 15	_{ab} 5	_{ab} 3	_a -	.04	.18	-
F	<i>Astragalus tenellus</i>	-	6	1	-	.06	.03	-
F	<i>Astragalus</i> sp.	-	2	5	-	.00	.01	-
F	<i>Balsamorhiza hookeri</i>	72	72	87	77	.73	1.38	1.67
F	<i>Castilleja flava</i>	-	2	4	4	.00	.01	.01
F	<i>Castilleja linariaefolia</i>	_b 15	_{ab} 14	_{ab} 5	_a 1	.03	.06	.01
F	<i>Cirsium</i> sp.	-	3	-	-	.00	-	-
F	<i>Collomia linearis</i> (a)	-	_c 69	_a 12	_b 51	.17	.10	.12
F	<i>Comandra pallida</i>	3	4	9	1	.03	.01	.00
F	<i>Collinsia parviflora</i> (a)	-	_b 78	_a 25	_c 190	.15	.09	1.25
F	<i>Crepis acuminata</i>	_a -	_b 17	_b 11	_a -	1.06	.08	-
F	<i>Cryptantha</i> sp.	-	2	-	-	.01	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	-	1	-	-	.00
F	<i>Draba</i> sp. (a)	-	1	4	1	.00	.01	.00
F	<i>Eriogonum alatum</i>	-	1	-	1	.00	-	.00
F	<i>Erigeron eatonii</i>	_b 100	_a 42	_a 50	_a 26	.13	.22	.17
F	<i>Erigeron flagellaris</i>	-	-	1	2	-	.00	.03
F	<i>Erigeron pumilus</i>	_a -	_a -	_a 5	_b 19	-	.01	.03
F	<i>Eriogonum racemosum</i>	-	-	3	-	-	.03	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Eriogonum umbellatum</i>	58	63	39	39	.83	.75	.64
F	<i>Gayophytum ramosissimum</i> (a)	-	3	-	2	.00	-	.01
F	<i>Hymenoxys acaulis</i>	-	3	-	-	.03	-	-
F	<i>Ipomopsis aggregata</i>	5	4	-	-	.01	-	-
F	<i>Lesquerella</i> sp.	-	5	5	3	.01	.01	.01
F	<i>Lithospermum</i> sp.	a ⁻	a ¹	a ⁻	b ¹⁶	.00	-	.10
F	<i>Lomatium</i> sp.	a ⁻	b ¹⁹	b ¹⁷	c ⁴⁰	.09	.09	.25
F	<i>Lupinus argenteus</i>	a ¹⁸	b ⁸⁰	b ⁸²	b ⁸⁴	1.79	2.37	4.55
F	<i>Lychnis drummondii</i>	a ⁻	a ⁻	a ⁻	b ⁹	-	-	.03
F	<i>Mertensia</i> sp.	-	8	-	5	.02	-	.01
F	<i>Microsteris gracilis</i> (a)	-	-	-	1	-	-	.00
F	<i>Penstemon humilis</i>	a ⁻	c ⁴⁰	b ¹⁴	b ¹⁴	.12	.08	.07
F	<i>Penstemon</i> sp.	c ¹⁰⁰	b ¹⁰	a ⁻	b ¹¹	.02	-	.07
F	<i>Petradoria pumila</i>	c ⁹⁴	bc ⁵⁹	ab ³⁷	a ²⁶	1.12	1.08	.72
F	<i>Phlox hoodii</i>	b ⁹³	a ²³	a ⁴⁰	b ¹⁰⁷	.10	1.22	2.37
F	<i>Phlox longifolia</i>	ab ⁵⁰	ab ⁶⁰	b ⁷⁹	a ³⁶	.32	1.31	.11
F	<i>Polygonum douglasii</i> (a)	-	c ¹⁶⁵	a ³	b ⁹⁹	.36	.00	.27
F	<i>Potentilla gracilis</i>	a ¹²	b ²⁸	ab ²³	a ¹⁰	.10	.11	.05
F	<i>Senecio debilis</i>	c ¹⁰¹	a ³³	a ²⁰	b ⁶³	.08	.21	.80
F	<i>Sedum lanceolatum</i>	a ⁻	c ⁵¹	b ¹⁷	ab ¹	.25	.11	.00
F	<i>Senecio multilobatus</i>	-	2	4	6	.00	.01	.06
F	<i>Streptanthus cordatus</i>	-	4	-	-	.00	-	-
F	<i>Taraxacum officinale</i>	a ⁻	b ³³	b ¹⁵	b ¹⁶	.15	.05	.15
F	<i>Trifolium gymnocarpon</i>	a ¹⁴	bc ¹³¹	b ¹⁰⁹	c ¹³⁶	.54	1.13	2.06
F	Unknown forb-annual (a)	-	8	-	-	.01	-	-
F	Unknown forb-perennial	11	-	-	37	-	-	.22
F	<i>Zigadenus elegans</i>	a ⁻	b ¹⁴	b ¹¹	b ¹⁷	.05	.19	.17
Total for Annual Forbs		0	344	46	345	0.75	0.21	1.67
Total for Perennial Forbs		1025	1152	991	1034	12.23	17.09	19.73
Total for Forbs		1025	1496	1037	1379	12.99	17.31	21.41

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

BROWSE TRENDS --

Management unit 09 , Study no: 2

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	1	1	1	.00	.15	.38
B	Artemisia tridentata vaseyana	91	94	93	22.71	26.12	25.46
B	Cercocarpus montanus	2	2	2	.15	.38	.03
B	Chrysothamnus viscidiflorus lanceolatus	24	18	18	.60	1.22	1.08
B	Purshia tridentata	75	70	72	14.75	11.55	11.78
B	Symphoricarpos oreophilus	11	14	12	.56	1.50	1.67
Total for Browse		204	199	198	38.78	40.95	40.40

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 2

Species	Percent Cover
	'05
Amelanchier utahensis	.11
Artemisia tridentata vaseyana	29.79
Cercocarpus montanus	.23
Chrysothamnus viscidiflorus lanceolatus	.66
Purshia tridentata	17.23
Symphoricarpos oreophilus	1.46

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 2

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	1.7
Purshia tridentata	2.4

BASIC COVER --

Management unit 09 , Study no: 2

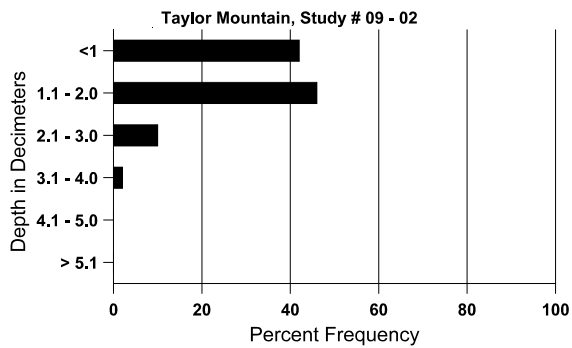
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	11.00	7.25	50.54	61.97	55.36
Rock	.50	.75	.58	.13	.13
Pavement	4.25	3.25	2.70	1.94	1.63
Litter	63.75	77.25	65.15	71.75	53.91
Cryptogams	0	0	1.87	1.22	.08
Bare Ground	21.00	11.50	6.45	7.75	7.76

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 2, Study Name: Taylor Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
9.5	55.0 (11.8)	7.2	37.4	36.0	26.6	5.0	4.5	153.6	1.3

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 2

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	2	6	33
Elk	8	3	8
Deer	21	20	25
Cattle	3	-	10

Days use per acre (ha)	
'00	'05
-	-
13 (31)	3 (7)
39 (96)	66 (164)
5 (9)	16 (39)

BROWSE CHARACTERISTICS --
Management unit 09 , Study no: 2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	-	20	-	-	100	0	-	-	0	31/43
00	20	-	-	20	-	-	0	100	-	-	0	30/28
05	20	-	-	20	-	-	0	0	-	-	0	19/31
Artemisia tridentata vaseyana												
82	4666	266	1200	2600	866	-	11	0	19	-	0	23/29
88	6532	-	1000	4666	866	-	12	1	13	-	0	23/26
95	4620	180	380	4040	200	300	72	12	4	.43	.43	24/39
00	5120	40	220	3780	1120	300	10	0	22	5	5	27/37
05	4300	-	200	2920	1180	580	34	27	27	10	10	29/40
Cercocarpus montanus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	40	-	-	40	-	-	0	100	0	-	0	32/41
00	40	-	-	40	-	-	0	100	0	-	0	27/34
05	60	-	-	-	60	-	33	67	100	-	0	29/34
Chrysothamnus viscidiflorus lanceolatus												
82	1533	-	600	933	-	-	0	0	0	-	0	17/14
88	2599	-	1066	1533	-	-	3	0	0	-	0	10/11
95	600	-	-	600	-	-	0	0	0	-	0	11/13
00	580	-	-	580	-	-	0	3	0	-	0	15/15
05	500	40	20	460	20	-	16	0	4	-	0	14/16
Purshia tridentata												
82	2065	66	266	1733	66	-	45	19	3	-	0	13/27
88	2266	-	333	1600	333	-	68	15	15	-	0	16/24
95	2620	-	300	2240	80	40	57	36	3	2	2	16/42
00	2500	-	220	1520	760	60	23	52	30	10	12	16/37
05	2320	-	220	1920	180	60	12	79	8	2	2	17/37

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Symphoricarpos oreophilus</i>												
82	266	-	-	266	-	-	0	0	0	-	0	19/11
88	532	-	133	333	66	-	0	0	12	-	13	14/16
95	380	80	40	340	-	-	0	0	0	-	0	14/37
00	320	20	20	280	20	-	13	0	6	-	0	16/39
05	360	-	20	340	-	20	0	0	0	-	0	15/29

Trend Study 9-4-05

Study site name: Sawtooth-Flat Spring .

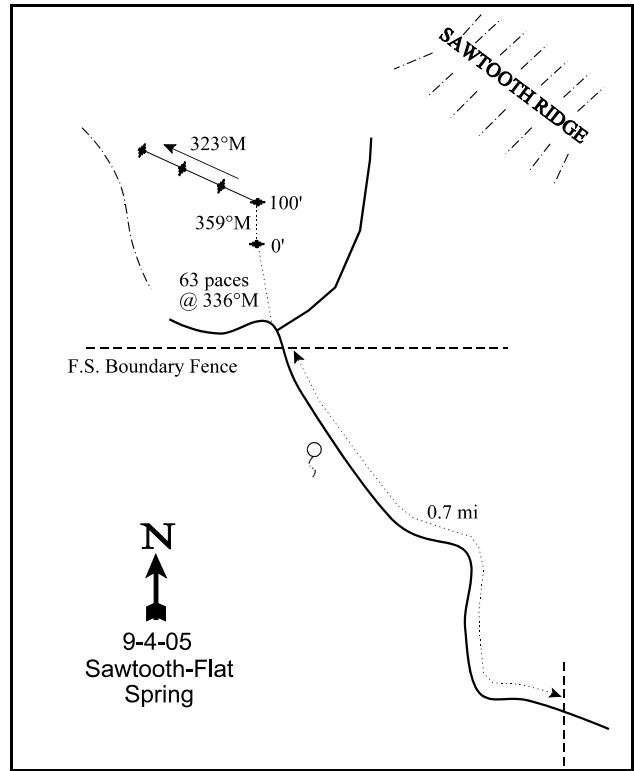
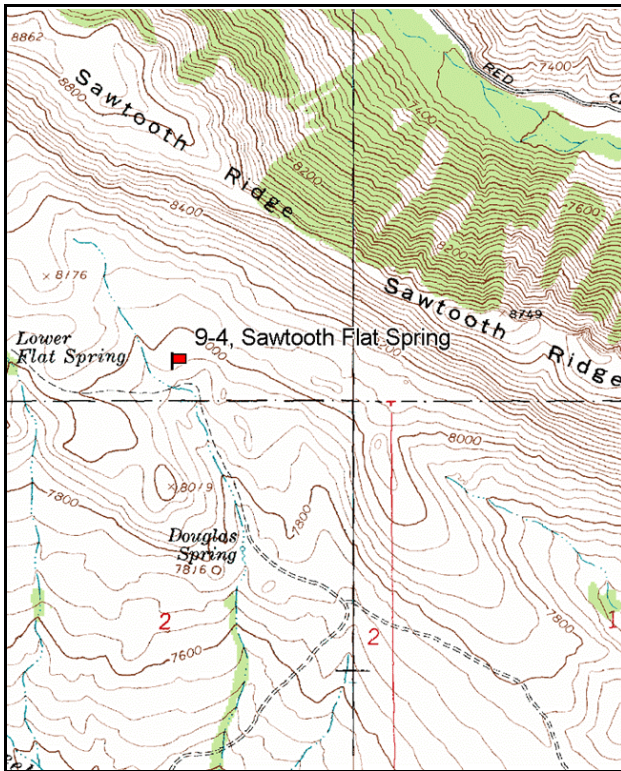
Vegetation type: Sagebrush-Bitterbrush .

Compass bearing: frequency baseline 359 degrees magnetic.

Frequency belt placement: line 1 (13 & 92ft), line 2 (40ft), line 3 (52ft), line 4 (71ft).

LOCATION DESCRIPTION

From Lapoint, drive east then turn north just before the bridge over Deep Creek. Proceed north for 6.85 miles to a fork. Bear right towards Deep Creek Ranch. Stay on this road for 9.8 miles to a dirt road on the left heading north up Pine Ridge. This road can also be reached by driving 3 miles west from Dry Fork. The gate may be locked. Turn left and drive 1.65 miles to a cattle guard. Continue 1.1 miles to a gate. Go through the gate and 0.7 miles to the fence on the FS boundary. Go through the gate and stop. From the yellow fencepost near the gate, walk 63 paces north bearing 336°M to the 0-foot baseline stake.



Map Name: Lake Mountain

Diagrammatic Sketch

Township 2S, Range 19E, Section 35

GPS: NAD 27, UTM 12T 4494142 N, 605103 E

DISCUSSION

Sawtooth-Flat Spring - Trend Study No. 9-4

The Sawtooth-Flat Spring trend study is located on the south side of Sawtooth Ridge, east of Lows Flat Spring. Elevation is 7,960 feet with a southeast aspect and 16% slope. The study site is just outside the 1978-79 Flat Springs prescribed burn. The study samples a mountain big sagebrush/grass type with an important bitterbrush component. Quadrat frequency of deer pellet groups was moderately high in 1995 at 32%, while elk were only 6%. Rabbit pellet group quadrat frequency was quite high in 1995. Pellet group data from 2000 estimated 75 deer, 25 elk, and 16 cow days use/acre (185 ddu/ha, 63 edu/ha, and 40 cdu/ha). Pellet group data from 2005 estimated 58 deer, 11 elk, and 23 cow days use/acre (142 ddu/ha, 28 edu/ha, and 56 cdu/ha). This study is located in the Lake Mountain allotment which is grazed from June 21 to September 30 by 276 cows and calves on a 4-unit rest-rotation system.

Soils are sandy loam in texture and very rocky. Estimated effective rooting depth is just over 9 inches, while penetrometer readings show the majority of rock to be in the upper 8 inches of the profile. The presence of mountain big sagebrush suggests that the soil is deeper and effective soil depth measurements are limited by the rocky nature of the soil profile. The soil is moderately acidic with a pH of 6.1 and relatively high in organic matter (4.3%). Vegetation and litter cover are high and well dispersed, preventing most soil erosion problems. The erosion condition class determined soil movement as stable in 2005.

Key browse on the site consist of antelope bitterbrush and mountain big sagebrush. Sagebrush is more abundant and had an average cover of 12% in 1995, 15% in 2000, and 14% in 2005. Density was estimated at 2,040 plants/acre in 1995 and slightly increased in 2000 and 2005 to about 2,700 plants/acre. Vigor has generally been good on sagebrush with less than 8% of the population displaying poor vigor in all readings. In 1995, 56% of the population was classified as moderately browsed. This dropped to less than 5% in 2000, but increased to 37% in 2005 with 18% classified as heavily utilized. Percent decadency has varied with each reading, the highest level occurred in 1988 at 37%. Percent decadency has remained near 23% since 2000, after it had increased from 14% in 1995. Recruitment of young has been good throughout the years and was 10% of the population in 1995, 9% in 2000, and 16% in 2005. Seedlings were abundant in 2000 and 2005. Annual leader growth averaged about 3 inches in 2000 and 2 inches in 2005.

Antelope bitterbrush is the most preferred browse species, as is evident by the moderate to heavy use. Bitterbrush averaged 4% cover in 1995, 3% in 2000 and 2005. The population was estimated at 1,720 plants/acre in 1995, 1,520 in 2000, and 1,440 in 2005. Vigor is good with less than 9% of the population showing poor vigor in all readings. Percent decadency steadily increased between 1988 and 1995, but decreased in 2000 and 2005 to about 13%. Recruitment of young has been moderately high, as it has averaged between 180-266 plants/acre in all years. The bitterbrush population displays a prostrate growth form averaging 14 inches in height on mature plants. Annual leader growth averaged about 5 inches in 2000 and 9 inches in 2005.

Other browse species are infrequent, but include: snowberry, mountain low rabbitbrush, and a few scattered serviceberry.

Grasses and forbs are abundant and diverse providing over half of the total vegetative cover since 1995. Due to recent seed head removal from livestock, species identification was difficult for some grasses in 1988 and 2005. Needle-and-thread, Kentucky bluegrass, and mutton bluegrass are the most abundant species in both cover and nested frequency. After recovering from the drought conditions of 2000, the sum of the nested frequency for perennial grasses increased slightly, although percent cover was the lowest it has ever been (12%). Percent cover of perennial grasses averaged 23% in 1995 and 30% in 2000. There are numerous valuable forb species, arrowleaf balsamroot and silver lupine are the most abundant. Combined, they

accounted for 74% of the forb cover in 1995, 90% in 2000, and 84% in 2005. Forb nested frequency was far lower in 2000 due to drought. It increased in 2005, but still had values less than that of 1995. Annual forbs were moderately abundant in 1995 and 2005, but almost non-existent with drought conditions in 2000.

1982 APPARENT TREND ASSESSMENT

Range condition is good and overall trend appears stable. There is little compelling evidence for either extensive soil loss or vegetational change. The area appears capable of supporting more big game animals if livestock use remains at the current level.

1988 TREND ASSESSMENT

Due to the dense herbaceous understory, ground cover is excellent. Basal vegetative cover increased significantly. Percent bare ground declined slightly and there was very little detectable soil movement. Trend for soil is slightly up. The browse trend is up for mountain big sagebrush due to a large increase in density, adequate reproductive potential, a good number of young plants, good vigor, and light to moderate use. Trend for the more preferred antelope bitterbrush is also slightly up. Vigor is good and there are an adequate number of young plants. Density of mature plants increased slightly but heavy use increased to 79% of the plants sampled. Percent decadency rose from 0% to 18%, but the population appears to be in good condition in spite of the increases in use and decadency. Quadrat frequency of grasses and forbs increased since 1982, indicating a slightly upward trend for the herbaceous understory.

TREND ASSESSMENT

soil - slightly up (+1)

browse - slightly up (+1)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

Percent bare ground has only declined from about 10% to a relative 4% bare soil. This would indicate a continued improvement in the soil trend, but not enough to warrant a change in trend at this time. Trend for soil is considered stable. Trend for browse is stable. Mountain big sagebrush declined in density, but most of this is probably due to the increased sample size giving a better estimate of the actual population size. Reproductive potential is low but stable, and recruitment from young plants is fairly good at 10%. Percent decadency declined from 37% to 14%, and the young age class appears adequate enough to replace the dying individuals in the population. Bitterbrush continues to be heavily used yet appears to be stable. Currently, 48% of the shrubs are heavily hedged. Percent decadence has increased to 22%, with 9% of the population classified as dying. Average height measurements of mature plants have declined somewhat since 1982. Recruitment from young bitterbrush plants is fairly good at 10%. Bitterbrush can withstand heavy use for long periods of time, but future trends should be watched closely in conjunction with the continued drought. Trend for grasses and forbs is stable. Some of the fluctuations in the nested frequency numbers of the *Poa* grasses is the result of identification problems in 1988 and not necessarily actual changes in composition. The Desirable Components Index rated this site as excellent with a score of 80 due to a low percentage of decadent shrubs, fair recruitment of shrubs, and excellent perennial grasses cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Excellent (80) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil continues to be stable. Erosion remains minimal as vegetation and litter cover remain high and well disbursed over the site. Bare ground remains low, even with drought is at only 7%. Trend for browse is stable. Sagebrush, which contributes to 76% of the browse cover, is slightly up with an increase in density (+26%) and lighter use compared to 1995 estimates. Recruitment is adequate, even with a slight increase in decadency from 14% to 23%. Bitterbrush density slightly declined, but still has good recruitment. Vigor remains mostly good even with increased heavy use and drought in 2000. Percent decadency also decreased from 22% to 11%. Trend for the herbaceous understory is slightly down due to drought. Perennial grass sum of nested frequency decreased by 13%, and the sum of nested frequency of perennial forbs decreased by 35%. Normal precipitation patterns in the future should reverse this decline. The Desirable Components Index rated this site as excellent to good with a score of 81 due to moderate percent of decadent shrubs, excellent browse cover, and good perennial grasses cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Excellent to Good (81) Mid level Potential scale

2005 TREND ASSESSMENT

Trend for soil is slightly down. Bare ground has increased on this site, while vegetation and litter decreased. The ratio of protective cover to bare ground decreased, but erosion remains minimal and is still sufficient to hold the soil in place. Trend for key browse, mountain big sagebrush and Antelope bitterbrush, is stable. Densities of sagebrush have remained at previous levels and percent young was 16% of the population, the highest it has ever been. Use is light to moderate and percent decadency has remained fairly consistent at 22%. Trend for herbaceous understory is slightly up. Sum of nested frequency for perennial grasses and forbs increased slightly, while annual forbs increased substantially. Percent cover of grasses was actually lower in 2005 than in the previous two readings. The Desirable Components Index rated this site as good with a score of 75 due to moderate percent of decadent shrubs, good browse cover, and moderate perennial grasses cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Good (75) Mid-level Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 4

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	_a .59	_b 116	_a .70	_a .80	1.42	.69	.52
G	Carex sp.	_b .85	_a .22	_a .49	_a .21	.24	2.16	.12
G	Koeleria cristata	_b .23	_a -	_a .5	_a .2	.00	.06	.03
G	Poa fendleriana	_b 315	_a 131	_a 135	_a 153	3.02	4.46	2.95

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Poa pratensis</i>	_a 81	_b 138	_b 165	_a 90	7.83	9.85	2.15
G	<i>Poa secunda</i>	_b 29	_{ab} 14	_a 3	_b 23	.09	.00	.27
G	<i>Sitanion hystrix</i>	_b 10	_{ab} 5	_a 1	_a 2	.03	.03	.00
G	<i>Stipa comata</i>	_a 45	_b 168	_{bc} 193	_c 207	5.97	12.59	4.78
G	<i>Stipa lettermani</i>	_b 83	_c 140	_a 14	_b 92	4.17	.49	1.12
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		730	734	635	670	22.81	30.35	11.97
Total for Grasses		730	734	635	670	22.81	30.35	11.97
F	<i>Agoseris glauca</i>	3	7	11	12	.02	.07	.07
F	<i>Allium</i> sp.	_a 2	_c 118	_b 28	_b 50	.36	.19	.16
F	<i>Antennaria rosea</i>	_{ab} 5	_b 13	_a 1	_a 1	.30	.03	.03
F	<i>Arabis</i> sp.	_b 51	_a 6	_a 7	_a 4	.01	.04	.01
F	<i>Artemisia ludoviciana</i>	-	-	4	-	-	.03	-
F	<i>Astragalus</i> sp.	4	6	-	-	.01	-	-
F	<i>Balsamorhiza hookeri</i>	-	-	-	1	-	-	.15
F	<i>Balsamorhiza sagittata</i>	152	160	148	141	14.00	15.28	16.07
F	<i>Castilleja linariaefolia</i>	-	4	2	1	.01	.03	.03
F	<i>Calochortus nuttallii</i>	-	2	-	1	.01	-	.00
F	<i>Chenopodium fremontii</i> (a)	-	-	-	2	-	-	.00
F	<i>Chenopodium leptophyllum</i> (a)	-	_b 15	_a -	_{ab} 8	.03	-	.01
F	<i>Collomia linearis</i> (a)	-	_c 264	_a 24	_b 138	2.08	.08	.43
F	<i>Comandra pallida</i>	-	3	7	-	.01	.09	-
F	<i>Collinsia parviflora</i> (a)	-	_b 173	_a 18	_c 255	1.33	.05	1.29
F	<i>Crepis acuminata</i>	_a 2	_b 21	_a 1	_a 5	.45	.00	.01
F	<i>Cryptantha</i> sp.	-	2	-	5	.00	-	.01
F	<i>Delphinium nuttallianum</i>	-	-	-	4	-	-	.04
F	<i>Descurainia pinnata</i> (a)	-	_b 13	_a -	_b 28	.07	-	.05
F	<i>Draba</i> sp. (a)	-	-	-	1	-	-	.00
F	<i>Eriogonum alatum</i>	4	-	-	6	-	-	.01
F	<i>Erigeron eatonii</i>	6	-	4	5	-	.01	.04
F	<i>Erigeron flagellaris</i>	8	1	5	-	.00	.06	.00
F	<i>Eriogonum racemosum</i>	9	7	16	5	.09	.28	.03
F	<i>Eriogonum umbellatum</i>	_a 1	_{ab} 14	_{ab} 13	_b 17	.30	.14	.12
F	<i>Heterotheca villosa</i>	-	-	2	4	-	.03	.03
F	<i>Lomatium</i> sp.	18	11	5	7	.03	.06	.02
F	<i>Lupinus argenteus</i>	_a 55	_b 91	_{ab} 77	_{ab} 73	3.35	2.72	3.32

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Lychnis drummondii</i>	_{ab} 6	_b 13	_a 1	_{ab} 7	.09	.00	.04
F	<i>Mertensia</i> sp.	-	-	-	3	-	-	.15
F	<i>Orobanche fasciculata</i>	-	8	3	4	.02	.03	.00
F	<i>Penstemon humilis</i>	_b 52	_b 34	_{ab} 20	_a 3	.17	.31	.01
F	<i>Phlox longifolia</i>	_b 96	_a 43	_a 20	_a 43	.20	.07	.22
F	<i>Polygonum douglasii</i> (a)	-	_b 76	_a 11	_b 73	.22	.02	.17
F	<i>Potentilla gracilis</i>	-	3	3	2	.03	.00	.00
F	<i>Senecio integerrimus</i>	_a -	_{ab} 2	_{ab} 2	_b 12	.15	.03	.05
F	<i>Sedum lanceolatum</i>	-	1	-	-	.00	-	-
F	<i>Senecio multilobatus</i>	1	2	1	10	.03	.00	.02
F	<i>Taraxacum officinale</i>	-	-	-	3	-	-	.15
F	<i>Tragopogon dubius</i>	7	7	-	-	.01	-	-
F	Unknown forb-perennial	5	-	-	-	-	-	-
F	<i>Zigadenus elegans</i>	_a -	_a 4	_a 1	_b 18	.01	.03	.09
Total for Annual Forbs		0	541	53	505	3.76	0.15	1.97
Total for Perennial Forbs		487	583	382	447	19.71	19.58	20.95
Total for Forbs		487	1124	435	952	23.47	19.73	22.93

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

BROWSE TRENDS --

Management unit 09 , Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Amelanchier utahensis</i>	0	1	0	-	-	-
B	<i>Artemisia tridentata vaseyana</i>	72	78	78	12.34	15.40	13.57
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	5	4	4	.30	.36	.18
B	<i>Eriogonum heracleoides</i>	3	7	16	.06	.30	.12
B	<i>Mahonia repens</i>	2	2	2	.00	.03	.06
B	<i>Opuntia fragilis</i>	3	2	3	.01	.00	-
B	<i>Pediocactus simpsonii</i>	1	0	0	.03	-	-
B	<i>Purshia tridentata</i>	52	54	43	3.87	3.12	2.80
B	<i>Symphoricarpos oreophilus</i>	11	12	6	.30	.52	1.12
Total for Browse		149	160	152	16.93	19.73	17.88

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 4

Species	Percent Cover
	'05
Artemisia tridentata vaseyana	23.38
Purshia tridentata	8.44
Symphoricarpos oreophilus	1.10

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 4

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	2.2
Purshia tridentata	9.2

BASIC COVER --

Management unit 09 , Study no: 4

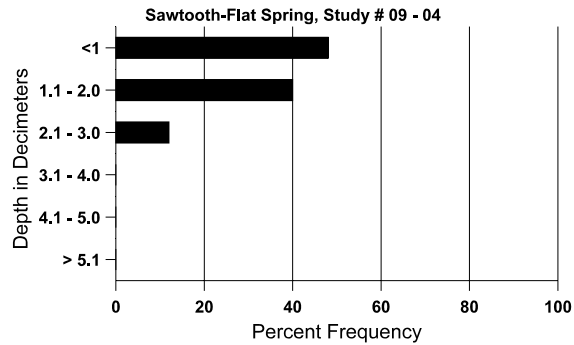
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	7.25	12.50	61.72	64.45	46.85
Rock	1.75	1.50	2.08	1.64	2.65
Pavement	0	2.00	1.07	1.77	.98
Litter	67.75	73.25	63.34	65.68	49.43
Cryptogams	.75	0	0	.42	.13
Bare Ground	22.50	10.75	5.61	7.58	19.03

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 4, Study Name: Sawtooth-Flat Spring

Effective rooting depth (in)	Temp °F (depth)	pH	% sand	% silt	% clay	%OM	ppm P	ppm K	dS/m
9.2	58.2 (10.7)	6.1	67.4	18.4	14.3	4.3	28.2	236.8	0.7

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 4

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	5	4	38
Elk	5	8	7
Deer	31	30	25
Cattle	9	1	9

Days use per acre (ha)	
'00	'05
-	-
25 (63)	11 (28)
75 (185)	58 (142)
16 (39)	23 (56)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	13/16
Artemisia tridentata vaseyana												
82	1466	-	66	1200	200	-	0	0	14	-	0	26/30
88	3932	133	600	1866	1466	-	34	5	37	-	2	22/20
95	2040	60	200	1560	280	380	56	4	14	4	4	27/43
00	2740	600	260	1840	640	240	4	.72	23	7	8	28/39
05	2680	1060	420	1680	580	720	37	18	22	7	7	32/40

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus lanceolatus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	120	-	-	120	-	-	0	0	-	-	0	14/28
00	120	-	-	120	-	-	0	0	-	-	0	15/24
05	100	-	20	80	-	-	20	20	-	-	0	10/16
Eriogonum heracleoides												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	120	-	60	60	-	-	0	0	-	-	0	10/13
00	220	-	-	220	-	-	0	0	-	-	0	4/6
05	700	20	100	600	-	-	37	9	-	-	0	5/6
Mahonia repens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	80	-	80	-	-	-	0	0	-	-	0	4/5
00	60	-	60	-	-	-	0	0	-	-	0	2/4
05	200	-	-	200	-	-	0	0	-	-	0	2/4
Opuntia fragilis												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	732	66	400	66	266	-	0	0	36	-	18	5/4
95	80	-	20	60	-	-	0	0	0	-	0	2/5
00	80	-	-	80	-	-	0	0	0	-	0	2/5
05	120	-	40	80	-	-	0	0	0	-	0	1/2
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	-	20	-	-	0	0	-	-	0	3/4
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
82	1066	-	-	1066	-	-	44	38	0	-	0	19/28
88	1865	-	266	1266	333	-	21	79	18	-	0	17/28
95	1720	-	180	1160	380	60	33	48	22	9	9	13/32
00	1520	20	220	1140	160	80	13	62	11	8	8	14/32
05	1440	-	180	1080	180	60	8	89	13	6	6	14/31

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus												
82	266	-	266	-	-	-	0	0	0	-	0	-/-
88	332	-	66	266	-	-	40	0	0	-	0	18/18
95	460	40	120	340	-	-	43	0	0	-	0	19/38
00	260	-	20	200	40	-	0	0	15	8	8	19/50
05	220	-	20	200	-	-	45	0	0	-	0	17/35

Trend Study 9-5-05

Study site name: Island Park.

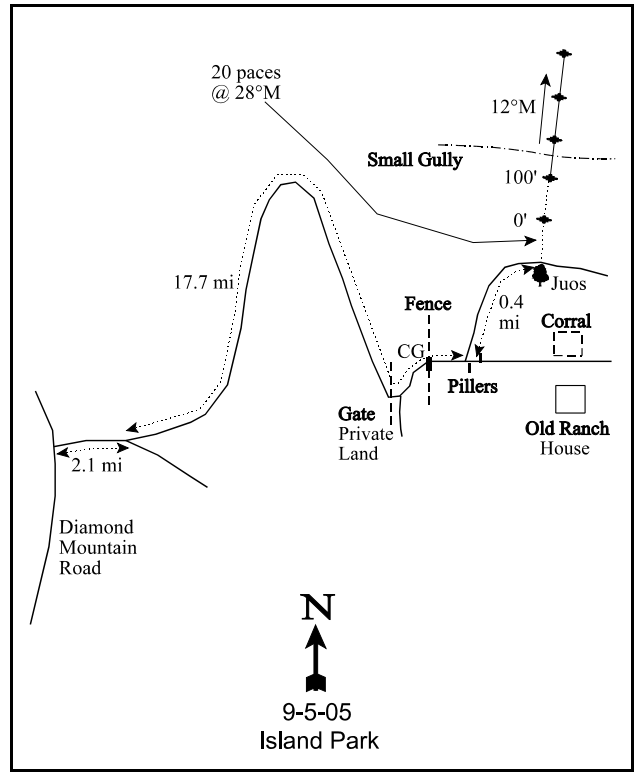
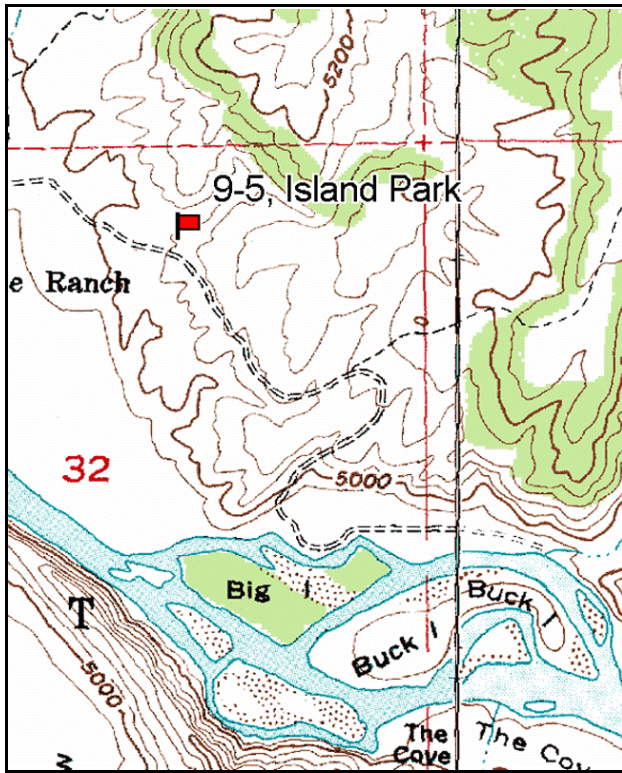
Vegetation type: Wyoming Big Sagebrush.

Compass bearing: frequency baseline 12 degrees magnetic.

Frequency belt placement: line 1 (9 & 88ft), line 2 (26ft), line 3 (48ft), line 4 (73ft).

LOCATION DESCRIPTION

From the Diamond Mountain Road, take the Island Park turnoff to the right. Proceed east for 2.1 miles to a fork. Stay to the left and go 17.7 miles. Just past the Jones Hole trailhead and before Ruple Ranch, there is a turnoff to the left. The road may be closed. Go left and proceed up the ridge for 0.4 miles to a juniper next to the road on the right. From the juniper, the 0-foot baseline stake is 20 paces away at a bearing of 28°M.



Map Name: Island Park

Diagrammatic Sketch

Township 3S, Range 25E, Section 32

GPS: NAD 27, UTM 12T 4487260 N, 658118 E

DISCUSSION

Island Park - Trend Study No. 9-5

The Island Park study is located on a sagebrush-grass slope one-half mile north of the Green River in Dinosaur National Monument. This site is on deer winter range at an elevation of approximately 5,000 feet with a slope of about 25%. Aspect is south-southwest. Deer and rabbit pellets had high quadrat frequencies in 1995, while elk were low. Quadrat frequency decreased for deer and rabbit pellets in 2000, but increased for elk. Pellet group data from 2000 estimated 47 deer and 57 elk days use/acre (116 ddu/ha and 141 edu/ha). Pellet group data from 2005 estimated 22 deer and 64 elk days use/acre (55 ddu/ha and 159 edu/ha). Livestock grazing is no longer permitted within the national monument.

Soils are a sandy loam with little surface rock. Estimated effective rooting depth is nearly 13 inches. The soil is neutral to slightly alkaline with a pH of 7.3. Phosphorus levels were measured at 4 ppm, values less than 6 ppm can limit normal plant growth and development (Tiedemann and Lopez 2004). Cryptogamic crusts have slowly increased since 1982 with no grazing, but declined in 2005. With drought in 2000, bare ground increased from 31% to nearly 35% relative cover and remained there in 2005. Soil movement was noticeable in 2000 with predominately bare ground in the interspaces of the shrubs, but not as much in 2005 due to an increase in annual grasses. The erosion condition class determined soil movement as stable in 2005.

Key browse species is Wyoming big sagebrush, although there may be some hybridization with Basin big sagebrush. In 1995, average cover was 8%, 6% in 2000, and only 1.5% in 2005. Density has continually decreased from an estimated 3,300 plants/acre in 1995. In 2000, sagebrush density was estimated at 2,780 plants/acre and has decreased to only 900 plants/acre in 2005. Percent decadence has been relatively high since this study began in 1982 with 44% of the population classified as decadent. It remained high at 51% in 1988, 39% in 1995, 85% in 2000, and 71% in 2005. The percentage of the population that is dying has increased from 28% in 1995 to 50% by 2000. It reached a high of 60% in 2005. Young recruitment is not replacing the dying plants and has been low since 2000. The ratio of dead sagebrush plants to live sagebrush in 2000 was 1:3 and in 2005 was 1:0.3. The sagebrush may disappear unless young recruitment is able to replace the dying plants.

Another sign of possible declining range condition, first noted in 1982, was the abundance of broom snakeweed which appeared to have an expanding population. In 1995, snakeweed was estimated at 3,580 plants/acre with high recruitment (36%) and mostly good vigor. In 2000, snakeweed increased exponentially to an estimated 30,120 plants/acre. Snakeweed often declines with drought and in 2005 the population was estimated at 2,700 plants/acre. Other shrubs encountered include: slenderbush eriogonum and pricklypear cactus.

The understory is dominated by cheatgrass and needle-and-thread grass. Needle-and-thread has been the dominate species in the past, but in 2005 cheatgrass cover and nested frequency surpassed that of needle-and-thread. Needle-and-thread has averaged 10-12% cover during all readings. Cheatgrass drastically increased from 4.5% average cover in 2000 to 12.5% in 2005. It was estimated at a 93% quadrat frequency. Cheatgrass and needle-and-thread combined made up 67% of the total vegetation in 2005. Forbs are few, dominated by annuals, and provide little useful forage. Combined forb cover contributes to less than 1.5% average cover.

1982 APPARENT TREND ASSESSMENT

Soil trend appears to be slightly declining. The estimates for ground cover show approximately 51% bare ground and less than 3% basal vegetative cover. There is active sheet and gully erosion underway and considerable quantities of soil and litter have piled up against small obstructions. Vegetative trend appears to be declining. The best evidence would appear to be an aggressive and expanding population of snakeweed

and the fair to poor condition of the key browse species, Wyoming big sagebrush. In addition, understory composition is less than desirable and produces little quality forage. Furthermore, grass and forb density is inadequate to prevent or seriously impede soil movement.

1988 TREND ASSESSMENT

Percent litter cover has declined, resulting in an increase in the amount of exposed bare soil from 50% to 60%. Consequently, there is evidence of some soil loss and sedimentation. Trend for soil is slightly down. Trend for the key browse, Wyoming big sagebrush, is also slightly down. Even though total population increased, the number of mature plants declined from 2,000 plants/acre to 1,666. The increase in population came primarily from the increase in decadent plants (1,666 to 2,866) which account for 51% of the population. Heavy use was also higher with 34% of the sagebrush displaying heavy hedging. Another negative factor is the abundance of broom snakeweed which increased since 1982. The herbaceous trend is up especially for grasses. Quadrat frequency of grasses doubled since 1982. Composition is dominated by needle-and-thread grass. Forbs are depleted and provide little useful forage.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly down (-1)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Trend for soil is slightly up due to a large increase in cryptogamic crusts (5% to 11%) and an obvious increase in vegetation cover. Aerial cover, instead of basal cover, was estimated in 1995. Percent bare ground decreased from nearly 60% to 31%. Vegetation and litter also have high nested frequency values, indicating well dispersed cover. The spring of 1995 was unusually wet and may be partly responsible for the dramatic change in some of these ground cover values. Browse trend continues to decline due to continued moderate to heavy use, high decadence, poor vigor, declining population, and continuing drought. The herbaceous trend is slightly up with increases in sum of nested frequency of perennial grasses and forbs. The Desirable Components Index rated this site as good with a score of 51 due to moderate browse cover, high percent decadence, fairly good recruitment of shrubs, and good perennial grass cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - down (-2)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Good (51) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable. Bare ground increased slightly but not enough to suggest a change in trend. The abundance of herbaceous vegetation, especially perennial species, decreased in 2000 due to continuing drought. However, litter cover and cryptogamic cover increased and help compensate for this loss. Herbaceous vegetation is key to holding soils in place. Trend for browse is down. Wyoming big sagebrush increased in percent decadency from 39% to 82%. Half of the sagebrush population was classified as dying. Recruitment is currently low (80 plants/acre) and not adequate to replace the individuals classified as dying (1,380 plants/acre). Over the past 18 years, young plants have averaged 11% of the population, while dead plants account for 31% of the population. In the long term, the dead within the population are not being replaced. Furthermore, broom snakeweed exploded in density from 3,580 plants/acre to an estimated 30,120 plants/acre. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses and

forbs declined by nearly half due to continuing drought. The Desirable Components Index rated this site as fair to poor with a score of 25 due to decreased browse cover, high percent decadence, and good perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - Fair to Poor (25) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground remained at 35% relative cover and the ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil has remained similar to previous values. Cryptogams decreased from 10% relative cover in 2000 to 1% in 2005. Trend for key browse, Wyoming big sagebrush, is down. Population density decreased from 2,780 plants/acre in 2000 to 900 in 2005. Percent decadence has remained high (71%) and 60% of the population was classified as dying in 2005. Utilization has remained moderate to heavy. Drought conditions from 2000-2003 have shown to have had detrimental effects to most sagebrush communities, especially the lower elevation Wyoming big sagebrush types. Trend for herbaceous understory is slightly down. Perennial grasses have remained stable, but annual grasses, cheatgrass and sixweeks fescue, both increased significantly. Forbs remain diverse, but low in percent cover and forage value. Almost 70% of the forbs are annual species. The Desirable Components Index rated this site as poor with a score of 17 due to decreased browse cover, high percent decadence, high percent cover of annual grasses, however, the site has good perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Poor (17) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 5

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	_b 62	_{ab} 38	_{ab} 43	_a 29	.10	1.42	.32
G	Agropyron spicatum	-	4	4	1	.03	.18	.15
G	Bromus tectorum (a)	-	_a 40	_b 97	_c 314	.16	1.48	12.54
G	Hilaria jamesii	25	43	21	45	.50	.24	1.07
G	Oryzopsis hymenoides	12	6	11	6	.39	.62	.10
G	Poa fendleriana	-	5	-	-	.06	-	-
G	Poa secunda	_a 2	_a 4	_a 7	_b 26	.01	.01	.30
G	Sitanion hystrix	_b 31	_b 36	_a 4	_a 9	.24	.15	.70
G	Stipa comata	_a 213	_b 285	_a 217	_a 202	12.38	9.53	10.72
G	Vulpia octoflora (a)	-	_c 324	_a 5	_b 208	2.97	.06	2.99

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
	Total for Annual Grasses	0	364	102	522	3.13	1.55	15.53
	Total for Perennial Grasses	345	421	307	318	13.73	12.16	13.38
	Total for Grasses	345	785	409	840	16.86	13.71	28.92
F	Allium sp.	_b 9	_c 130	_{ab} 1	_a -	.42	.00	-
F	Astragalus convallarius	_b 8	_b 18	_{ab} 5	_a -	.12	.01	-
F	Astragalus purshii	-	3	-	-	.01	-	-
F	Castilleja chromosa	-	3	4	-	.03	.03	-
F	Calochortus nuttallii	-	3	6	4	.01	.01	.01
F	Chenopodium leptophyllum(a)	-	1	-	3	.00	-	.00
F	Collinsia parviflora (a)	-	-	-	3	-	-	.00
F	Descurainia pinnata (a)	_a 1	_b 57	_a -	_a 4	.12	-	.01
F	Draba sp. (a)	-	_b 35	_a -	_a -	.06	-	-
F	Erigeron sp.	-	3	5	-	.00	.01	-
F	Euphorbia robusta	-	3	-	-	.03	-	-
F	Ipomopsis congesta	-	8	-	-	.02	-	-
F	Lepidium sp. (a)	-	_b 24	_a -	_a 4	.09	-	.04
F	Lesquerella sp.	1	1	-	-	.00	-	-
F	Lygodesmia sp.	-	3	-	6	.01	-	.07
F	Machaeranthera grindelioides	3	-	-	-	-	-	-
F	Navarretia intertexta (a)	-	-	-	6	-	-	.01
F	Phlox longifolia	_b 72	_a 23	_a 22	_a 8	.05	.15	.02
F	Plantago patagonica (a)	-	_b 16	_a -	_c 51	.05	-	.36
F	Polygonum douglasii (a)	-	3	4	-	.00	.01	-
F	Salsola iberica (a)	-	_a -	_a -	_b 12	-	-	.04
F	Sisymbrium altissimum (a)	-	3	2	6	.15	.03	.06
F	Sphaeralcea coccinea	_a 3	_b 18	_{ab} 7	_c 40	.13	.01	.89
F	Taraxacum officinale	-	3	1	-	.00	.00	-
F	Unknown forb-perennial	7	-	-	-	-	-	-
	Total for Annual Forbs	1	139	6	89	0.49	0.04	0.53
	Total for Perennial Forbs	103	219	51	58	0.86	0.24	0.99
	Total for Forbs	104	358	57	147	1.35	0.29	1.52

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

BROWSE TRENDS --

Management unit 09 , Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	79	78	34	7.76	5.69	1.50
B	Eriogonum microthecum	30	15	22	.19	.16	.44
B	Gutierrezia sarothrae	76	100	66	.98	12.44	1.93
B	Leptodactylon pungens	2	2	0	.03	.15	-
B	Opuntia sp.	20	16	19	.07	.36	.64
Total for Browse		207	211	141	9.06	18.83	4.53

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 5

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	2.11
Eriogonum microthecum	.25
Gutierrezia sarothrae	2.83
Opuntia sp.	.51

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 5

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.3

BASIC COVER --

Management unit 09 , Study no: 5

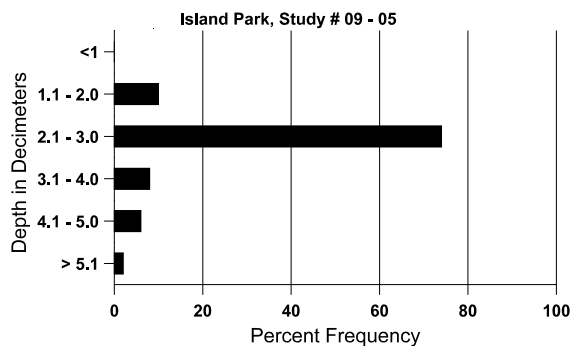
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	2.75	4.75	31.06	35.34	39.24
Rock	0	0	0	0	0
Pavement	0	0	.01	.15	.03
Litter	45.50	31.00	32.54	35.04	28.71
Cryptogams	1.00	4.50	10.82	12.38	1.02
Bare Ground	50.75	59.75	31.40	44.68	37.68

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 5, Study Name: Island Park

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
12.9	73.4 (14.3)	7.3	57.4	26.7	15.9	0.6	4.0	112.0	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 5

Type	Quadrat Frequency			Days use per acre (ha)	
	'95	'00	'05	'00	'05
Rabbit	45	10	51	-	-
Elk	6	25	48	57 (141)	64 (159)
Deer	32	21	29	47 (116)	22 (55)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
82	3799	-	133	2000	1666	-	54	14	44	-	30	17/23
88	5665	133	1133	1666	2866	-	42	34	51	2	14	20/21
95	3300	180	560	1440	1300	1520	50	29	39	28	29	16/25
00	2780	20	80	420	2280	1140	53	28	82	50	50	16/25
05	900	-	60	200	640	3000	29	44	71	60	60	17/22

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Eriogonum microthecum</i>												
82	200	-	-	200	-	-	0	0	0	-	0	13/6
88	733	-	200	533	-	-	0	0	0	-	0	9/5
95	1020	20	60	860	100	-	4	4	10	-	0	10/10
00	500	-	-	480	20	-	12	12	4	-	4	5/6
05	780	-	-	780	-	-	0	31	0	-	0	12/13
<i>Gutierrezia sarothrae</i>												
82	7466	-	800	6666	-	-	0	0	0	-	0	12/10
88	30332	66	3066	24600	2666	-	0	0	9	-	1	8/6
95	3580	26560	1300	2260	20	100	3	0	1	-	0	12/13
00	30120	-	340	27720	2060	320	0	0	7	3	3	8/9
05	2700	220	100	2580	20	40	0	0	1	-	0	12/12
<i>Leptodactylon pungens</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	60	-	-	60	-	-	0	0	-	-	0	4/8
00	120	-	20	100	-	-	0	0	-	-	0	4/8
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
82	133	-	-	133	-	-	0	0	0	-	0	3/5
88	599	-	266	333	-	-	11	0	0	-	0	4/8
95	440	-	-	420	20	20	0	0	5	-	0	4/16
00	380	-	20	320	40	-	0	0	11	-	0	4/12
05	560	-	-	440	120	-	0	0	21	11	18	5/18

Trend Study 9-6-05

Study site name: Above Steinaker Draw .

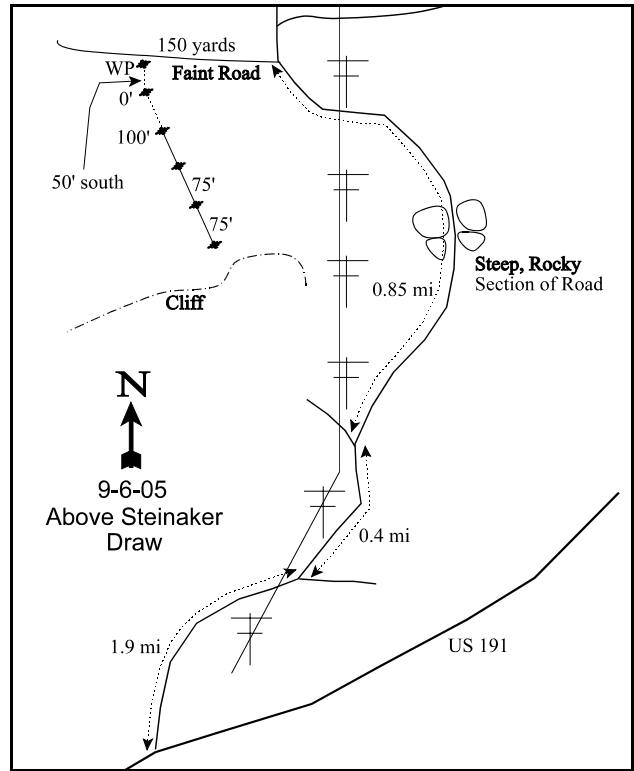
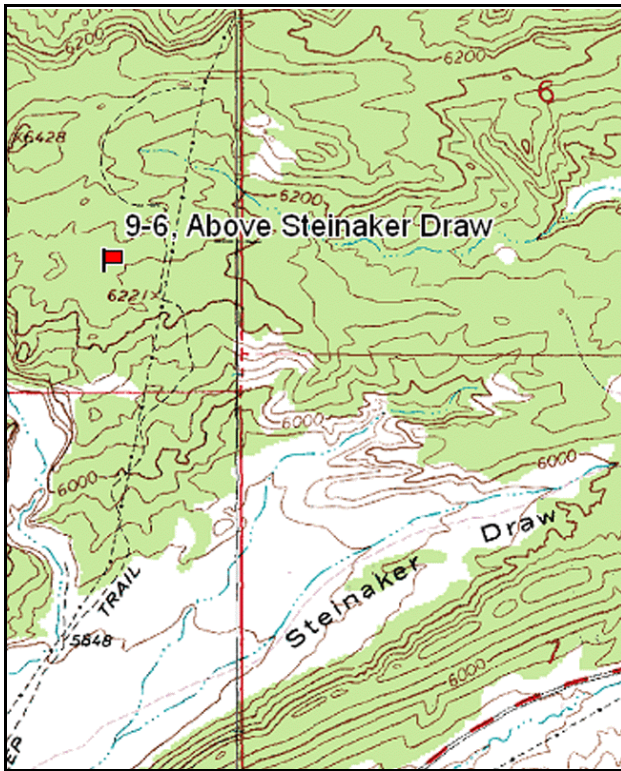
Vegetation type: Pinyon-Juniper .

Compass bearing: frequency baseline 143 degrees magnetic.

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

LOCATION DESCRIPTION

One mile north of Steinaker Reservoir, turn left off highway US 191. Staying to the right, go northeast on the dirt road for approximately 1.9 miles. Just after crossing under the power lines, there is a fork. Bear left at this fork, going 0.4 miles to a fork at the base of the hill. Proceed up the right fork, following the power lines, going approximately 0.85 miles to the top of a rough, sandy 4-WD road. Just after you come up a very steep, rocky section, you top out and the road bends to the right beneath the power lines. Beyond the bend is a faint road leading off to the west. Walk along this trail about 150 yards to a witness post on the left side of the old road. The study site is in the juniper/sage on the south side of the road. The 0-foot baseline stake is 50 feet south of the witness post.



Map Name: Steinaker Reservoir

Diagrammatic Sketch

Township 3S, Range 21E, Section 1

GPS: NAD 27, UTM 12T 4493285 N, 626581 E

DISCUSSION

Above Steinaker Draw - Trend Study No. 9-6

The Above Steinaker Draw study was established in 1988. It is located in an open juniper stand with an understory of Wyoming big sagebrush. This study was added to replace an old study, Steinaker Draw, which was established in 1982 and sampled a little-used desert shrub range type. The study site lies in a small basin that has a gentle slope in the bottom (2%), but gets steeper on the short slopes which run up to sandstone ridges. The general aspect is to the northeast. The area does not receive much snow, annual precipitation ranges from 9 to 12 inches. The elevation is 6,250 feet. Old sign of wintering deer and elk were abundant although in 2000, with several mild winters, fresh sign was scarce. Pellet group data from 2000 estimated 6 deer and 9 elk days use/acre (15 ddu/ha and 22 edu/ha). No cattle pats were sampled in 2000. Pellet group data from 2005 estimated 60 deer and 36 elk, and 1 cow days use/acre (149 ddu/ha, 88 edu/ha, and 2 cdu/ha). Cattle graze the Red Mountain allotment, managed by the BLM, in spring or fall as part of a deferred system.

The soil is a loamy sand in the LaMarsh-Rock Outcrop complex. Estimated effective rooting depth is just over 16 inches and penetrometer readings show rock to be evenly distributed throughout the upper 20 inches of the soil profile. There are areas where soils are more shallow resulting in exposed bedrock. Soil phosphorus levels are 6.2 ppm, values less than 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Soils are often without plant cover and tend to support well-developed cryptogams. Cryptogamic crust cover has been high in all years. Although permeability is rapid, surface runoff is moderate and erosion potential is high. The soil is most vulnerable during high intensity summer thunderstorms. At most other times, erosion is localized and not severe. Moderate pedestaling occurs around the stems of sagebrush and the trunks of juniper trees. The erosion condition class determined soil movement as stable in 2005.

The mature juniper overstory estimated point-center quarter density of 65 juniper trees/acre with an average diameter of 11.8 inches in 2000. In 2005, point-center quarter estimated 86 junipers/acre with a mean diameter of 13.0 inches. Overhead canopy cover was estimated at 10% in 2000 and 12% in 2005. Due to a low average precipitation, this site is marginal for pinyon. Therefore, pinyon had an estimated density of only 6 trees/acre in 2000, with an average trunk diameter of 3 inches.

Openings in the juniper woodland allow for a moderate stand of Wyoming big sagebrush. Wyoming big sagebrush density estimated about 2,600 plants/acre in both 1995 and 2000. This decreased to 1,860 plants/acre in 2005. Percent decadence has increased from 11% in 1995 to 32% in 2000, and reached 55% in 2005. Sagebrush cover was estimated at 12% in 1995, 10% in 2000, and 8% in 2005. Vigor was generally good with fair growth and seed production in both 1988 and 1995. Poor vigor slightly increased to 9% in 2000 and then again increased in 2005 to 27%. Increases in poor vigor and percent decadency are partially due to drought, but utilization increased from light use to moderate-heavy. Young recruitment was good in both 1988 and 1995 at 12 and 16%, but decreased to 4% in 2000 and 1% in 2005. Annual grasses (cheatgrass) are reducing soil moisture and nutrients for young shrubs (Hall et al. 1999).

Other shrubs include a small population of spiny hopsage and Black sagebrush. Both species are palatable and show light to moderate use. Density for each species is under 160 plants/acre in all data collection years. Both species displayed poor vigor in 2000 and 2005, most likely from drought conditions.

The herbaceous understory is dominated by annuals. Cheatgrass and sixweeks fescue are the most abundant grasses and account for 43% of the total vegetation cover. Nested frequency increased significantly for both cheatgrass and sixweeks fescue in 2005. Sixweeks fescue was fairly abundant in 1995, but infrequent in 2000. Some places support a dense stand of cheatgrass, while perennial species are clumped in others. Thickspike wheatgrass was fairly abundant in 1995, but decreased significantly in 2000 and remained low in 2005.

Needle-and-thread is the most dominant perennial grass. Others include Sandberg bluegrass and galleta. Sum of nested frequency of perennial grasses and forbs decreased by 37% in 2000 and decreased another 9% in 2005. Forbs are rare and reduced substantially with drought conditions between 2000 and 2005. Twenty-one species were sampled in 1995, this decreased to 12 species in 2000, and rose slightly in 2005 to 16 species. Lobeleaf groundsel is the most abundant forb, but decreased significantly in 2005.

1988 APPARENT TREND ASSESSMENT

The percentage of basal vegetative cover is relatively low (5%), but litter cover is higher than expected (55%). Cryptogams provide a substantial amount of ground cover (21%), thereby reducing the amount of bare soil to 18%, which is relatively low for this type of site. Trend for soil appears stable. Wyoming big sagebrush appears to be slightly down due to its moderately high decadency rate. Apparent trend for the herbaceous understory is stable.

1995 TREND ASSESSMENT

Bare ground slightly increased from 18% to 20%, while cryptogamic cover and litter decreased. Due to the variable ground cover, the much larger sampling design may be responsible for some of the changes in ground cover. Sum of nested frequency of vegetation and litter are high indicating well dispersed cover for these cover classes. Additionally, grasses and forbs account for 43% of the total vegetation cover. Sum of nested frequency for perennial grasses and forbs have also increased since 1988. Taking these factors into consideration, trend for soil is considered stable. Trend for Wyoming big sagebrush is slightly up. Percent decadence has declined from 57% to 11% and heavy use has also declined. The herbaceous understory trend is down. Overall, the sum of nested frequency for perennial grasses decreased substantially. Sum of nested frequency for perennial forbs increased from 13 to 168, but they typically provide less than 1% total cover. The Desirable Components Index rated this site as good with a score of 48 due to good browse cover, low decadence, moderate percent cover of annual grasses, but only fair perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - down (-2)

winter range condition (DC Index) - Good (48) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Cover from cryptogams doubled, while bare ground decreased to 17% which is relatively low for this community type. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil is relatively high at over 4:1, which indicates well dispersed cover over the site. Trend for browse is slightly down. The key species, Wyoming big sagebrush shows increases percent decadency from 11% to 32%, a decrease in recruitment from 16% to 4%, and a slight increase in poor vigor from 2% to 9%. Drought is the principle factor driving these downward trends. With a return to normal precipitation in the future, these parameters should improve. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses and forbs decreased by 37% in 2000 due to drought. Composition is poor as annual species make up a significant portion of the understory at this site. The Desirable Components Index rated this site as fair with a score of 32 due to good browse cover, moderate to high decadence, moderate percent cover of annual grasses, but low perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - down (-2)

winter range condition (DC Index) - Fair (32) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soil continues to be stable. Protective ground cover (vegetation, litter, and cryptogams) to bare soil has decreased slightly from 2000, but still provides good protection from erosion. Bare ground nested frequency increased slightly and cryptograms decreased slightly. Trend for key browse Wyoming big sagebrush is down. Density decreased from 2,620 plants/acre in 2000 to 1,860 in 2005. Percent decadence continued to increase from 32% in 2000 to 55% in 2005. Over half the population is decadent and 27% of the population was classified as dying in 2005. Of all four readings, young recruitment was the lowest this year, which may be partially due to the increase in cheatgrass. Trend for herbaceous understory is slightly down. Perennial grasses have improved slightly in the 2000 reading, but annual grasses, cheatgrass and sixweeks fescue, have increased 89%. The majority of the species composition is made up of annual species. The Desirable Components Index rated this site as poor with a score of 12 due to fair browse cover, high percent decadence, high percent cover of annual grasses, and low perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Poor (12) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 6

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	_b 136	_b 141	_a 60	_a 46	4.41	.73	.42
G	Bromus tectorum (a)	-	_a 212	_a 249	_b 314	5.16	5.40	14.89
G	Hilaria jamesii	_b 113	_a 13	_a 23	_a 25	.13	.34	.65
G	Oryzopsis hymenoides	_b 17	_{ab} 4	_a -	_a 1	.04	-	.01
G	Poa fendleriana	_b 23	_a 6	_a -	_b 18	.04	-	.41
G	Poa secunda	41	40	28	44	.30	.55	.87
G	Sitanion hystrix	3	-	-	-	-	-	-
G	Sporobolus cryptandrus	-	3	-	4	.38	-	.15
G	Stipa comata	52	33	40	41	.70	1.36	1.56
G	Vulpia octoflora (a)	-	_b 208	_a 21	_b 197	1.04	.04	3.60
Total for Annual Grasses		0	420	270	511	6.21	5.44	18.50
Total for Perennial Grasses		385	240	151	179	6.02	2.99	4.09
Total for Grasses		385	660	421	690	12.23	8.43	22.59
F	Arabis sp.	1	6	-	-	.01	-	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Astragalus sp.	-	-	-	2	-	-	.00
F	Calochortus nuttallii	5	1	-	-	.00	-	-
F	Chaenactis douglasii	-	1	-	-	.00	-	-
F	Chenopodium fremontii (a)	-	a-	a-	b11	-	-	.05
F	Chenopodium leptophyllum(a)	-	b34	a-	b28	.09	-	.05
F	Collinsia parviflora (a)	-	b40	a2	a9	.08	.00	.05
F	Cryptantha sp.	a1	b52	a-	a-	.22	-	-
F	Delphinium nuttallianum	a-	a-	a2	b12	-	.00	.08
F	Descurainia pinnata (a)	a4	b51	a-	b29	.21	-	.50
F	Draba sp. (a)	-	b53	a-	a2	.14	-	.00
F	Eriogonum cernuum (a)	-	b16	a-	ab3	.03	-	.04
F	Erigeron sp.	a-	b9	ab3	a-	.02	.01	-
F	Eriogonum sp.	-	5	1	-	.03	.00	-
F	Gilia sp. (a)	-	b64	a-	a5	.21	-	.01
F	Hymenoxys acaulis	-	-	7	-	-	.01	-
F	Ipomopsis aggregata	-	8	-	-	.04	-	-
F	Lappula occidentalis (a)	-	c78	a16	b46	.28	.17	.30
F	Lactuca serriola	-	3	-	-	.01	-	-
F	Lepidium sp. (a)	a9	b74	a2	a17	.27	.00	.21
F	Lomatium sp.	-	3	4	-	.03	.06	-
F	Lupinus argenteus	-	-	-	-	-	.03	-
F	Machaeranthera canescens	-	-	-	7	-	-	.04
F	Mentzelia sp.	-	-	-	3	-	-	.15
F	Oenothera sp.	-	4	-	-	.01	-	-
F	Polygonum douglasii (a)	-	b25	a2	ab11	.06	.00	.04
F	Schoenocrambe linifolia	-	-	-	1	-	-	.00
F	Senecio multilobatus	a5	c70	c80	a30	.15	2.24	.93
F	Sphaeralcea coccinea	1	-	-	-	-	-	-
F	Townsendia incana	-	6	8	-	.04	.02	-
Total for Annual Forbs		13	435	22	161	1.39	0.18	1.27
Total for Perennial Forbs		13	168	105	55	0.59	2.38	1.21
Total for Forbs		26	603	127	216	1.98	2.57	2.49

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

BROWSE TRENDS --

Management unit 09 , Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Artemisia nova</i>	0	3	2	.38	.91	.15
B	<i>Artemisia tridentata wyomingensis</i>	61	62	53	11.60	10.16	7.92
B	<i>Chrysothamnus nauseosus</i>	0	2	5	-	.06	-
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	14	10	5	1.64	1.20	.76
B	<i>Ephedra viridis</i>	3	3	3	.15	.15	.03
B	<i>Grayia spinosa</i>	8	9	8	1.52	2.36	2.21
B	<i>Gutierrezia sarothrae</i>	4	2	0	.03	-	-
B	<i>Juniperus osteosperma</i>	0	4	5	2.20	3.99	4.30
B	<i>Opuntia sp.</i>	36	31	36	1.50	1.01	2.11
Total for Browse		126	126	117	19.03	19.85	17.50

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 6

Species	Percent Cover	
	'00	'05
<i>Artemisia tridentata wyomingensis</i>	-	9.10
<i>Chrysothamnus nauseosus</i>	-	.28
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	.65
<i>Ephedra viridis</i>	-	.01
<i>Grayia spinosa</i>	-	2.21
<i>Juniperus osteosperma</i>	10.39	12.23
<i>Opuntia sp.</i>	-	1.03

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 6

Species	Average leader growth (in)
	'05
<i>Artemisia tridentata wyomingensis</i>	2.7

POINT-QUARTER TREE DATA --

Management unit 09 , Study no: 6

Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Juniperus osteosperma	65	86	11.8	13.0

BASIC COVER --

Management unit 09 , Study no: 6

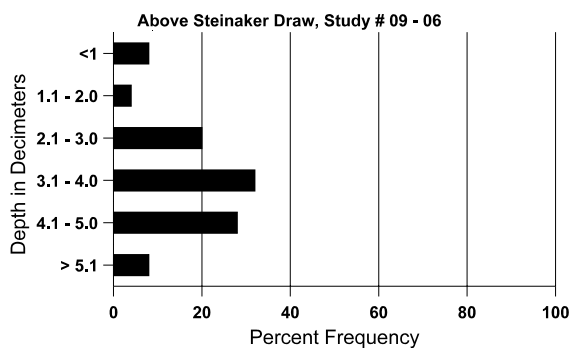
Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	4.75	35.26	31.51	38.94
Rock	.25	.41	.15	.15
Pavement	0	.00	0	0
Litter	55.50	48.90	46.34	35.62
Cryptogams	21.25	11.38	23.07	14.13
Bare Ground	18.25	20.29	17.57	24.15

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 6, Study Name: Above Steinaker Draw

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
16.4	35.6 (17.9)	7.0	82.4	7.7	9.9	0.5	6.2	48.0	0.4

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 6

Type	Quadrat Frequency			Days use per acre (ha)	
	'95	'00	'05	'00	'05
Rabbit	28	67	81	-	-
Elk	29	32	34	9 (23)	36 (88)
Deer	39	18	46	6 (15)	60 (149)
Cattle	1	-	-	-	1 (2)

BROWSE CHARACTERISTICS --
Management unit 09 , Study no: 6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	7/17
00	60	-	-	40	20	20	0	0	33	33	33	18/25
05	40	-	-	20	20	60	50	0	50	50	50	14/20
Artemisia tridentata wyomingensis												
88	2165	66	266	666	1233	-	45	14	57	-	3	30/24
95	2580	20	420	1880	280	380	14	.77	11	2	2	26/38
00	2620	-	100	1680	840	660	25	.76	32	9	9	29/39
05	1860	60	20	820	1020	800	38	54	55	27	27	30/40
Ceratoides lanata												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	13/10
Cercocarpus montanus												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	38/60
05	0	-	-	-	-	-	0	0	-	-	0	43/63
Chrysothamnus nauseosus												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	-/-
00	40	-	20	20	-	20	0	0	0	-	0	28/24
05	100	-	-	60	40	20	80	0	40	20	20	19/18
Chrysothamnus viscidiflorus viscidiflorus												
88	99	-	33	33	33	-	0	0	33	20	100	18/20
95	320	-	60	240	20	-	44	0	6	-	0	19/21
00	220	-	-	200	20	-	0	0	9	9	9	13/13
05	100	-	-	20	80	20	20	0	80	60	60	17/21
Ephedra viridis												
88	132	-	66	33	33	-	25	50	25	-	0	15/14
95	60	-	20	40	-	-	0	0	0	-	0	21/24
00	60	-	-	60	-	-	67	0	0	-	0	20/23
05	60	80	-	40	20	-	0	33	33	33	33	22/24

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Grayia spinosa</i>												
88	166	-	-	66	100	-	40	20	60	-	0	22/23
95	160	-	-	140	20	-	25	13	13	13	13	27/45
00	180	-	-	40	140	-	22	0	78	56	56	32/47
05	160	-	-	80	80	20	0	0	50	38	100	32/51
<i>Gutierrezia sarothrae</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	420	-	-	420	-	-	71	0	-	-	0	12/12
00	40	-	-	40	-	-	0	0	-	-	0	7/9
05	0	-	-	-	-	-	0	0	-	-	0	9/9
<i>Juniperus osteosperma</i>												
88	133	-	100	33	-	-	0	0	0	-	0	72/57
95	0	-	-	-	-	-	0	0	0	-	0	-/-
00	100	-	-	60	40	-	0	0	40	20	20	-/-
05	100	-	-	60	40	20	20	0	40	20	20	-/-
<i>Opuntia sp.</i>												
88	1132	-	166	966	-	-	0	0	0	-	0	3/11
95	3520	40	300	3220	-	-	0	0	0	-	0	3/11
00	2580	40	60	2280	240	140	0	0	9	7	7	3/12
05	1960	-	-	1960	-	-	0	0	0	-	65	4/10

Trend Study 9-7-05

Study site name: Warren Draw .

Vegetation type: Mountain Big Sagebrush .

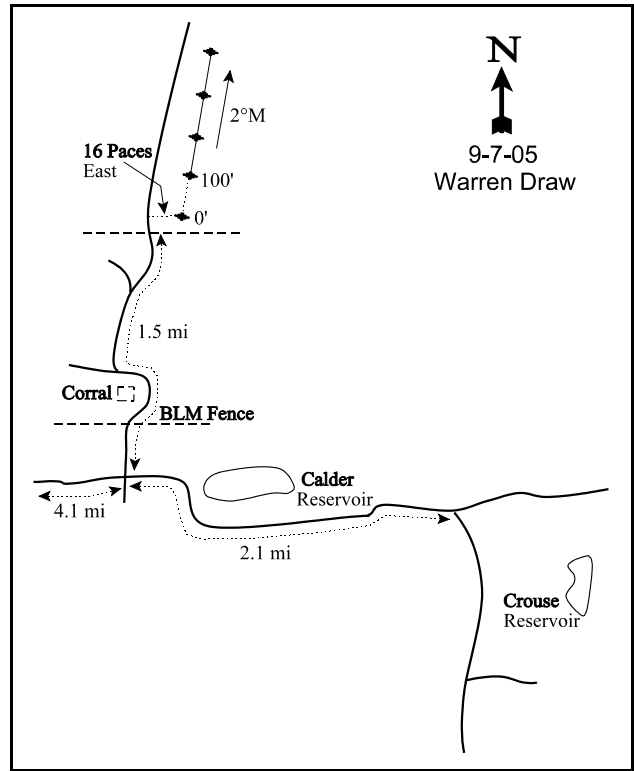
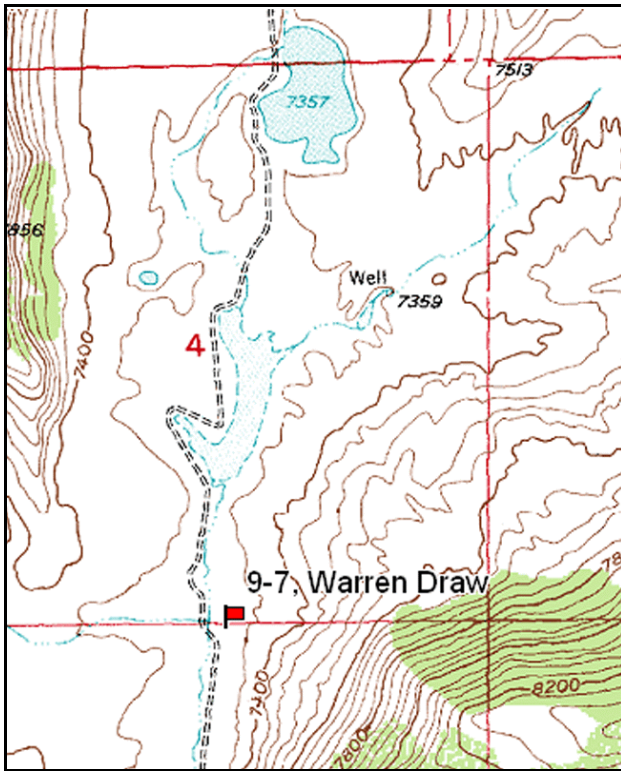
Compass bearing: frequency baseline 2 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction between Crouse and Calder reservoirs proceed west 2.1 miles to an intersection. Turn right (north) and go 1.5 miles, past a fence and 2 forks. On the other side of the second fence, a boundary between BLM and DWR land, stop and walk 16 paces east to the 0-foot baseline stake. The frequency baseline is marked with green steel fenceposts approximately 18 inches in height.

Alternative route: From the Diamond Mountain turnoff off US 191 travel east to an intersection just south of Matt Warner reservoir. Turn right towards Calder reservoir and proceed 4.1 miles to a fork. Turn left (north) at this fork and travel 1.5 miles passing through one fence and coming to another. On the other side of the second fence, a boundary between BLM and DWR land, stop and walk 16 paces east to the 0-foot baseline stake. The frequency baseline is marked with green steel fenceposts approximately 18 inches in height.



Map Name: Warren Draw

Diagrammatic Sketch

Township 1S, Range 24E, Section 4

GPS: NAD 27, UTM 12T 4513015 N, 649639 E

DISCUSSION

Warren Draw - Trend Study No. 9-7

The Warren Draw trend study is located just north of the DWR boundary fence in Warren Draw. The site is on a gentle (10%) west-facing slope at an elevation of approximately 7,350 feet. The area is used year-round by deer and elk. Sage grouse also appear to be in abundance. Water is readily available in most years with several stock ponds within a mile. In 1995, pellet group quadrat frequency data suggested moderately low use by elk and deer. Pellet group data from 2000 estimated 22 deer, 8 elk, and 1 cow days use/acre (54 ddu/ha, 20 edu/ha, and 2 cdu/ha). Pellet group data from 2005 estimated 78 deer, 13 elk and 1 cow days use/acre (193 ddu/ha, 31 edu/ha, and 2 cdu/ha).

Soil conditions are good with abundant protective ground cover (vegetation, litter, and cryptogams) and low amounts of bare soil. Soil texture is a sandy clay loam with a neutral pH of 6.6. Soil depth is moderate with an estimated effective rooting depth of nearly 13 inches. Some areas close to the site contain black sagebrush, which indicates localized rooting depth restrictions. Rock and pavement are scarce both on the surface and within the profile. Penetrometer readings used to estimate a profile stoniness index are more indicative of soil compaction in the profile than the presence of rocks. The erosion condition class determined soil movement as stable in 2005. Some pedestaling was observed around mature sagebrush plants.

The key browse species is mountain big sagebrush. The sagebrush stand has had an average cover of 20%. Population density was estimated at 7,320 plants/acre in 1995, 8,940 in 2000, and 8,220 in 2005. Percent decadence has been fairly high over all sampling years, except in 1982. In 1982, decadency was low at 7%, but increased to 51% by 1988 and has remained between 20% and 42% since then. The portion of the population classified as dying increased from 1% in 1995 to 11% in 2000. It reached a high of 20% in 2005. In 2000, several sagebrush plants were covered with ants. Young recruitment has been fairly good over the years at 12-13%, but decreased in 2005 to 5%. Seedlings were fairly abundant in 2005. Use has been light to moderate. Annual leader growth was fairly good in 2000, about 4 inches, but decreased to only 1.6 inches in 2005.

The only other browse species sampled was slenderbush eriogonum and fringed sagebrush. Snowberry is also scattered around the area in lower numbers.

Even with a high density and cover of sagebrush, the herbaceous understory is abundant. Grasses combined to produce nearly 15% cover in 1995 and 2000, then increased to 24% in 2005. Forbs averaged 24% cover in 1995 and 16% in 2000 and 2005. Eleven perennial grasses were sampled in 2005; Sandberg bluegrass, mutton bluegrass, and pinewoods needlegrass were the most abundant. These 3 species combined to produce 79% of the grass cover in 2005. Other species include: bottlebrush squirreltail, needle-and-thread, prairie junegrass, thickspike wheatgrass, Kentucky bluegrass, and a sedge species. Perennial grasses slightly decreased in sum of nested frequency in 2000 due to drought, but partially recovered by 2005. Forbs are diverse and abundant with 22 perennial species encountered in 1995, 18 in 2000, and 20 in 2005. Forbs decreased in cover from 24% in 1995 to 16% in 2000 and 2005. The dominant species are mainly mat forming and include: rose pussytoes, desert phlox, and owllover. Species with forage value included Silver lupine, penstemon, dandelion, and bluebells.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable to improving. All nine categories on the apparent trend evaluation form had favorable ratings. Vegetative trend appears stable but is perhaps more precarious at least with respect to the key browse species. Mountain big sagebrush appears to be sustaining itself at the present time, but age, form and vigor class distributions tend to be borderline. Reproduction may be a problem. All of these will be important parameters to monitor in the future.

1988 TREND ASSESSMENT

Soil conditions have improved in some areas but declined in others. Basal vegetative cover has increased from 18% to 23%. Percent litter cover declined slightly while percent bare ground increased. The site is in good condition and the soil trend is considered stable. The key browse species, mountain big sagebrush, displays a slightly improving trend. Even though population density increased dramatically, the proportion of decadent plants also dramatically increased from 7% to 51%. Biotic potential (number of seedlings) is currently high at 28% and the proportion of young plants is good at 13%. The number of mature plants has also increased slightly. The current population could decline in the future if drought conditions persist and cause the high number of decadent sagebrush to die-off. The herbaceous trend is up due to a large increase in the quadrat frequency of grasses and forbs since 1982.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Ground cover characteristics have improved in most categories since 1988. Currently, 53% of the ground surface is covered by vegetation, 65% of which is covered by herbaceous plants. Percent litter has declined due to the prolonged drought, but cryptogamic cover has increased and percent bare ground has declined from 16% to 14%. Trend for soil is stable. The browse trend is slightly up for mountain big sagebrush. The number of mature plants increased, while the number of decadent shrubs declined from 51% to 20%. The only negative aspect of the browse trend is the moderate and heavy use of the sagebrush. Thirty-four percent of the plants were heavily hedged, up from 9% in 1988. Trend for the herbaceous understory is slightly up due to an increase in the sum of nested frequency of grasses and forbs. Three species sampled in 1988 increased significantly in nested frequency while three others declined significantly. The main difference in composition is the appearance of thickspike wheatgrass. If identification was accurate in the past, it appears that thickspike is coming into the site and squirreltail is going out. The Desirable Components Index rated this site as excellent with a score of 85 due to good browse cover, moderate decadence, excellent percent cover for perennial grass and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Excellent (85) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover are abundant with the proportion of bare ground remaining about the same. Erosion is minimal as a result. Trend for browse is stable. Mountain big sagebrush shows increases in poor vigor and decadency, but these increases can be attributed to drought and should improve with normal precipitation in the future. Recruitment remains good at 12% and the number of young plants is adequate to replace the dying individuals in the population, if any should be lost to die-off. Use also decreased to a more moderate level compared to that in 1995. Trend for the herbaceous understory is down due to drought. Sum of nested frequency decreased for perennial grasses, and moderately decreased for perennial forbs. The Desirable Components Index rated this site as good with a score of 78 due to good browse cover, high decadence, excellent percent cover for perennial grass and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - Good (78) Mid-level Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Protective ground cover (vegetation, litter, and cryptogams) to bare soil has remained similar to previous years and provides good protection from erosion. Trend for key browse, mountain big sagebrush, is slightly down. The population density dropped from 8,940 plants/acre in 2000 to 8,220 in 2005. This is not a large drop, but percent decadence and percent dying have both increased. Plants classified as dying increased from 11% in 2000 to 20% in 2005. Young recruitment is also slightly down with only 5% of population classified as young. Trend for the herbaceous understory is slightly up. Sum of nested frequency for perennial grasses slightly increased, while perennial forbs increased by 16%. Annual forbs increased dramatically, but most are low growing and poor in forage value. The Desirable Components Index rated this site as good with a score of 75 due to good browse cover, high decadence, excellent percent cover for perennial grass and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Good (75) Mid-level Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 7

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	a-	c265	c279	b207	2.48	3.87	1.67
G	Agropyron intermedium	-	-	4	-	-	.15	-
G	Bouteloua gracilis	-	-	-	3	-	-	.03
G	Carex sp.	26	29	18	8	.14	.30	.02
G	Festuca ovina	b20	b30	a-	a1	.29	-	.00
G	Koeleria cristata	c51	ab9	b11	a-	.04	.05	-
G	Poa fendleriana	a41	a79	b153	b121	1.52	5.07	4.39
G	Poa pratensis	a-	bc27	ab10	c36	.43	.21	1.07
G	Poa secunda	a89	a108	a79	b222	1.08	.98	11.01
G	Sitanion hystrix	c278	b52	a13	b42	2.23	.25	.45
G	Stipa comata	ab57	b65	a34	ab52	1.72	.67	1.85
G	Stipa pinetorum	b188	b177	b136	a86	4.61	3.60	3.06
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		750	841	737	778	14.58	15.18	23.57
Total for Grasses		750	841	737	778	14.58	15.18	23.57

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Achillea millefolium</i>	34	33	42	26	.34	.71	.46
F	<i>Agoseris glauca</i>	a-	a-	a ⁵	b ²⁹	-	.01	.14
F	<i>Allium</i> sp.	-	2	2	-	.01	.03	-
F	<i>Antennaria rosea</i>	ab ¹⁹¹	ab ¹⁸⁹	b ¹⁹⁶	a ¹⁵⁵	5.49	6.70	3.07
F	<i>Androsace septentrionalis</i> (a)	-	b ³⁶	a ¹⁸	a ⁸	.09	.04	.02
F	<i>Arabis drummondii</i>	24	7	4	4	.03	.01	.03
F	<i>Artemisia ludoviciana</i>	1	-	-	-	-	-	-
F	<i>Astragalus aretioides</i>	1	1	-	-	.00	-	-
F	<i>Aster</i> sp.	15	24	23	34	.09	.17	.51
F	<i>Chenopodium leptophyllum</i> (a)	-	6	-	3	.01	-	.00
F	<i>Collinsia parviflora</i> (a)	-	b ⁴³	a ⁷	c ¹⁰⁶	.26	.01	.34
F	<i>Cryptantha</i> sp.	-	1	-	-	.00	-	-
F	<i>Delphinium nuttallianum</i>	-	6	-	-	.03	-	.00
F	<i>Descurainia pinnata</i> (a)	1	1	-	-	.00	-	-
F	<i>Draba</i> sp. (a)	-	-	3	-	-	.01	-
F	<i>Erigeron eatonii</i>	b ¹³⁶	b ¹⁵⁷	a ⁶⁵	a ⁶⁶	.62	.37	.62
F	<i>Erigeron flagellaris</i>	a-	a-	b ¹¹	a ⁶	-	.11	.03
F	<i>Gayophytum ramosissimum</i> (a)	-	b ¹⁸	a-	b ²³	.09	-	.07
F	<i>Heterotheca villosa</i>	-	2	-	-	.00	-	-
F	<i>Hymenoxys richardsonii</i>	3	3	3	-	.03	.03	-
F	<i>Lupinus argenteus</i>	a ²⁴	b ⁴⁴	a ¹⁷	ab ²⁸	1.44	.56	1.62
F	<i>Lychnis drummondii</i>	-	5	-	-	.06	-	-
F	<i>Mertensia</i> sp.	a-	a-	a-	b ⁸	-	-	.12
F	<i>Microsteris gracilis</i> (a)	-	6	2	1	.02	.00	.00
F	<i>Navarretia</i> sp.	-	b ¹⁴	a-	b ²³	.08	-	.18
F	<i>Oenothera</i> sp.	-	-	-	3	-	-	.15
F	<i>Orthocarpus luteus</i> (a)	-	b ¹⁰⁹	a ³⁰	b ¹⁰⁶	3.04	.16	1.74
F	<i>Orobancha</i> sp.	-	2	-	-	.00	-	-
F	<i>Penstemon</i> sp.	13	1	6	10	.00	.09	.18
F	<i>Phlox hoodii</i>	c ²³⁴	b ¹⁷²	ab ¹⁶¹	a ¹²⁷	10.77	5.90	5.26
F	<i>Phlox longifolia</i>	a ⁵²	b ⁸¹	a ³⁹	a ⁴³	.34	.07	.12
F	<i>Polygonum douglasii</i> (a)	-	b ¹⁶¹	a ¹²	a ²⁰	.59	.03	.05
F	<i>Potentilla gracilis</i>	-	2	6	8	.03	.01	.01
F	<i>Schoenocrambe linifolia</i>	-	-	-	3	-	-	.00
F	<i>Taraxacum officinale</i>	a ¹⁸	ab ³⁸	a ¹⁶	b ⁴⁸	.13	.21	.66
F	<i>Tragopogon dubius</i>	-	-	3	2	-	.01	.03

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Trifolium gymnocarpon	_a -	_c 113	_b 41	_d 139	.27	.23	.85
F	Unknown forb-annual (a)	-	3	-	-	.00	-	-
F	Unknown forb-perennial	11	-	-	-	-	-	-
F	Zigadenus elegans	-	3	12	-	.00	.12	-
Total for Annual Forbs		1	383	72	267	4.12	0.26	2.24
Total for Perennial Forbs		757	900	652	762	19.82	15.39	14.11
Total for Forbs		758	1283	724	1029	23.94	15.65	16.35

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

BROWSE TRENDS --

Management unit 09 , Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	0	1	1	-	-	-
B	Artemisia tridentata vaseyana	99	97	97	20.41	18.76	20.37
B	Eriogonum microthecum	3	3	3	.03	.01	.15
Total for Browse		102	101	101	20.45	18.77	20.53

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 7

Species	Percent Cover
	'05
Artemisia tridentata vaseyana	25.14

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 7

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	1.6

BASIC COVER --

Management unit 09 , Study no: 7

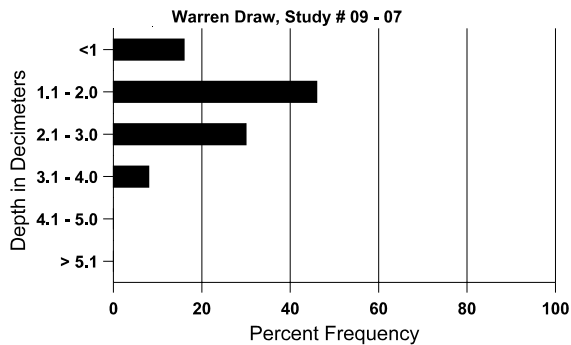
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	18.25	23.00	53.39	57.93	51.55
Rock	1.25	1.50	.16	.08	.67
Pavement	0	0	.07	.09	.10
Litter	65.50	59.00	50.50	66.19	45.95
Cryptogams	.25	.50	1.31	1.22	.84
Bare Ground	14.75	16.00	13.86	13.88	16.30

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 7, Study Name: Warren Draw

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
12.9	60.0 (13.5)	6.6	63.4	16.7	19.9	2.1	20.4	265.6	0.8

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 7

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	3	13	67
Elk	14	21	15
Deer	10	24	39
Cattle	2	1	2

Days use per acre (ha)	
'00	'05
-	-
8 (20)	13 (31)
22 (55)	78 (193)
1 (2)	1 (2)

BROWSE CHARACTERISTICS --
Management unit 09 , Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	0	0	-	-	0	4/5
05	20	-	-	20	-	-	0	100	-	-	0	1/2
Artemisia tridentata vaseyana												
82	3799	-	-	3533	266	-	30	26	7	-	7	18/31
88	10732	3000	1400	3866	5466	-	63	9	51	.74	9	21/25
95	7320	140	940	4940	1440	840	30	34	20	1	1	16/29
00	8940	80	1060	4580	3300	1120	25	5	37	11	11	17/29
05	8220	440	420	4380	3420	1920	31	24	42	20	20	17/24
Chrysothamnus viscidiflorus viscidiflorus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	6/9
Eriogonum microthecum												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	100	-	-	100	-	-	0	0	-	-	0	4/15
00	60	-	-	60	-	-	0	0	-	-	67	6/9
05	120	-	-	120	-	-	0	0	-	-	0	5/9
Symphoricarpos oreophilus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	13/11
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Tetradymia canescens</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	13/36

Trend Study 9-9-05

Study site name: Little Hole .

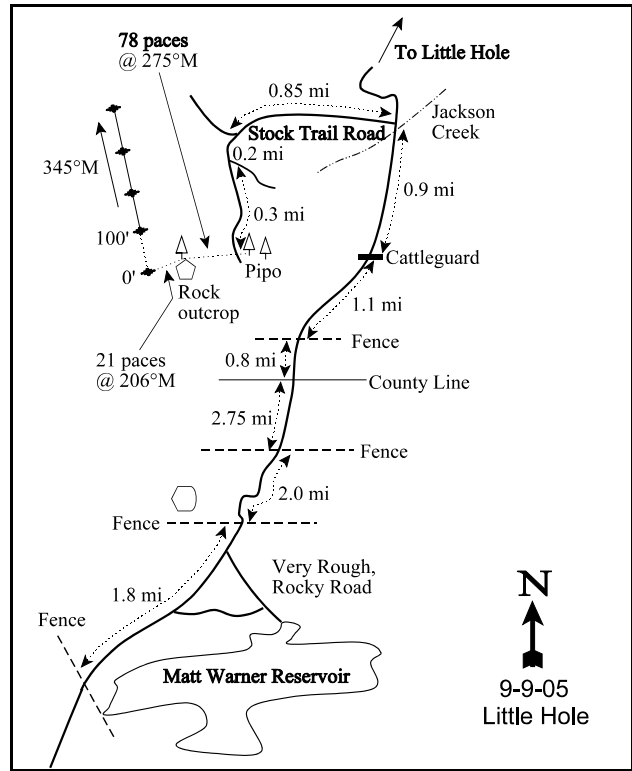
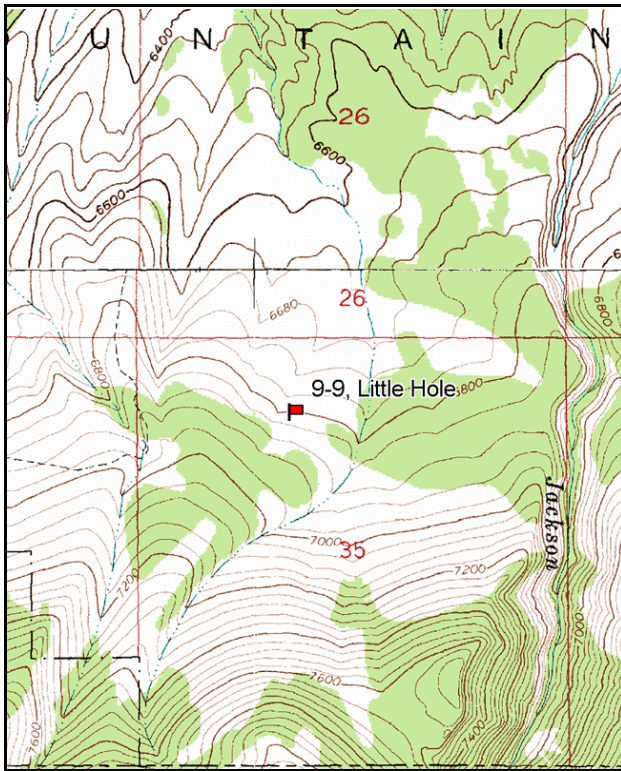
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 345 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of Highway U.S. 191 and the Diamond Mountain Road, take the Diamond Mountain Road to the north to a fork with a sign indicating Browns Park Road 10 miles and Vernal 36 miles. Turn left (north) towards Jackson Draw and proceed down Jackson Draw towards Little Hole. When you get to Matt Warner Reservoir, continue past a fence for 1.8 miles to another fence. Continue on the very rocky road for 2.0 miles to the next fence, passing a pond on the left. Go through this fence and drive 2.75 miles to the county line. Continue 0.8 miles past the county line to a fence. From here, drive 1.1 miles to a cattle guard and continue 0.9 miles to Jackson Creek. Just after crossing Jackson Creek make a left turn and proceed 0.85 miles to an intersection. Bear left, drive 0.2 miles to a fork. Proceed to the right for 0.3 miles to two large ponderosa pines near the road. From the 2 large ponderosa pines, walk SW (275°M) for 78 paces to a large rock outcropping just below another large ponderosa. From this tree, the 0-foot baseline stake is 21 paces at 206°M. The frequency baseline is marked by 18 inch green fenceposts.



Map Name: Jackson Draw

Diagrammatic Sketch

Township 2N, Range 23E, Section 35

GPS: NAD 27, UTM 12T 4525506 N, 644104 E

DISCUSSION

Little Hole - Trend Study No. 9-9

The Little Hole study is on a north-facing, 20% slope overlooking the Green River at Little Hole. The study samples a mixed mountain brush type with scattered pinyon-juniper, Ponderosa pine, and Douglas fir. Elevation is 6,800 feet and is considered an important winter range for deer and elk. This site is managed by the Utah Division of Wildlife as part of the Little Hole WMA. The state section is small and is surrounded by BLM lands, which are grazed by cattle during the summer from June 1 to October 15 as part of the Little Hole allotment. Pellet group data from 2000 estimated 28 deer, 6 elk, and 9 cow days use/acre (69 ddu/ha, 15 edu/ha, and 22 cdu/ha). Cattle pats sampled appeared to be from the fall of 1999. Pellet group data from 2005 estimated 38 deer, 9 elk, and 15 cow (93 ddu/ha, 23 edu/ha, and 36 cdu/ha).

Soils are derived from igneous parent material and have a sandy clay loam texture. Soil depth characteristically varies as the transect runs downslope. Estimated effective rooting depth is over 12 inches. Penetrometer readings used to estimate a stoniness profile index show high rock frequency between the surface down to 12 inches. The soil is slightly acidic with a pH of 6.2. Erosion potential is moderate on this 20% slope, but due to a somewhat abundant understory, erosion appears to be minimal. Evidence of past soil movement can be seen by a build-up of soil on the uphill side of shrub and tree stems. Despite minor soil movement, the erosion condition class determined soil movement as stable in 2005.

Mountain big sagebrush and antelope bitterbrush are the key browse species. Sagebrush averaged 11% cover in 2005, which is down from the 15-17% in 1995 and 2000. Density of sagebrush decreased from 4,220 plants/acre in 1995, to 3,320 in 2000, and finally to 2,600 in 2005. Percent decadency was estimated at 19% in 1995, but has doubled to over 45% in both 2000 and 2005. The percentage of plants classified as dying increased from 5% in 2000 to 29% in 2005. Young recruitment has been low, but in 2005 was not producing enough plants to replace those that were classified as dying. The seedling population had increased in 2005 and may provide some additional recruitment. Utilization on sagebrush has been light to moderate. Drought conditions had persisted for several years, but began to be above average in the winter of 2004, which may improve range conditions.

Antelope bitterbrush averaged 13.5% cover in 2005, which is higher than the 8-9% produced in 1995 and 2000. Density of bitterbrush estimated 1,780 plants/acre in 1995, decreased to 1,540 in 2000, but increased slightly to 1,860 in 2005. Percent decadence was very low in 1995 at 1% and increased in 2000 and 2005 to roughly 13%, which is still relatively low. Recruitment was moderately low at 100 plants/acre and increased from moderate-heavy use to heavy use. Vigor is good and average leader growth in 2005 was 4 inches.

A small number of true mountain mahogany and serviceberry are present. Mahogany were heavily hedged in 2005 and vigor was good. Density estimated 280 plants/acre in 2000 and 2005. Percent decadency was low in 2000 at 7% and increased to 21% in 2005. Serviceberry had an estimated density of 120 plants/acre in 1995 and 2000 and slightly increased to 280 in 2005. Use has been moderate to heavy, decadence low, and has shown good young recruitment for the few plants.

Other browse found on the site include: mountain low rabbitbrush, slenderbush eriogonum, broom snakeweed, Oregon grape, and snowberry. Point-center quarter data in 2000 estimated 42 pinyon trees/acre, 7 juniper trees/acre, 8 ponderosa pine trees/acre, and 5 Douglas fir trees/acre. The average diameter of pinyon was 1.8 inches, juniper was 6.7 inches, ponderosa pine was 3.6 inches, and Douglas fir was 3.4 inches. Point-center quarter data in 2005 estimated 20 juniper and 72 pinyon trees/acre. The average juniper diameter was 5.4 inches and pinyon diameter was 3.5 inches.

The herbaceous understory is diverse, especially the grass component. Perennial grass cover has increased from 11% in 1995, 21% in 2000, and 23 % in 2005. Eleven perennial grasses were sampled in 1995 and 2005, and Kentucky bluegrass was the most abundant every year sampled. The sum of the nested frequencies for perennial grasses significantly decreased from 1995 to 2000, but had nearly recovered by 2005. Other species include: needle-and-thread, oniongrass, bluebunch wheatgrass, mutton bluegrass, Sandberg bluegrass, Letterman needlegrass, and bottlebrush squirreltail.

Forbs have been diverse in number, but not particularly abundant during any reading. Twenty-two perennial forb species were encountered in 1995, 15 in 2000, and 23 in 2005. Increased precipitation returned the sum of nested frequency of perennial forbs in 2005 to the levels similar to those prior to the drought conditions in 2000-2004. Silver lupine is the only species that contributed more than 1% total cover in 2005, and it only contributed 2% cover in 2005. Hairy goldaster is the only other perennial forb to provide greater than 1% cover, which it did in 1995. Annual forbs were abundant in 1995 and fairly abundant in 2005, but nearly non-existent in 2000 due to the dry conditions.

1982 APPARENT TREND ASSESSMENT

Overall range trend appears stable to perhaps slightly improving. An apparent increase in antelope bitterbrush is encouraging. A concurrent decline in mountain big sagebrush is less so. If the community is in a state of flux, it will be important to prevent any increase in broom snakeweed or pricklypear. Soil trend appears stable.

1988 TREND ASSESSMENT

Ground cover data show an increase in vegetative cover which is consistent with frequency and density data, although the percentage of rock cover doubled to almost 13%. Percent bare ground declined from 16% to 9%. In this situation we have done nothing more than traded bare soil for rock cover. Soil trend is still considered stable. Trend for mountain big sagebrush is slightly down due to an increase in percent decadency. This condition is caused by the unusually dry conditions present this year and will improve with normal precipitation patterns. Trend for antelope bitterbrush is up due to a large increase in seedling and young plants indicating an increasing population. Overall, the browse trend is considered stable. The herbaceous understory trend is up with increased quadrat frequency for both grasses and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Soil trend is considered stable due to little changes in percent bare ground from 9% to 4%. Percent rock cover has declined and litter cover has remained fairly stable. The herbaceous understory makes up only 38% of the vegetative cover, but sum of nested frequency of vegetation and litter cover are high, indicating well dispersed protective cover. Trend for sagebrush is up due to a major decrease in decadency. It appears that most of the decadent shrubs are now normal mature plants with good vigor. This site was read in mid-September of 1988 and decadency numbers were likely inflated due to sagebrush dropping leaves in response to the dry conditions of that year. Trend for bitterbrush is slightly up due to an increase in the number of mature plants. Reproductive potential and percent young declined since 1988, but there are still sufficient seedlings and young to maintain the population. Average height and crown has also increased significantly. Overall browse trend is slightly up. The herbaceous understory trend is stable. Three of the five most numerous perennial grass species increased significantly, but the overall sum of nested frequency for perennial grasses declined

slightly. Sum of nested frequency for perennial forbs increased substantially. The Desirable Components Index rated this site as good with a score of 75 due to good browse cover, low decadence, good percent cover for perennial grass and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - stable (0)

winter range condition (DC Index) - Good (75) High Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Relative cover for bare ground doubled from 3% to 6%, but this is still comparatively low. Vegetation and litter cover remain high and are well disbursed over the site. Erosion remains minimal on this moderately steep site. Trend for browse is slightly down. Trend for mountain big sagebrush is slightly down due to the large increase in percent decadency from 19% to 47%. The percent of plants classified as dying remains low at 5%. This increase is due to drought and should improve with better precipitation in the future. Density also decreased from 4,220 plants/acre in 1995 to 3,320 in 2000. Bitterbrush remains in mostly good vigor, decadency is low at 12% and use is not extreme. Trend for the herbaceous understory is down overall. Although Kentucky bluegrass is the most abundant grass and increased in both cover and nested frequency in 2000, six other perennial grasses significantly decreased in nested frequency. Perennial forbs, while less abundant than grasses, declined in sum of nested frequency by nearly half. The Desirable Components Index rated this site as good with a score of 75 due to good browse cover, moderate decadence, good percent cover for perennial grass and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - down (-2)

winter range condition (DC Index) - Good (75) High Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Protective ground cover (vegetation, litter, and cryptogams) to bare soil has increased from 2000 and still provides good protection from erosion. Trend for key browse mountain big sagebrush and antelope bitterbrush is slightly down. Mountain big sagebrush is down with half of the sagebrush population classified as decadent. Density decreased by 22% with 29% of the population classified as dying. Recruitment of young is low and not replacing the population classified as dying. Bitterbrush density slightly increased, percent decadence is low, and has good vigor. This improved bitterbrush is not enough to compensate for the downward sagebrush trend. Trend for herbaceous understory is up. Perennial grasses are abundant and provided good forage. Sum of nested frequency increased for both perennial grasses and forbs and returned to levels similar to 1995. Cheatgrass is present on the site, but in low numbers. The Desirable Components Index rated this site as good with a score of 80 due to good browse cover, moderate decadence, excellent percent cover for perennial grass and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - up (+2)

winter range condition (DC Index) - Good (80) High Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 9

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Agropyron dasystachyum</i>	a ₅₃	b ₉₂	b ₁₁₅	b ₉₄	1.24	1.89	1.49
G	<i>Agropyron spicatum</i>	c ₉₇	bc ₇₀	ab ₄₁	a ₃₉	.84	1.12	1.03
G	<i>Bromus tectorum</i> (a)	-	c ₅₀	a ₃	b ₂₅	.45	.00	.12
G	<i>Carex</i> sp.	2	9	7	1	.17	.18	.03
G	<i>Koeleria cristata</i>	c ₆₁	ab ₅	a ₋	b ₁₃	.02	-	.22
G	<i>Melica bulbosa</i>	a ₂₇	c ₉₈	ab ₄₃	b ₆₀	1.87	.69	1.89
G	<i>Poa fendleriana</i>	a ₂₈	b ₉₂	a ₃₅	a ₁₂	1.38	.92	.34
G	<i>Poa pratensis</i>	a ₉₀	a ₁₄₀	b ₂₀₆	b ₂₃₁	3.18	14.19	11.21
G	<i>Poa secunda</i>	c ₁₅₀	b ₇₅	a ₂₇	ab ₅₀	1.00	.22	1.50
G	<i>Sitanion hystrix</i>	b ₁₁₃	a ₃₃	a ₁₂	a ₁₈	.35	.22	.56
G	<i>Stipa comata</i>	d ₁₄₄	b ₅₇	a ₂₀	c ₉₆	1.03	.80	3.87
G	<i>Stipa lettermani</i>	8	8	16	24	.21	.39	.73
Total for Annual Grasses		0	50	3	25	0.45	0.00	0.12
Total for Perennial Grasses		773	679	522	638	11.33	20.68	22.90
Total for Grasses		773	729	525	663	11.79	20.68	23.03
F	<i>Agoseris glauca</i>	a ₋	bc ₁₅	ab ₃	c ₂₂	.06	.00	.13
F	<i>Alyssum alyssoides</i> (a)	-	-	-	1	-	-	.03
F	<i>Antennaria rosea</i>	15	8	16	9	.48	.86	.48
F	<i>Arabis</i> sp.	3	3	-	5	.00	-	.01
F	<i>Astragalus convallarius</i>	1	11	12	5	.09	.39	.06
F	<i>Astragalus</i> sp.	1	-	-	-	-	-	-
F	<i>Castilleja linariaefolia</i>	-	1	-	-	.06	-	-
F	<i>Calochortus nuttallii</i>	-	3	-	2	.01	-	.02
F	<i>Chaenactis douglasii</i>	b ₁₃	a ₋	a ₁	a ₋	-	.00	-
F	<i>Collomia linearis</i> (a)	-	c ₁₀₉	a ₋	b ₄₁	.33	-	.22
F	<i>Comandra pallida</i>	a ₋	b ₂₉	b ₂₅	b ₃₂	.26	.18	.82
F	<i>Collinsia parviflora</i> (a)	-	c ₂₅₂	a ₁₀	b ₁₆₅	2.74	.02	.95
F	<i>Crepis acuminata</i>	b ₈	ab ₇	a ₋	ab ₃	.04	-	.06
F	<i>Cystopteris fragilis</i>	4	-	-	-	-	-	-
F	<i>Delphinium nuttallianum</i>	-	6	-	7	.01	-	.02
F	<i>Descurainia pinnata</i> (a)	-	2	-	4	.00	-	.03
F	<i>Draba</i> sp. (a)	-	-	-	3	-	-	.00
F	<i>Erigeron eatonii</i>	b ₁₅	a ₁	ab ₇	a ₋	.00	.01	.00
F	<i>Eriogonum umbellatum</i>	2	-	2	-	-	.00	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Gayophytum ramosissimum(a)	-	3	-	3	.00	-	.01
F	Heterotheca villosa	_b 84	_a 51	_a 40	_a 30	1.01	.73	.96
F	Ipomopsis aggregata	3	6	5	-	.02	.06	.01
F	Lepidium densiflorum (a)	-	7	-	4	.02	-	.04
F	Linum lewisii	-	3	-	-	.00	-	.00
F	Lithospermum ruderales	4	1	1	2	.03	.00	.18
F	Lomatium sp.	-	7	-	7	.02	-	.04
F	Lupinus argenteus	_a -	_c 38	_b 11	_c 49	.69	.10	2.15
F	Lychnis drummondii	-	-	-	2	-	-	.00
F	Microsteris gracilis (a)	-	4	2	8	.01	.00	.01
F	Navarretia intertexta (a)	-	-	-	1	-	-	.00
F	Orobanche sp.	-	5	-	5	.03	-	.06
F	Penstemon sp.	3	-	-	-	-	-	-
F	Petradoria pumila	7	-	-	-	-	-	-
F	Phlox hoodii	-	2	3	3	.00	.15	.15
F	Polygonum douglasii (a)	-	_b 19	_a 8	_a 8	.06	.02	.01
F	Sphaeralcea coccinea	_b 24	_{ab} 17	_{ab} 13	_a 9	.09	.20	.09
F	Taraxacum officinale	_b 17	_b 16	_a -	_{ab} 8	.07	-	.08
F	Tragopogon dubius	_b 9	_a -	_a -	_a -	-	-	.00
F	Trifolium gymnocarpon	_a -	_b 29	_a 6	_b 31	.06	.04	.11
F	Zigadenus paniculatus	_a -	_a 2	_{ab} 4	_b 7	.00	.06	.10
Total for Annual Forbs		0	396	20	238	3.18	0.05	1.34
Total for Perennial Forbs		213	261	149	238	3.09	2.82	5.60
Total for Forbs		213	657	169	476	6.27	2.87	6.94

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

BROWSE TRENDS --

Management unit 09 , Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	6	4	6	.03	.41	.93
B	Artemisia tridentata vaseyana	91	82	71	15.07	16.77	11.15
B	Cercocarpus montanus	16	13	12	1.31	1.69	2.90
B	Chrysothamnus viscidiflorus lanceolatus	4	4	1	.18	.06	-
B	Eriogonum heracleoides	2	1	3	.18	-	-
B	Eriogonum microthecum	32	24	22	1.07	1.12	.87
B	Gutierrezia sarothrae	6	0	1	-	-	.15
B	Mahonia repens	2	0	0	-	-	-
B	Pinus edulis	0	4	6	1.74	2.24	5.44
B	Pinus ponderosa	0	0	0	.38	-	-
B	Purshia tridentata	51	56	56	7.84	9.34	13.51
B	Symphoricarpos oreophilus	16	15	21	1.53	2.60	4.44
B	Tetradymia canescens	0	1	1	-	-	.15
Total for Browse		226	204	200	29.36	34.25	39.58

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 9

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	-	1.54
Artemisia tridentata vaseyana	-	9.61
Cercocarpus montanus	-	3.59
Chrysothamnus viscidiflorus lanceolatus	-	.20
Eriogonum heracleoides	-	.11
Eriogonum microthecum	-	1.03
Pinus edulis	2.00	7.48
Purshia tridentata	-	22.01
Symphoricarpos oreophilus	-	10.26
Tetradymia canescens	-	.03

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 09 , Study no: 9

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	2.4
Purshia tridentata	4.1

POINT-QUARTER TREE DATA --
Management unit 09 , Study no: 9

Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Juniperus osteosperma	8	20	6.7	5.4
Pinus edulis	42	72	1.8	3.5

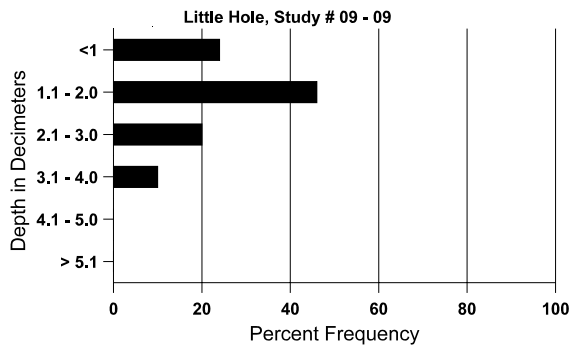
BASIC COVER --
Management unit 09 , Study no: 9

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	8.75	12.25	52.22	56.11	57.41
Rock	6.00	12.50	8.00	5.73	6.80
Pavement	.25	.75	.20	.90	.14
Litter	64.50	61.50	64.56	66.65	49.31
Cryptogams	5.00	4.25	1.27	1.97	1.02
Bare Ground	15.50	8.75	3.90	8.44	5.46

SOIL ANALYSIS DATA --
Herd Unit 09, Study # 9, Study Name: Little Hole

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
12.5	59.6 (12.8)	6.2	64.4	18.0	20.6	2.6	6.4	153.6	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 9

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	4	13	27
Moose	1	1	-
Elk	4	3	7
Deer	15	12	8
Cattle	6	7	10

Days use per acre (ha)	
'00	'05
-	-
2 (5)	-
6 (15)	9 (23)
28 (69)	38 (93)
9 (22)	15 (36)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	33	-	-	33	-	-	100	0	0	-	0	27/22
88	66	-	33	33	-	-	0	0	0	-	0	26/20
95	120	-	20	100	-	-	33	0	0	-	33	29/38
00	120	-	40	80	-	-	17	17	0	-	17	35/44
05	280	20	100	160	20	-	50	50	7	-	0	32/37
Artemisia tridentata vaseyana												
82	1999	-	33	1600	366	-	57	2	18	1	3	17/23
88	3566	-	400	533	2633	-	42	3	74	2	4	16/20
95	4220	20	280	3140	800	600	45	2	19	4	4	23/34
00	3320	140	160	1600	1560	500	1	0	47	5	5	25/32
05	2600	320	60	1340	1200	1400	26	12	46	29	29	28/34
Ceanothus fendleri												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	8/23
Cercocarpus montanus												
82	33	-	-	33	-	-	100	0	0	-	0	28/31
88	66	100	33	33	-	-	50	50	0	-	0	22/31
95	380	20	40	340	-	20	21	11	0	-	0	37/50
00	280	-	60	200	20	-	29	21	7	-	21	35/49
05	280	-	20	200	60	-	21	79	21	-	0	39/45

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	220	-	-	220	-	-	0	0	-	-	0	16/19
00	180	-	40	140	-	-	0	0	-	-	0	14/10
05	60	-	-	60	-	-	0	100	-	-	0	16/19
<i>Eriogonum heracleoides</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	-	40	-	-	0	0	-	-	0	7/19
00	40	-	-	40	-	-	0	0	-	-	0	-/-
05	60	-	-	60	-	-	0	0	-	-	0	9/21
<i>Eriogonum microthecum</i>												
82	200	-	-	200	-	-	0	0	0	-	17	9/8
88	732	33	266	366	100	-	0	0	14	-	9	7/6
95	1960	-	60	1900	-	-	0	0	0	-	0	11/16
00	1100	40	100	980	20	-	2	0	2	-	0	9/11
05	740	-	40	680	20	-	5	3	3	-	0	8/12
<i>Gutierrezia sarothrae</i>												
82	266	-	-	266	-	-	0	0	-	-	0	9/6
88	166	-	-	166	-	-	0	0	-	-	0	7/6
95	160	-	-	160	-	-	0	0	-	-	0	10/10
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	11/17
<i>Mahonia repens</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	40	-	-	-	0	0	-	-	0	4/5
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
82	233	-	-	233	-	-	0	0	0	-	0	6/9
88	333	-	200	100	33	-	0	0	10	-	30	4/6
95	0	-	-	-	-	-	0	0	0	-	0	4/7
00	0	-	-	-	-	-	0	0	0	-	0	7/22
05	0	-	-	-	-	-	0	0	0	-	0	6/11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
82	33	-	33	-	-	-	0	0	0	-	0	-/-
88	33	66	33	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	-/-
00	80	20	40	40	-	-	0	0	0	-	0	-/-
05	120	40	40	60	20	-	0	0	17	-	0	-/-
Pinus ponderosa												
82	66	-	33	33	-	-	0	0	-	-	0	41/69
88	133	-	133	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
82	399	-	66	333	-	-	33	0	0	-	0	22/32
88	1866	400	1300	500	66	-	25	7	4	-	4	17/24
95	1780	20	300	1460	20	40	49	1	1	-	0	22/50
00	1540	-	80	1280	180	40	6	26	12	-	4	25/49
05	1860	-	100	1520	240	60	42	54	13	3	3	24/45
Symphoricarpos oreophilus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	460	20	160	300	-	-	0	0	0	-	0	20/43
00	520	-	60	460	-	-	0	0	0	-	0	12/28
05	1080	-	80	980	20	-	0	0	2	-	0	21/37
Tetradymia canescens												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	13/22
00	40	-	-	20	20	-	0	0	50	-	0	17/24
05	20	-	-	20	-	-	0	0	0	-	0	17/30

Trend Study 9-10-05

Study site name: Toliver Creek Chaining.

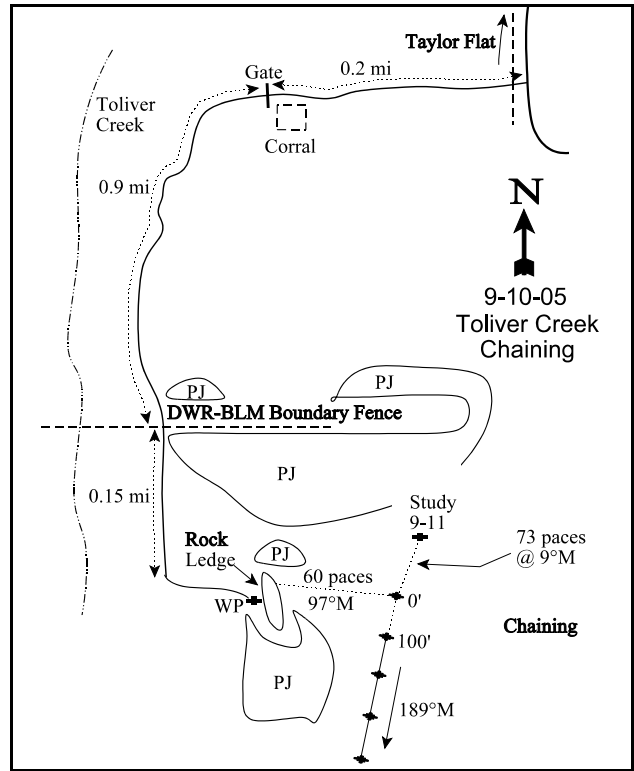
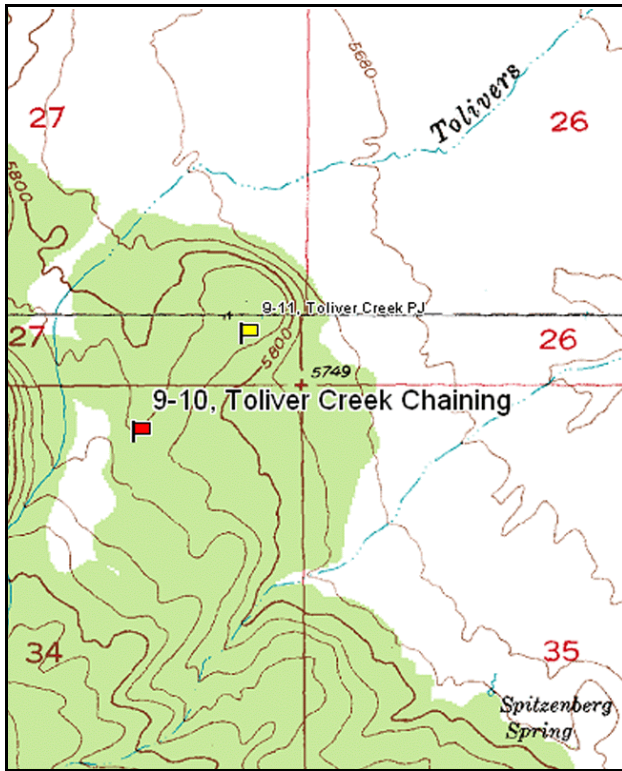
Vegetation type: Chained, Seeded P-J.

Compass bearing: frequency baseline 189 degrees magnetic.

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

LOCATION DESCRIPTION

From the north side of the Green River at the Taylor Flat bridge, go south across the river 1.75 miles. Turn right and go through a gate. Go 0.2 miles to a gate by a corral. Continue south and west 0.7 miles to the DWR-BLM boundary fence. Go through the gate and continue 0.15 miles to the end of the road. There is a P-J covered, rocky ledge about 75 feet east. From the ledge, walk 60 paces at 97°M into the chaining to a short green fencepost tagged #909 which marks the start of the frequency baseline.



Map Name: Warren Draw

Diagrammatic Sketch

Township 2N, Range 24E, Section 34

GPS: NAD 27, UTM 12T 4525860 N, 652609 E

DISCUSSION

Toliver Creek Chaining - Trend Study No. 9-10

The Toliver Creek Chaining study was established in 1988 to monitor a large pinyon-juniper chaining completed during the fall of 1986. It was two-way chained and seeded with grasses, forbs, and shrubs. This area is managed by the BLM and is considered critical deer winter range, as with all of the Browns Park area. Another study was established in the adjacent undisturbed pinyon-juniper stand to provide comparative baseline data for species composition and trend assessment. The study site is located in the foothills above Taylor Flat. This site has a northern aspect with a slope of 3-5% and lies at an elevation of 5,900 feet. Animal use appears light, although quadrat frequency of elk and deer pellets increased between 1995 and 2000. Pellet group data from 2000 estimated 25 deer, 7 elk, and 2 cow days use/acre (62 ddu/ha, 17 edu/ha, and 5 cdu/ha). Pellet group data from 2005 estimated 42 deer, 68 elk, and 20 cow days use/acre (103 ddu/ha, 167 edu/ha, and 48 cdu/ha). This area is in the Taylor Flat allotment which is usually grazed in the spring from April 1 to May 31 for 1,000 AUM's.

The sandy loam soils are fairly shallow and extremely rocky. Estimated effective rooting depth is just over 7 inches. Penetrometer readings to estimate the profile stoniness index showed nearly all probes hit rocks within the first 5 inches of the soil surface. Rock cover on the surface is high at 22%. Although rocky, this soil does support mountain big sagebrush, suggesting that the rock here is of a cobbly nature and does not prohibit root penetration. Vegetation and litter cover have been adequate to prevent serious erosion. The erosion condition class determined soil movement as stable in 2005.

Due to the shallow, rocky nature of the site, the control of pinyon and juniper by chaining was close to 100%. Few seedlings were observed and none were sampled in the density plots of 1988. Point-center quarter data from 2000 estimate 38 juniper and 12 pinyon trees/acre. Average diameter of juniper is 2.4 inches, while that of pinyon is only 1.5 inches. Fifteen percent of the juniper and 5% of the pinyon trees sampled consisted of live mature tipped trees which were not eradicated by the chaining treatment. Point-center quarter for 2005 estimated 35 junipers/acre with an average diameter of 2.1 inches.

Browse species are not abundant. The combined average cover for all browse species has been less than 5% all years. Mountain big sagebrush, fourwing saltbush, and rubber rabbitbrush do provide some forage, but not much. Mountain big sagebrush estimated 380 plants/acre in 1995, 520 in 2000, and 400 in 2005. Big sagebrush has good vigor, low decadency, and good recruitment from young plants. Use is light and average annual leader growth averaged 5 inches in 2000 and 4 inches in 2005. Fourwing saltbush estimated 160 plants/acre in 1995, 120 in 2000 and 100 in 2005. In 2000 and 2005, all saltbush plants were classified as mature. Use is light to moderate, vigor normal, with no decadent plants. Leader growth on fourwing averaged 5 inches in 2000 and 2005. White-stemmed rubber rabbitbrush estimated 60 plants/acre in 1995, 260 in 2000, and 100 in 2005. Although this species is not always an important forage source, it is palatable to browsing animals and may be more important due to the lack of a well developed shrub component. Use on rubber rabbitbrush is light with good vigor and low decadency. Increaser species, including prickly pear and broom snakeweed, are present with snakeweed showing a substantial decrease in 2005.

The herbaceous understory was dominated by cheatgrass in 1995 with an average total cover of 23%. In 2000, it declined significantly to 5% then even lower to less than 1% by 2005. A good mix of seeded native perennial grasses are present, but most remain infrequent. Crested wheatgrass significantly increased in nested frequency between 1995 and 2000. It was the dominant grass from 2000 on. Crested wheatgrass was mostly dried up in July of 2000. It exhibited moderate to heavy use. The decrease in cheatgrass appears correlated to the significant increase in crested wheatgrass, which increased from 4% average total cover in 1995, to 9% in 2000, and to 16% in 2005. Other perennial grasses that have been sampled include: intermediate wheatgrass, squirreltail, orchard grass, needle-and-thread, blue bunch wheatgrass, and Sandberg bluegrass. As a group,

perennial grasses increased in sum of nested frequency in 2000 mostly due to crested wheatgrass and remained similar in 2005. Forbs were scarce in 2000 with drought conditions and slightly increased in 2005 with a return to normal precipitation. The increase in forb cover was mainly due to annual forbs and not perennial forbs. All forbs combined provided less than 3% average cover in 2005. They have never exceeded 4% cover. In 1995, perennial forbs were more abundant than annual forbs. Eighteen species were sampled in 1995, 6 in 2000, and 13 in 2005.

1988 APPARENT TREND ASSESSMENT

Large rocks are prominent on the surface and account for 23% of the ground cover. Debris from the chaining provides a substantial amount of surface litter cover (54%). Bare ground is moderately high at 28%. Trend for soil appears stable at this time. There are low densities of shrubs on the site, but fourwing saltbush and mountain big sagebrush should increase in time. The herbaceous understory contains a good variety of seeded and native grasses although annual cheatgrass is currently the most abundant grass. Trend for grasses and forbs is improved from pre-chained conditions, however the abundance of annual grasses and forbs is a concern.

1995 TREND ASSESSMENT

Ground cover characteristics have improved since the chaining. Currently, there is only 5% bare soil and litter cover has remained moderately high at 54%. Although, more than 60% of the total vegetative cover is contributed by cheatgrass. This annual is not a very dependable provider of protective cover. Therefore, trend for soil is only slightly up. The browse trend has improved for sagebrush and fourwing saltbush. One negative aspect is the increase of broom snakeweed which has increased 90% since 1988. However, the population appears to be stabilizing with mostly mature plants and a much lower percent of seedlings to mature population. The herbaceous trend is down due to the dominance of annual grasses and forbs. Cheatgrass makes up 80% of the grass cover and 62% of the total vegetative cover. Annual forbs account for 39% of the forb cover. Drought conditions since 1987 have intensified this condition. Two perennial seeded grasses, crested and intermediate wheatgrass, did increase significantly in nested frequency since the last reading. These and other perennial grasses should eventually gain dominance. The Desirable Components Index rated this site as very poor with a score of 0 due to poor browse cover, low percent cover for perennial grass and forbs, and high annual grass cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - slightly up (+1)

herbaceous understory - down (-2)

winter range condition (DC Index) - Very poor (0) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down. Bare ground increased from 5% to 22% and vegetation and litter cover both decreased. These changes in ground cover are due to drought and should reverse in the future with normal precipitation. Trend for browse is slightly up. Mountain big sagebrush slightly increased in density and has good vigor and low decadency. Recruitment from young sagebrush plants is also good at 12%. Fourwing saltbush remains stable, even though no young plants were sampled in 2000. However, drought conditions make it difficult for young shrubs to establish and persist. Normal precipitation in the future will hopefully increase the number of young sagebrush and fourwing plants at this site, resulting in population increases. Trend for the herbaceous understory is up as crested wheatgrass significantly increased in nested frequency, while cheatgrass significantly decreased in nested frequency. The understory is still limited and forbs are scarce. The Desirable Components Index rated this site as very poor with a score of 22, although much better than 1995. Browse cover is still low, but annual grasses decreased in cover, and perennial grass cover increased.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly up (+1)

herbaceous understory - up (+2)

winter range condition (DC Index) - Very poor (22) Mid-level Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Bare ground increased slightly in nested frequency and cover. Vegetation and litter cover remained similar to 2000 estimates even with a return to normal precipitation patterns. Erosion is minimal with abundant litter still on the ground from the chaining. Trend for key browse, mountain big sagebrush and fourwing saltbush, is slightly down. Density of sagebrush decreased from 520 plants/acre in 2000 to 400 in 2005. Recruitment is still good for sagebrush, but the population is still very small and not very resilient to changes. Saltbush density remained similar to 2000 and still no young or seedlings plants were recorded in the population. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses did not change much, although cover for crested wheatgrass did increase from 10% in 2000 to 16% in 2005. Cheatgrass decreased significantly in nested frequency in 2000 and did so again in 2005. Cheatgrass cover is now less than 1%. Two of the perennial grasses, bottlebrush squirreltail and purple three-awn, increased significantly in nested frequency. Forbs still remain scarce. The Desirable Components Index rated this site as very poor with a score of 33 due to low browse cover, good perennial grass cover, and low annual grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - Very poor (33) Mid-level Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 10

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	_a 84	_b 165	_c 248	_c 257	4.30	9.80	16.05
G	Agropyron intermedium	_a 3	_b 25	_{ab} 21	_{ab} 15	.55	.38	.31
G	Agropyron spicatum	_a -	_a 4	_b 25	_a -	.03	.17	-
G	Aristida purpurea	_a -	_a -	_a -	_b 9	.03	-	.12
G	Bromus tectorum (a)	_c 210	_d 363	_b 147	_a 62	22.82	4.74	.34
G	Dactylis glomerata	_c 73	_b 16	_b 22	_a -	.16	.71	.00
G	Oryzopsis hymenoides	_b 17	_a -	_a 2	_{ab} 6	-	.03	.06
G	Poa secunda	11	1	6	6	.00	.01	.01
G	Sitanion hystrix	_b 33	_a -	_a -	_b 20	.00	-	.38
G	Sporobolus cryptandrus	2	6	1	5	.01	.00	.15
G	Stipa comata	_a -	_b 20	_b 11	_b 14	.69	.11	.14
G	Unknown grass - perennial	39	-	-	-	-	-	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Vulpia octoflora</i> (a)	-	_a 22	_a 4	_b 61	.06	.01	.18
Total for Annual Grasses		210	385	151	123	22.89	4.75	0.51
Total for Perennial Grasses		262	237	336	332	5.79	11.23	17.24
Total for Grasses		472	622	487	455	28.68	15.98	17.76
F	<i>Calochortus nuttallii</i>	-	5	-	-	.01	-	-
F	<i>Chenopodium album</i> (a)	_b 7	_a -	_a -	_b 6	-	-	.02
F	<i>Chenopodium leptophyllum</i> (a)	_b 22	_a -	_a -	_a 4	-	-	.01
F	<i>Collinsia parviflora</i> (a)	-	-	-	2	-	-	.01
F	<i>Cymopterus longipes</i>	-	3	4	1	.01	.01	.01
F	<i>Descurainia pinnata</i> (a)	_b 19	_b 20	_a -	_b 16	.44	-	.08
F	<i>Draba reptans</i> (a)	_a 7	_b 83	_a -	_a 3	.23	-	.01
F	<i>Erodium cicutarium</i> (a)	-	_b 26	_a 6	_c 46	.41	.01	1.87
F	<i>Gilia</i> sp. (a)	-	_b 18	_a -	_b 15	.05	-	.04
F	<i>Lappula occidentalis</i> (a)	-	1	-	-	.00	-	-
F	<i>Lactuca serriola</i>	_a -	_b 70	_a -	_a -	.30	-	-
F	<i>Lepidium densiflorum</i> (a)	-	7	-	2	.01	-	.03
F	<i>Leucelene ericoides</i>	_b 37	_b 40	_{ab} 24	_a 23	.73	.18	.06
F	<i>Machaeranthera canescens</i>	-	4	-	3	.01	-	.00
F	<i>Melilotus officinalis</i>	-	7	-	-	.21	-	-
F	<i>Medicago sativa</i>	_b 24	_a 9	_a -	_a -	.34	-	-
F	<i>Phlox hoodii</i>	-	6	1	-	.06	.00	-
F	<i>Sanguisorba minor</i>	5	-	-	-	-	-	-
F	<i>Sisymbrium altissimum</i> (a)	-	_b 50	_a 2	_a 2	.48	.00	.02
F	<i>Sphaeralcea coccinea</i>	_a -	_b 23	_b 13	_b 26	.71	.05	.28
F	<i>Tragopogon dubius</i>	-	6	-	-	.04	-	-
F	Unknown forb-annual (a)	7	-	-	-	-	-	-
F	Unknown forb-perennial	9	3	-	-	.15	-	-
Total for Annual Forbs		62	205	8	96	1.64	0.01	2.10
Total for Perennial Forbs		75	176	42	53	2.59	0.24	0.36
Total for Forbs		137	381	50	149	4.24	0.26	2.46

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

BROWSE TRENDS --

Management unit 09 , Study no: 10

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Artemisia tridentata vaseyana</i>	6	8	8	.33	.98	1.46
B	<i>Atriplex canescens</i>	5	5	5	.15	.66	.51
B	<i>Chrysothamnus depressus</i>	0	3	0	-	.15	-
B	<i>Chrysothamnus nauseosus hololeucus</i>	3	5	5	.41	-	.33
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	0	1	0	-	-	-
B	<i>Echinocereus sp.</i>	0	1	3	-	-	.18
B	<i>Gutierrezia sarothrae</i>	35	32	14	1.61	.38	.07
B	<i>Juniperus osteosperma</i>	0	5	6	.96	.73	1.81
B	<i>Opuntia sp.</i>	21	27	24	.57	.25	.27
B	<i>Pinus edulis</i>	0	1	1	-	-	-
Total for Browse		70	88	66	4.03	3.16	4.66

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 10

Species	Percent Cover
	'05
<i>Artemisia tridentata vaseyana</i>	1.66
<i>Atriplex canescens</i>	1.10
<i>Chrysothamnus nauseosus hololeucus</i>	1.61
<i>Echinocereus sp.</i>	.18
<i>Gutierrezia sarothrae</i>	.20
<i>Juniperus osteosperma</i>	2.65
<i>Opuntia sp.</i>	.55

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 10

Species	Average leader growth (in)
<i>Artemisia tridentata vaseyana</i>	4.0
<i>Atriplex canescens</i>	5.2

POINT-QUARTER TREE DATA --
Management unit 09 , Study no: 10

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	38	35
Pinus edulis	12	-

Average diameter (in)	
'00	'05
2.4	2.1
1.5	-

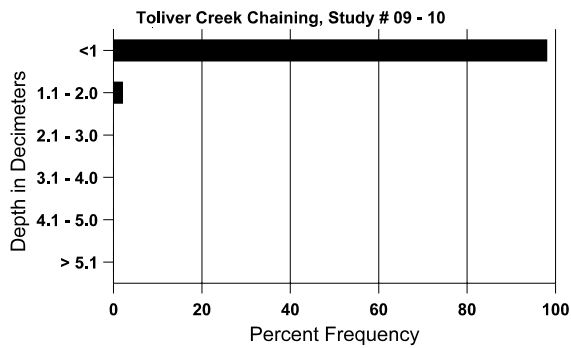
BASIC COVER --
Management unit 09 , Study no: 10

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	3.00	38.45	21.76	22.98
Rock	12.25	22.84	22.35	23.47
Pavement	1.50	.37	1.22	.59
Litter	54.75	54.20	42.52	34.02
Cryptogams	0	.09	1.69	.72
Bare Ground	28.50	5.06	22.23	27.58

SOIL ANALYSIS DATA --
Herd Unit 09, Study # 10, Study Name: Toliver Creek Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
7.4	68.8 (8.4)	7.3	69.4	17.0	13.6	4.5	14.3	288.0	0.9

Stoniness Index



PELLET GROUP DATA --
 Management unit 09 , Study no: 10

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	18	35	82
Elk	7	23	36
Deer	12	13	12
Cattle	3	5	3

Days use per acre (ha)	
'00	'05
-	-
7 (17)	68 (167)
26 (65)	42 (103)
2 (5)	20 (48)

BROWSE CHARACTERISTICS --
 Management unit 09 , Study no: 10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>												
88	33	-	33	-	-	-	0	0	0	-	0	-/-
95	380	120	280	100	-	-	11	0	0	-	0	13/16
00	520	-	60	440	20	-	0	0	4	-	0	14/18
05	400	-	60	340	-	-	15	10	0	-	0	22/31
<i>Atriplex canescens</i>												
88	133	133	133	-	-	-	0	0	-	-	0	-/-
95	160	-	40	120	-	-	0	0	-	-	0	27/36
00	120	-	-	120	-	-	17	0	-	-	0	28/37
05	100	-	-	100	-	-	20	0	-	-	0	38/47
<i>Chrysothamnus depressus</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	60	-	20	40	-	-	0	0	-	-	0	2/8
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Chrysothamnus nauseosus hololeucus</i>												
88	33	-	-	33	-	-	0	0	0	-	0	11/8
95	60	-	-	60	-	-	0	0	0	-	0	28/31
00	260	-	180	60	20	-	0	0	8	-	0	34/44
05	100	-	20	80	-	20	0	0	0	-	0	36/47
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization						
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)	
<i>Echinocereus</i> sp.													
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	2/3	
00	20	-	20	-	-	-	0	0	-	-	0	3/6	
05	80	-	-	80	-	-	0	0	-	-	0	3/6	
<i>Gutierrezia sarothrae</i>													
88	200	-	-	200	-	-	0	0	0	-	0	4/6	
95	1920	80	100	1820	-	-	0	0	0	-	0	11/17	
00	2120	-	20	1900	200	200	0	0	9	8	50	4/7	
05	320	-	-	300	20	-	0	0	6	6	6	7/11	
<i>Juniperus osteosperma</i>													
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	120	-	100	20	-	-	0	0	-	-	0	-/-	
05	120	-	40	80	-	60	0	0	-	-	0	-/-	
<i>Opuntia</i> sp.													
88	1065	66	533	366	166	-	0	0	16	-	13	4/12	
95	560	-	20	540	-	-	0	0	0	-	0	3/12	
00	720	-	40	660	20	-	0	0	3	-	0	3/8	
05	760	40	-	760	-	20	0	0	0	-	0	3/10	
<i>Pinus edulis</i>													
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	20	-	20	-	-	-	0	0	-	-	0	-/-	
05	20	-	20	-	-	60	0	0	-	-	0	-/-	

Trend Study 9-13-05

Study site name: John Starr Flat .

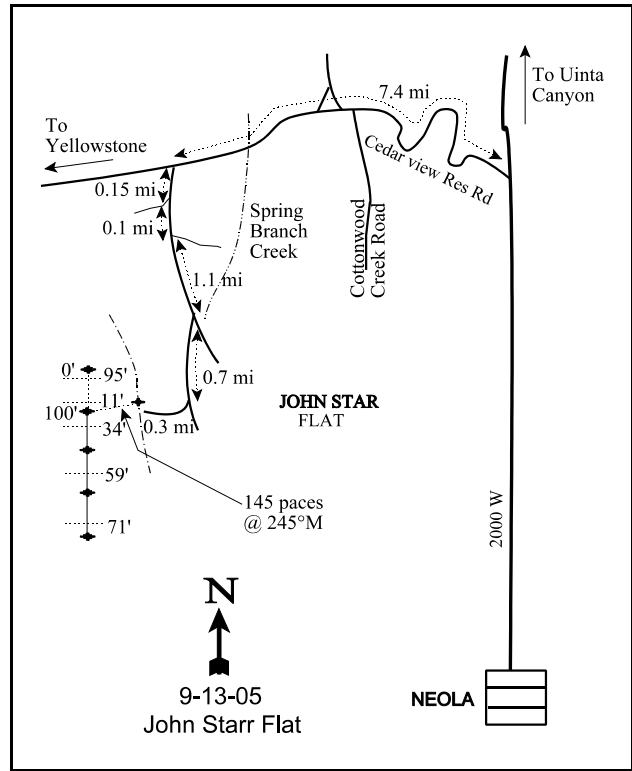
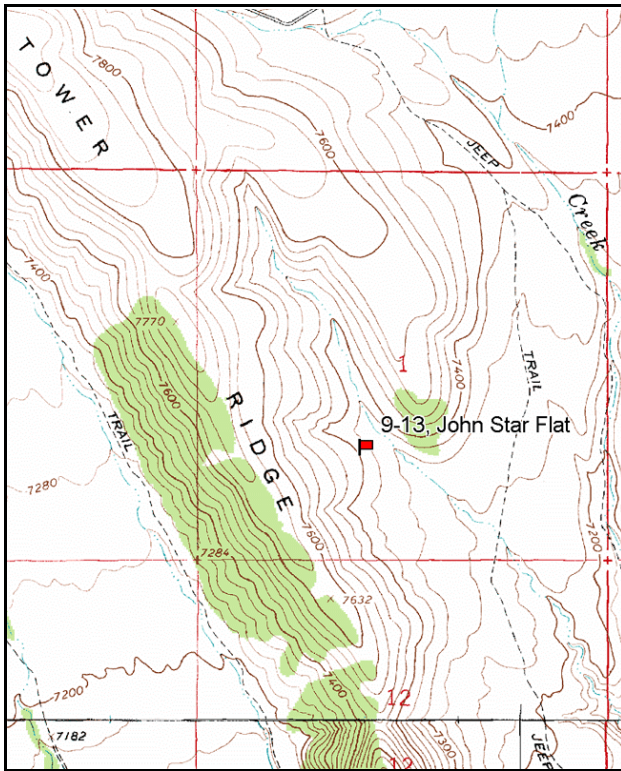
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 355 degrees magnetic.

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

LOCATION DESCRIPTION

From Neola, drive north to a major fork. Turn left, west, (right fork goes to Uinta Canyon) and travel towards Yellowstone for 7.4 miles on the main road. At this point, turn left (south). Go 0.15 miles to a small fork and stay left. Continue 0.1 miles to another fork and bear right. Proceed 1.1 miles to a major fork and continue on the right fork for 0.7 miles. At the next fork turn right towards the hills to the west. Proceed 0.3 miles to the end of the road near a gully. From the end of the road, the 0-foot baseline stake is located 145 paces away at an azimuth of 245°M. The frequency baseline stakes are marked by green steel fenceposts approximately 18" in height. Browse tag #7020 is on the first baseline stake.



Map Name: Heller Lake

Diagrammatic Sketch

Township 1N, Range 3W, Section 1

GPS: NAD 27, UTM 12T 4484405 N, 569975 E

DISCUSSION

John Starr Flat - Trend Study No. 9-13

This trend study is located at the northwest edge of John Starr Flat near the base of Tower Ridge. The area is within the Ute Indian Reservation and the study was established with assistance of a tribal biologist. The study is on critical winter range for both deer and elk. Domestic livestock graze during the remainder of the year. The range type is mixed mountain brush on a northeasterly aspect with a 10-15% slope. Elevation is 7,400 feet. Pellet group data from 2000 estimated 46 deer and 20 elk days use/acre (114 ddu/ha and 50 edu/ha). Pellet group data from 2005 estimated 17 deer, 47 elk, and 2 cow days/acre (43 ddu/ha, 116 edu/ha, and 4 cdu/ha). A group of elk were observed near the site in 2005.

The sandy loam soils are very rocky, but deep enough to support a dense mountain brush type. Effective rooting depth is estimated at a moderately shallow 7 inches, but with deep rooted shrub species, the roots are obviously able to penetrate through the rocky profile. The soil reaction is neutral with a pH of 6.7. Phosphorus is low at 4.1 ppm, values less than 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Vegetation and litter cover are abundant enough to prevent severe erosion. Bare ground is moderate at an estimated 13% relative cover since 1995. The erosion condition class determined soil movement as slight in 2005.

The key browse species is true mountain mahogany, which has provided around 10% average cover since 1995. In 1982, the population was estimated at 2,866 plants/acre. This increased to 5,000 plants/acre in 1988, mostly due to young plants. Large fluctuations in mahogany density are due to the change into a much larger sample size used after the 1988 reading which gives better estimates of shrub populations. Its density has declined every year since 1995. The population was estimated to be 3,580 plants/acre in 1995, 3,260 in 2000, and 2,420 in 2005. Utilization has been moderate to heavy from 1995 to 2005. Percent decadency has typically been below 8%, but in 2005 increased to 16%. Mahogany vigor has been normal all years except in 2000 when drought created a chlorotic appearance and some plants began to drop leaves. Young recruitment has remained good at around 20% since 1995. Leader growth was low in 2000 which was a very dry year averaging only 2 inches, but increased to 4.5 inches in 2005.

Other key browse include: serviceberry, black sagebrush, mountain big sagebrush, bitterbrush and snowberry. The serviceberry population is small, but dropped from 1,060 plants/acre in 2000 to 660 in 2005. Decadence increased from 0% in 1995 to 11% in 2000, and finally to 48% in 2005. Heavy use increased in 2000 and has remained heavy in 2005. As with mahogany, use was difficult to determine due to minimal annual growth in 2000, because of drought conditions. This can result in plants taking on a hedged appearance without necessarily experiencing very much use. Recruitment was low in 2005 with only 6% of the serviceberry population classified as young. This had decreased from 28% in 1995 to 15% in 2000. Serviceberry appear to be growing in close proximity to mahogany plants, which may provide some protection from browsing. Increases in decadency and poor vigor are likely drought related, and as with mahogany, some plants displayed a chlorotic appearance and were dropping leaves when the site was read in June of 2000.

Mountain big sagebrush density has fluctuated slightly between 1,400 and 1,500 plants/acre since 1995. Decadence has been moderately high at 30% since 2000. Use is light to moderate on sagebrush and 18% of the population was classified as young in 2000 and 12% in 2005. Good young recruitment will help replace the old dying plants. Black sagebrush was estimated at 1,560 plants/acre in 1995, 2,260 in 2000, and 1,640 in 2005. Use is light and percent decadency fluctuated from 4% in 1995, to 16% in 2000, back to 4% in 2005. Brittle pricklypear cactus is abundant and has fluctuated between 5,500 to 6,600 plants/acre since 1995.

The herbaceous understory is abundant and accounted for 40% of the total vegetative cover in 1995, 46% in 2000, and 50% by 2005. Grasses are dominated by the following perennials: needle-and-thread, bluebunch

wheatgrass, sedge, and Indian ricegrass. Cheatgrass decreased significantly from 1995 to 2000 with drought conditions, but increased significantly in nested frequency in 2005, with the return to normal precipitation. Forbs are especially diverse and averaged 27 species in 1988 and 2000, but had increased to 37 species in 1995 and 2005. The sum of nested frequency of perennial forbs decreased by 33% in 2000 due to drought and had not changed in 2005, even with the return to normal precipitation levels. Annual forbs were very abundant in 1995 and 2005 with above normal precipitation, but they were almost non-existent in 2000 with drought.

1982 APPARENT TREND ASSESSMENT

Range trend, both for soil and vegetation, appears stable to improving. Soil movement and loss are negligible. Vegetative and litter cover provide adequate soil protection. The browse component appears healthy, although rather heavily utilized. However, stand maintenance and productivity seem assured under current levels of animal use. Grasses are vigorous, diverse and productive. No apparent problems are evident. Forb composition and productivity is somewhat deficient, but not seriously so.

1988 TREND ASSESSMENT

Soil trend appears stable with continued adequate protective ground cover. The browse trend is slightly up for the key preferred species true mountain mahogany. The number of mature plants declined slightly, but the number of seedlings and young increased dramatically. Percent decadence is still low at 8%, yet more shrubs display heavy use and poor vigor. Trend for the herbaceous understory is stable to slightly improving. Quadrat frequency of bluebunch wheatgrass, Sandberg bluegrass, and needle-and-thread increased while frequency of squirreltail, Indian ricegrass, and prairie Junegrass declined.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - stable (0)

1995 TREND ASSESSMENT

Soil conditions are still stable with adequate protective ground cover. Trend for browse is slightly up for mahogany. Although total density declined from 5,000 plants/acre to 3,580, the number of mature plants increased. It should also be noted that 60% of the population in 1988 was classified as young plants and with the accompanying drought, many would have been lost. The much increased sample size would also account for some of the change in density. Decadency declined from 8% to 1% and vigor has improved. The only negative aspect is the increased heavy use (23% to 30%). A few bitterbrush were picked up in the larger sample used in 1995. Fifty percent of the mature plants were heavily hedged. Snowberry also showed more moderate to heavy use in 1995. Overall, the combined trend for the herbaceous understory is down. There was a very large decrease for perennial grasses and a slight increase for perennial forbs. However, the slight increase in perennial forbs cannot compensate for the large losses to the perennial grasses. The Desirable Components Index rated this site as fair with a score of 66 due to good browse cover, low decadence, good forb cover, moderate perennial grass cover, and low annual grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - down (-2)

winter range condition (DC Index) - Fair (66) High Potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable. Bare ground slightly increased and the ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil decreased slightly, but not enough to warrant a change in trend. Erosion is slight based on the erosion condition class. Trend for browse is stable. Poor vigor increased in the mahogany population, but this is due to drought and should improve with better precipitation in the future. Percent decadence is low (6%) and recruitment is fairly high at 21%. The increase in heavy use may be overestimated due to depressed annual leader growth caused by drought in 2000. Serviceberry and mountain big sagebrush both show increased decadency and poor vigor. As with mahogany, these increases are most likely drought related and should improve with normal precipitation. Recruitment is high for both of these species as well. Trend for the herbaceous understory is slightly down overall. Sum of nested frequency increased for perennial grasses, but decreased substantially for perennial forbs. Overall, forbs contribute to about 50% of the herbaceous cover. The loss of forb frequency is due to drought and may improve with a return to normal precipitation patterns. The Desirable Components Index rated this site as good to excellent with a score of 89 due to good browse, forb, and grass cover, as well as decreased annual grass cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Good to Excellent (89) High Potential scale

2005 TREND ASSESSMENT

Trend for soil is considered stable. Bare ground slightly decreased and the ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground increased back to the 1995 level of 3.2:1. However, these slight changes do not warrant a change in trend. Trend for key browse true mountain mahogany is down. Population density decreased from 3,260 plants/acre in 2000 to 2,420 in 2005. Young recruitment is good at 20%, but percent decadency increased slightly from 6% in 2000 to 16% in 2005. Use has remained heavy on mahogany and serviceberry. Serviceberry and black sagebrush both decreased in density in 2005, while mountain big sagebrush remained fairly constant. Percent decadency on mountain big sagebrush remained high at 30%, but young recruitment was fairly good at 12%. Trend for the herbaceous understory is considered stable. Overall, perennial forbs and grasses sum of nested frequency improved slightly. Cheatgrass increased significantly and appears to be increasing, however it still is below 5% cover and a quadrat frequency of about 50%. Annual forbs were also abundant with above average precipitation. The Desirable Components Index rated this site as good with a score of 75 due to good browse, forb, and grass cover, but annual grass cover increased.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - stable (0)

winter range condition (DC Index) - Good (75) High Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 13

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	-	-	-	6	-	-	.03
G	Agropyron spicatum	_b 125	_a 67	_a 73	_a 50	.66	2.08	1.52
G	Bouteloua gracilis	12	4	9	11	.03	.33	.22
G	Bromus tectorum (a)	-	_b 61	_a 14	_c 145	1.28	.06	3.60
G	Carex sp.	93	110	94	98	1.67	3.58	2.66
G	Koeleria cristata	5	-	5	4	-	.30	.20
G	Oryzopsis hymenoides	_a 7	_a 21	_a 24	_b 62	.36	.78	2.17
G	Poa fendleriana	-	-	2	5	-	.00	.09
G	Poa secunda	_c 171	_a 3	_b 29	_{ab} 9	.00	.51	.04
G	Sitanion hystrix	_b 59	_a 22	_a 17	_{ab} 41	.18	.31	.44
G	Stipa comata	_c 175	_a 76	_{bc} 132	_{ab} 116	.85	6.64	3.95
Total for Annual Grasses		0	61	14	145	1.28	0.06	3.60
Total for Perennial Grasses		647	303	385	402	3.77	14.57	11.34
Total for Grasses		647	364	399	547	5.05	14.64	14.94
F	Agoseris glauca	-	-	-	3	-	-	.15
F	Allium sp.	-	-	-	2	-	-	.02
F	Antennaria rosea	_b 8	_a -	_a -	_a -	-	-	-
F	Arabis sp.	_a 3	_b 45	_a 1	_a 6	.16	.00	.04
F	Arenaria congesta	-	-	1	-	-	.00	-
F	Artemisia ludoviciana	_{ab} 6	_b 21	_{ab} 17	_a 2	.15	.28	.01
F	Astragalus convallarius	7	6	1	-	.04	.01	-
F	Astragalus spatulatus	2	1	-	1	.03	-	.03
F	Balsamorhiza hookeri	_b 155	_b 123	_b 117	_a 68	1.11	2.79	2.30
F	Balsamorhiza sagittata	-	-	-	1	-	-	.03
F	Castilleja linariaefolia	_a -	_b 26	_a 2	_a -	.13	.03	-
F	Calochortus nuttallii	_a 6	_a 3	_a 3	_b 31	.00	.00	.10
F	Chenopodium leptophyllum(a)	-	_b 22	_a 7	_a 4	.05	.02	.01
F	Collomia linearis (a)	-	_c 133	_a 1	_b 99	.80	.00	.66
F	Comandra pallida	_b 43	_a 13	_{ab} 34	_a 15	.14	.32	.15
F	Collinsia parviflora (a)	-	-	-	8	-	-	.04
F	Crepis acuminata	_a -	_{ab} 4	_a 1	_b 11	.03	.00	.27
F	Cryptantha sp.	_{ab} 15	_c 37	_a 3	_{bc} 40	.27	.03	.29
F	Cymopterus longipes	7	6	9	21	.02	.09	.22
F	Delphinium nuttallianum	-	-	-	6	-	-	.02

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Descurainia pinnata</i> (a)	-	b19	a-	b16	.04	-	.07
F	<i>Draba</i> sp. (a)	-	b58	a-	b31	.11	-	.07
F	<i>Erigeron flagellaris</i>	c21	bc14	ab4	a-	.02	.03	-
F	<i>Erigeron pumilus</i>	ab2	ab12	b17	a1	.03	.19	.00
F	<i>Eriogonum umbellatum</i>	ab5	b13	b9	a-	.08	.10	-
F	<i>Gilia</i> sp. (a)	-	-	-	4	-	-	.00
F	<i>Helianthella microcephala</i>	58	76	76	52	1.40	1.12	1.75
F	<i>Heuchera parvifolia</i>	4	5	-	-	.01	-	-
F	<i>Hymenoxys acaulis</i>	-	1	-	2	.00	-	.03
F	<i>Lappula occidentalis</i> (a)	-	b104	a2	b137	.51	.00	.54
F	<i>Lepidium densiflorum</i> (a)	-	c174	a-	b143	1.28	-	.45
F	<i>Linum lewisii</i>	-	5	-	5	.01	-	.03
F	<i>Lithospermum ruderales</i>	b15	a3	a1	a3	.04	.03	.15
F	<i>Lychnis drummondii</i>	3	3	-	-	.03	-	-
F	<i>Machaeranthera grindelioides</i>	14	18	24	24	.39	.73	.77
F	<i>Orobanch</i> sp.	-	3	-	-	.00	-	-
F	<i>Penstemon caespitosus</i>	b12	a-	ab1	a-	-	.00	-
F	<i>Penstemon humilis</i>	c35	bc14	a-	b13	.09	-	.13
F	<i>Petrorhiza pumila</i>	46	60	57	47	1.45	3.11	3.10
F	<i>Phlox longifolia</i>	b72	ab51	a30	a36	.19	.18	.17
F	<i>Polygonum douglasii</i> (a)	-	c79	a1	b46	.35	.00	.10
F	<i>Schoenocrambe linifolia</i>	a-	b57	a7	b54	.43	.01	.36
F	<i>Sedum lanceolatum</i>	b55	a22	a14	a9	.16	.05	.05
F	<i>Senecio multilobatus</i>	8	3	2	3	.63	.00	.03
F	<i>Sphaeralcea coccinea</i>	12	21	10	16	.19	.39	.26
F	<i>Tragopogon dubius</i>	4	-	3	-	-	.00	-
F	<i>Zigadenus elegans</i>	a-	b12	b10	c23	.02	.05	.22
Total for Annual Forbs		0	589	11	488	3.15	0.03	1.96
Total for Perennial Forbs		618	678	454	495	7.33	9.62	10.74
Total for Forbs		618	1267	465	983	10.48	9.66	12.70

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

BROWSE TRENDS --
Management unit 09 , Study no: 13

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Amelanchier utahensis</i>	20	35	25	1.33	5.81	2.82
B	<i>Artemisia frigida</i>	0	8	8	-	.06	.18
B	<i>Artemisia nova</i>	38	40	35	1.24	2.92	2.15
B	<i>Artemisia tridentata vaseyana</i>	38	41	49	5.35	3.95	5.09
B	<i>Cercocarpus montanus</i>	85	80	77	10.75	10.21	9.60
B	<i>Chrysothamnus depressus</i>	3	2	1	.06	.03	.00
B	<i>Chrysothamnus nauseosus graveolens</i>	0	1	0	-	-	-
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	12	12	13	.68	.39	.36
B	<i>Eriogonum corymbosum</i>	1	0	2	-	.00	.00
B	<i>Gutierrezia sarothrae</i>	12	8	26	.56	.40	.55
B	<i>Juniperus osteosperma</i>	0	2	2	.85	1.00	1.68
B	<i>Opuntia fragilis</i>	72	68	75	1.28	1.51	1.68
B	<i>Pediocactus simpsonii</i>	2	9	3	-	.00	.00
B	<i>Pinus edulis</i>	0	1	1	.00	-	.30
B	<i>Purshia tridentata</i>	9	5	4	.49	.36	.21
B	<i>Symphoricarpos oreophilus</i>	9	15	16	.45	1.88	2.05
B	<i>Tetradymia canescens</i>	5	2	2	-	.03	-
Total for Browse		306	329	339	23.08	28.61	26.75

CANOPY COVER, LINE INTERCEPT --
 Management unit 09 , Study no: 13

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	-	3.68
Artemisia frigida	-	.05
Artemisia nova	-	3.38
Artemisia tridentata vaseyana	-	5.73
Cercocarpus montanus	-	14.31
Chrysothamnus viscidiflorus lanceolatus	-	.55
Eriogonum corymbosum	-	.06
Gutierrezia sarothrae	-	1.66
Juniperus osteosperma	2.00	2.83
Opuntia fragilis	-	.88
Pinus edulis	-	.70
Purshia tridentata	-	1.01
Symphoricarpos oreophilus	-	1.96
Tetradymia canescens	-	.20

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 09 , Study no: 13

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	2.4
Cercocarpus montanus	4.5

BASIC COVER --
 Management unit 09 , Study no: 13

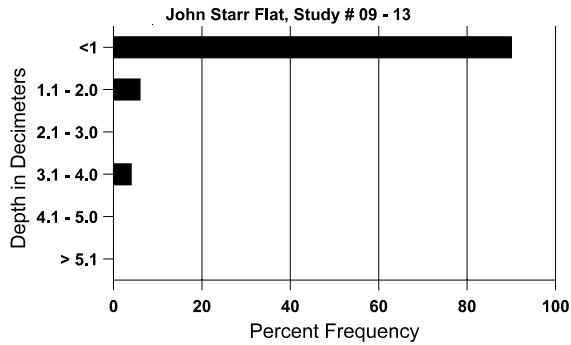
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	0	7.50	41.08	48.65	50.09
Rock	0	4.75	9.96	12.08	12.89
Pavement	0	2.50	1.25	4.17	2.76
Litter	0	68.75	46.87	46.81	37.80
Cryptogams	0	.75	.23	.21	.50
Bare Ground	12.75	15.75	13.88	17.58	13.75

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 13, Study Name: John Starr Flat

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
7.6	60.4 (9.1)	6.7	67.4	16.0	16.6	3.8	4.1	134.4	0.8

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 13

Type	Quadrat Frequency			Days use per acre (ha)	
	'95	'00	'05	'00	'05
Rabbit	8	21	23	-	-
Elk	10	15	21	20 (50)	47 (116)
Cattle	-	-	-	-	2 (4)
Deer	23	19	18	46 (114)	17 (43)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 13

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	333	-	-	333	-	-	100	0	0	-	0	24/24
88	533	-	333	200	-	-	50	13	0	-	0	26/25
95	640	-	180	460	-	-	41	13	0	-	0	24/32
00	1060	60	160	780	120	40	28	45	11	4	17	32/37
05	660	-	40	300	320	-	33	58	48	12	12	28/37

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	220	-	-	220	-	-	0	0	-	-	0	9/11
05	380	20	-	380	-	-	0	0	-	-	0	9/8
Artemisia nova												
82	2066	66	333	1733	-	-	52	0	0	-	0	12/17
88	4132	266	1200	1666	1266	-	18	2	31	.48	8	14/15
95	1560	40	260	1240	60	20	51	15	4	1	1	9/15
00	2260	260	100	1800	360	40	5	4	16	8	8	9/15
05	1640	20	20	1560	60	80	39	13	4	1	1	9/15
Artemisia tridentata vaseyana												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	266	133	200	-	66	-	0	0	25	-	0	-/-
95	1380	300	300	800	280	180	49	17	20	12	13	21/33
00	1520	-	280	780	460	60	26	5	30	9	13	26/29
05	1460	-	180	840	440	180	14	11	30	11	11	17/26
Cercocarpus montanus												
82	2866	-	600	2133	133	-	65	7	5	-	0	21/27
88	5000	800	3000	1600	400	-	43	23	8	-	20	30/36
95	3580	180	780	2760	40	-	60	30	1	-	0	27/38
00	3260	-	700	2380	180	20	23	64	6	1	16	27/39
05	2420	-	480	1560	380	120	19	69	16	5	6	29/39
Chrysothamnus depressus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	332	-	-	266	66	-	0	0	20	-	0	4/6
95	60	-	-	60	-	-	0	0	0	-	0	7/13
00	60	20	-	60	-	-	0	67	0	-	0	7/13
05	20	-	-	20	-	-	0	0	0	-	0	3/8
Chrysothamnus nauseosus graveolens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	60	-	-	60	-	-	0	100	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	21/18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	400	-	20	380	-	-	0	5	0	-	0	14/17
00	320	-	-	320	-	20	6	0	0	-	0	14/21
05	400	-	40	340	20	-	0	0	5	-	0	14/20
<i>Eriogonum corymbosum</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	-	20	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	80	-	-	80	-	-	0	0	-	-	0	8/10
<i>Gutierrezia sarothrae</i>												
82	66	-	-	66	-	-	0	0	0	-	0	9/9
88	799	-	-	733	66	-	0	0	8	-	8	8/6
95	400	60	-	380	20	-	0	0	5	-	0	10/11
00	880	-	-	840	40	20	0	0	5	-	0	6/8
05	1180	-	40	1140	-	-	0	0	0	-	0	10/11
<i>Juniperus osteosperma</i>												
82	66	-	-	66	-	-	0	0	-	-	0	47/39
88	66	-	-	66	-	-	0	0	-	-	0	53/55
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	40	-	20	20	-	-	0	0	-	-	0	-/-
05	40	-	40	-	-	-	0	0	-	-	0	-/-
<i>Opuntia fragilis</i>												
82	2333	-	-	2333	-	-	0	0	0	-	0	2/7
88	12133	1533	4200	6000	1933	-	0	0	16	.98	10	2/6
95	5440	60	580	4860	-	-	0	0	0	-	0	3/8
00	6620	200	280	6180	160	100	.30	0	2	.60	.60	2/6
05	5760	-	160	5560	40	-	0	0	1	.69	1	2/7
<i>Pediocactus simpsonii</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	-	40	-	-	0	0	-	-	0	2/3
00	300	-	-	300	-	-	0	0	-	-	0	2/3
05	120	-	60	60	-	-	0	0	-	-	0	2/3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	66	-	66	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	20	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	-/-
Purshia tridentata												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	280	-	40	240	-	-	36	43	0	-	0	17/31
00	180	-	-	180	-	-	22	67	0	-	0	17/40
05	80	-	-	60	20	20	0	100	25	25	25	17/39
Symphoricarpos oreophilus												
82	1400	-	1000	400	-	-	0	0	0	-	0	7/4
88	1132	-	866	266	-	-	0	0	0	-	29	9/14
95	320	40	60	260	-	-	19	13	0	-	0	13/26
00	860	-	120	740	-	-	2	0	0	-	0	8/16
05	860	-	-	840	20	-	0	0	2	2	2	10/17
Tetradymia canescens												
82	266	-	-	266	-	-	75	25	0	-	25	13/14
88	199	-	133	66	-	-	33	0	0	-	0	7/10
95	160	-	20	120	20	-	63	25	13	-	0	9/13
00	40	-	-	-	40	-	50	50	100	-	0	16/17
05	40	-	-	40	-	-	50	0	0	-	0	6/15

Trend Study 9-15-05

Study site name: Mud Springs Draw .

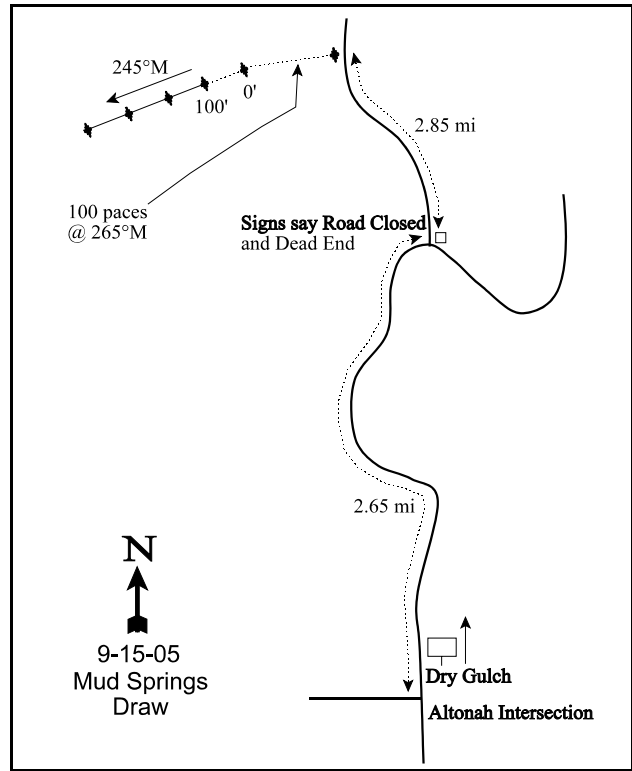
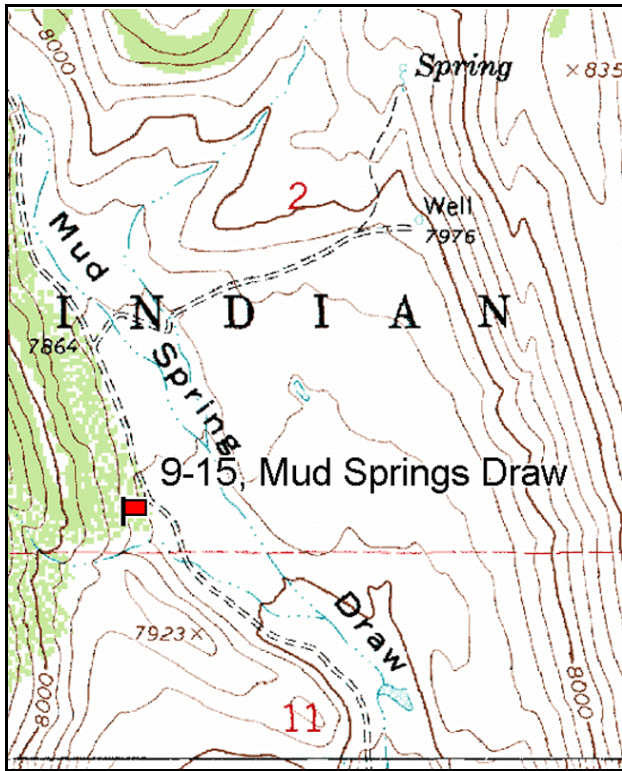
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 245 degrees magnetic.

Frequency belt placement: line 1 (7 & 96ft), line 2 (32ft), line 3 (50ft), line 4 (79ft).

LOCATION DESCRIPTION

From the town of Altonah, proceed north for 2.0 miles to an intersection. Take the road which runs to the northwest for 2.65 miles until you come to another intersection. Go straight through the intersection and go up Mud Spring Draw for 2.85 miles to a red stake on the left side of the road. From the stake, the 0-foot baseline stake is 100 paces away at a bearing of 265°M. The frequency baseline stakes are marked by green steel fenceposts cut to 12-18" in height. The 0' stake has a piece of wire wrapped around it.



Map Name: Burnt Mill Springs

Diagrammatic Sketch

Township 1N, Range 4W, Section 11

GPS: NAD 27, UTM 12T 4483792 N, 558500 E

DISCUSSION

Mud Spring Draw - Trend Study No. 9-15

This study was established in 1982 and is located within the Ute Indian Reservation in Mud Spring Draw at approximately 7,900 feet. The site is located on a easterly aspect with a slope of 15-30%. The site was not read in 2000 due to a road closure. In 1995, deer pellet group frequency was greater than in 2005. Elk pellet group frequency was greater in 2005 than in 1995. Pellet group data from 2005 estimated 56 elk, 31 deer, 1 moose, and 2 cow days use/acre (137 edu/ha, 76 ddu/ha, 2 mdu/ha, and 4 cdu/ha).

Soils are rocky and moderately shallow with numerous large rocks on the surface. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground was estimated at 5.2:1 in 1995 and decreased slightly in 2005 to 4.2:1. Both values provide abundant and adequate protection from soil erosion. The erosion condition class determined soil movement as stable in 2005.

The key preferred browse species is true mountain mahogany, which had an average cover of 15% in 1995 and 20% in 2005. Population density decreased slightly from 3,600 plants/acre in 1995 to 2,980 in 2005. Percent young has been good since the study was established in 1982 and was 17% of the population in 1995 and 19% in 2005. Percent decadence is low and vigor is generally good. Utilization was light to moderate in past years, but increased to mostly heavy use in 2005.

Other browse species include: serviceberry, mountain big sagebrush, antelope bitterbrush, and snowberry. Serviceberry density has remained steady at round 600 plants/acre. Mountain big sagebrush density has dropped from 500 plants/acre in 1995 to 120 in 2005. Both species have exhibited moderate hedging. Sagebrush percent decadency decreased from 1995 to 2000, but the drop in sagebrush density suggest several plants have died in all age classes. Bitterbrush population has also decreased from 600 plants/acre in 1995 to 380 in 2005. Use is moderate to heavy and percent decadence increased to 21% in 2005.

Grasses and forbs are diverse and quite abundant. Bluebunch wheatgrass, needle-and-thread, and mutton bluegrass are the most abundant grass species. Perennial grasses provided an average cover of 9% in 1995 and 15% in 2005. Cheatgrass was not observed in 1995, but averaged almost 2% cover in 2005. Annual forbs have dominated the forb component. They provided 8% average cover in 1995 and 5% in 2005. Hooker balsamroot was the only common perennial forb species. Perennial forb cover averaged nearly 4% in 1995 and 2005.

1982 APPARENT TREND ASSESSMENT

Soil condition is fair with an apparent stable to perhaps slightly downward trend. In spite of good vegetative and litter cover, some soil loss is occurring. Slope steepness (15-30%) is undoubtedly a major contributing factor. Vegetative conditions look good for trend, from a big game winter range standpoint, and it appears stable to improving. The condition of the key browse species is especially encouraging.

1988 TREND ASSESSMENT

The soil trend is improving due to the accumulation of litter and minimal evidence of soil movement. Slightly less bare soil was measured in 1988 due to increases in the percentage of basal vegetative cover. However, trend for soil is still stable for the changes are not significant enough to warrant a change in trend. The key browse species, true mountain mahogany, continues on an upward trend. It was rated in excellent condition. Individuals were moderately hedged, in good vigor, with few decadent shrubs. Browsing appears to have increased over the years, but it is still well within acceptable levels. Although frequency of the several valuable browse species was unchanged, density of the mountain mahogany, serviceberry and big sagebrush

increased. These shrubs also have healthy populations of young plants. In 1988, these species were classified as 16% heavily hedged, 53% moderately hedged and the remainder only lightly used. Trend for the herbaceous understory is improving with significant increases in quadrat frequency for grasses and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

Soil conditions continue to show some improvement, but not enough to warrant a change in trend. Litter cover declined from 72% to 57%, likely due to prolonged drought, yet percent bare ground declined to only 4%. Trend for the key browse species is slightly improved since 1988. Less seedling and young plants were encountered in 1995, but the number of mature plants has remained stable since 1982. It appears that some mature plants might have been classified as young in 1988 resulting in a lower population density for mature plants and an inflated estimate of young plants. Percent decadence is low, vigor is good, and utilization is moderate. Trend for the perennial herbaceous understory is slightly down for grasses, but improved for forbs. However, on average perennial forbs only contribute to only 24% of the herbaceous cover. Overall the trend is slightly down. The Desirable Components Index rated this site as good with a score of 74 due to excellent browse cover, low decadence, and moderate to good forb and grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Good (74) High Potential scale

2005 TREND ASSESSMENT

Trend for soil is considered stable. Percent bare ground, rock and pavement all increased since 1995. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare ground slightly decreased from 1995, but is still good to protect soil from erosion. Trend for key browse, true mountain mahogany, is slightly down. Density decreased from 3,600 plants/acre in 1995 to 2,980 in 2005. Recruitment is good with 19% of the population classified as young. Sagebrush is not dominant, but the density decreased substantially from 500 plants/acre in 1995 to 120 in 2005. Trend for the herbaceous understory is stable. Perennial grass and forb nested frequency decreased slightly from 1995 estimates, while cover for perennial grasses increased. Annual forbs have fluctuated with precipitation and cheatgrass was first observed in 2005. The Desirable Components Index rated this site as good with a score of 86 due to good browse cover, low decadence, and good forb and grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - Good (86) High Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 15

T y p e	Species	Nested Frequency			Average Cover %	
		'88	'95	'05	'95	'05
G	Agropyron dasystachyum	a-	b20	23	.30	.57
G	Agropyron spicatum	b263	b239	a195	4.48	5.93
G	Bouteloua gracilis	3	-	-	-	-
G	Bromus tectorum (a)	-	a-	b57	-	1.55
G	Carex sp.	ab54	b83	a34	1.22	.60
G	Elymus salina	a-	ab10	b19	.07	.11
G	Oryzopsis hymenoides	-	-	10	-	.22
G	Poa fendleriana	c256	a79	b124	1.52	4.09
G	Poa pratensis	a-	b36	a-	.53	-
G	Poa secunda	b47	a-	a1	-	.03
G	Sitanion hystrix	9	6	8	.01	.11
G	Stipa comata	a50	b95	b120	1.04	2.82
Total for Annual Grasses		0	0	57	0	1.55
Total for Perennial Grasses		682	568	534	9.19	14.50
Total for Grasses		682	568	591	9.19	16.06
F	Agoseris glauca	a-	b16	b12	.07	.20
F	Allium sp.	a-	c147	b121	.59	.62
F	Arabis sp.	6	7	1	.01	.00
F	Artemisia dracunculus	-	-	1	-	.00
F	Artemisia ludoviciana	23	13	15	.16	.07
F	Astragalus convallarius	4	-	-	-	-
F	Balsamorhiza hookeri	55	50	41	.83	1.89
F	Castilleja chromosa	b11	a2	a-	.00	-
F	Calochortus nuttallii	a-	b23	c43	.11	.14
F	Chaenactis douglasii	2	-	-	-	-
F	Collomia linearis (a)	-	143	124	.82	.50
F	Comandra pallida	b15	ab11	a1	.17	.00
F	Collinsia parviflora (a)	-	a238	b272	4.19	4.19
F	Crepis acuminata	-	3	4	.00	.18
F	Cryptantha sp.	-	2	7	.00	.06
F	Delphinium nuttallianum	-	1	2	.00	.03
F	Descurainia pinnata (a)	-	b156	a15	2.56	.05
F	Draba sp. (a)	-	b55	a30	.29	.07
F	Erigeron eatonii	-	-	1	-	.00

Type	Species	Nested Frequency			Average Cover %	
		'88	'95	'05	'95	'05
F	<i>Erigeron flagellaris</i>	-	-	2	-	.00
F	<i>Eriogonum umbellatum</i>	_b 19	_{ab} 10	_a 1	.25	.03
F	<i>Gilia</i> sp. (a)	-	5	5	.04	.01
F	<i>Heterotheca villosa</i>	-	4	-	.03	-
F	<i>Lappula occidentalis</i> (a)	-	_a 3	_b 10	.00	.03
F	<i>Lepidium densiflorum</i> (a)	-	13	30	.08	.18
F	<i>Linum lewisii</i>	-	-	-	.03	-
F	<i>Lithospermum</i> sp.	_b 14	_{ab} 3	_a 3	.30	.03
F	<i>Lomatium</i> sp.	-	-	2	-	.03
F	<i>Lupinus argenteus</i>	_b 25	_b 27	_a -	.56	-
F	<i>Machaeranthera grindelioides</i>	5	2	-	.15	.00
F	<i>Microsteris gracilis</i> (a)	-	_a -	_b 79	-	.40
F	<i>Penstemon</i> sp.	_b 30	_a 6	_a 2	.03	.03
F	<i>Petrorhiza pumila</i>	3	5	2	.30	.03
F	<i>Phlox longifolia</i>	1	-	-	-	-
F	<i>Polygonum douglasii</i> (a)	-	_b 15	_a 1	.03	.00
F	<i>Schoenocrambe linifolia</i>	_a -	_a 2	_b 11	.01	.11
F	<i>Sedum</i> sp.	_c 35	_b 14	_a -	.09	-
F	<i>Sphaeralcea coccinea</i>	1	-	3	-	.03
F	<i>Taraxacum officinale</i>	-	2	-	.00	-
F	<i>Tragopogon dubius</i>	2	2	-	.01	.00
F	Unknown forb-perennial	-	2	-	.01	-
F	<i>Zigadenus elegans</i>	_a -	_a -	_b 31	-	.16
Total for Annual Forbs		0	628	566	8.03	5.45
Total for Perennial Forbs		251	354	306	3.77	3.72
Total for Forbs		251	982	872	11.81	9.17

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

BROWSE TRENDS --

Management unit 09 , Study no: 15

Type	Species	Strip Frequency		Average Cover %	
		'95	'05	'95	'05
B	Amelanchier utahensis	21	23	1.86	3.52
B	Artemisia tridentata vaseyana	19	6	1.89	.41
B	Cercocarpus montanus	77	77	15.03	20.06
B	Chrysothamnus viscidiflorus viscidiflorus	26	25	1.84	.64
B	Mahonia repens	76	74	4.90	3.90
B	Opuntia sp.	47	24	.46	.27
B	Pediocactus simpsonii	1	2	-	-
B	Purshia tridentata	23	17	2.01	1.12
B	Symphoricarpos oreophilus	32	22	2.25	1.95
Total for Browse		322	270	30.27	31.89

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 15

Species	Percent Cover
	'05
Amelanchier utahensis	4.40
Artemisia tridentata vaseyana	.61
Cercocarpus montanus	29.48
Chrysothamnus viscidiflorus viscidiflorus	1.95
Mahonia repens	3.83
Opuntia sp.	.08
Pediocactus simpsonii	.05
Purshia tridentata	4.03
Symphoricarpos oreophilus	3.54

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 15

Species	Average leader growth (in)
	'05
Cercocarpus montanus	3.4
Purshia tridentata	2.4

BASIC COVER --

Management unit 09 , Study no: 15

Cover Type	Average Cover %			
	'82	'88	'95	'05
Vegetation	0	12.25	45.35	49.86
Rock	0	7.50	14.46	17.57
Pavement	0	.50	.53	1.65
Litter	0	71.50	56.93	42.75
Cryptogams	0	1.00	.43	.08
Bare Ground	13.25	7.25	4.13	11.20

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 15, Study Name: Mud Springs Draw

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
Need to Collect									

PELLET GROUP DATA --

Management unit 09 , Study no: 15

Type	Quadrat Frequency		Days use per acre (ha)
	'95	'05	
Rabbit	9	20	-
Moose	-	1	1 (2)
Elk	15	28	56 (137)
Deer	29	19	31 (76)
Cattle	-	1	2 (4)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	466	-	-	466	-	-	14	29	0	-	0	27/25
88	666	-	400	200	66	-	40	30	10	-	30	45/53
95	600	20	40	540	20	20	53	7	3	-	0	30/35
05	580	-	140	360	80	20	24	28	14	-	0	34/42

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>												
82	266	-	-	200	66	-	25	0	25	-	0	22/29
88	399	-	200	66	133	-	50	0	33	-	0	22/20
95	500	-	40	280	180	460	68	8	36	12	12	23/25
05	120	-	-	100	20	140	50	0	17	-	0	13/20
<i>Cercocarpus montanus</i>												
82	3133	-	800	2333	-	-	28	0	0	-	0	33/24
88	4799	733	3333	1333	133	-	63	18	3	-	0	43/43
95	3600	60	600	2840	160	20	72	6	4	1	2	35/42
05	2980	20	580	2080	320	80	16	59	11	6	7	40/48
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
82	1600	-	-	1600	-	-	0	0	0	-	0	18/13
88	1199	-	66	533	600	-	0	0	50	-	33	10/11
95	680	-	-	660	20	-	0	0	3	-	0	16/21
05	680	-	20	640	20	-	0	0	3	3	3	12/18
<i>Gutierrezia sarothrae</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	10/6
<i>Mahonia repens</i>												
82	3933	-	-	3933	-	-	0	0	-	-	0	5/6
88	31066	-	2600	28466	-	-	0	0	-	-	.85	4/3
95	27720	40	800	26920	-	-	0	0	-	-	0	4/6
05	4780	-	240	4540	-	-	0	0	-	-	0	4/5
<i>Opuntia sp.</i>												
82	1000	-	-	1000	-	-	0	0	0	-	0	2/5
88	933	733	933	-	-	-	0	0	0	-	0	-/-
95	2120	-	360	1740	20	-	0	0	1	.94	.94	2/8
05	980	-	220	760	-	-	0	0	0	-	0	3/6
<i>Pediocactus simpsonii</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	-	20	-	-	0	0	-	-	0	1/4
05	60	-	-	60	-	-	0	0	-	-	0	1/3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
82	200	-	-	200	-	-	33	67	0	-	0	17/25
88	133	-	-	133	-	-	50	0	0	-	0	19/25
95	600	-	60	520	20	-	67	10	3	-	0	22/41
05	380	-	-	300	80	20	47	37	21	11	11	21/40
Symphoricarpos oreophilus												
82	999	-	333	666	-	-	0	0	-	-	0	13/15
88	1199	-	466	733	-	-	11	0	-	-	0	12/16
95	1780	60	280	1500	-	-	1	0	-	-	0	14/25
05	1660	-	320	1340	-	-	0	0	-	-	0	9/14
Tetradymia canescens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	11/17
05	0	-	-	-	-	-	0	0	-	-	0	11/23

Trend Study 9-16-05

Study site name: Mosby Mountain .

Vegetation type: Mountain Big Sagebrush .

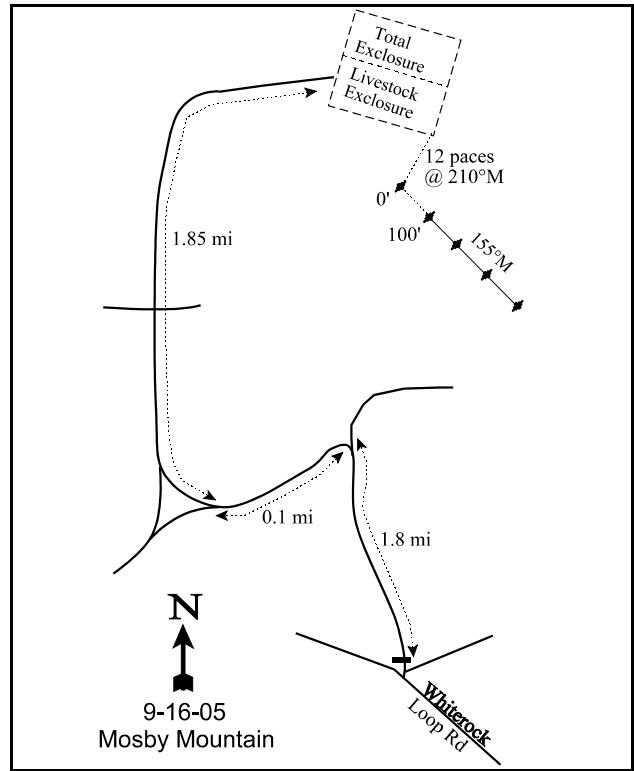
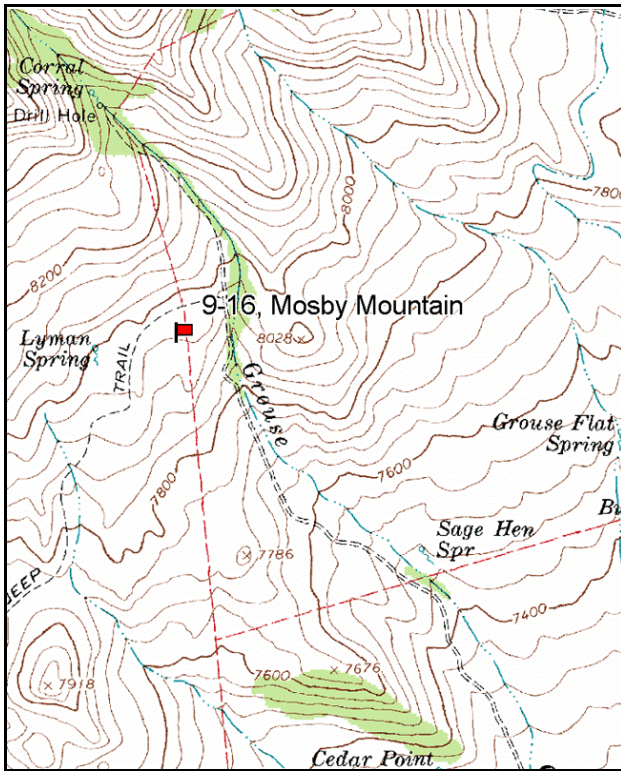
Compass bearing: frequency baseline 155 degrees magnetic.

Frequency belt placement: line 1 (11 & 96ft), line 2 (30ft), line 3 (50ft), line 4 (72ft).

LOCATION DESCRIPTION

From the town of Whiterocks, go east on White Rocks Rd (11500 N) approximately 1.75 miles to a "T" in the road. Turn left (north) on White Rocks Loop Rd (5500 E) and go 3.5 miles to an intersection where 2 roads fork off to the right. Turn right then take the left fork. Head north for approximately 1.9 miles to a two-track on the left (west) side of the road. Turn left and drive 0.1 miles to a fork. Take the right fork and drive 1.85 miles to the Mosby Mountain Enclosure. The 0-foot baseline stake is located 12 paces from the southwest corner of the big game enclosure bearing 210°M.

This site may also be accessed from the east by traveling north through Tridell on 8000 E. Go though the reservation then west to Mosby Mountain.



Map Name: Lake Mountain

Diagrammatic Sketch

Township 3S, Range 18E, Section 14

GPS: NAD 27, UTM 12T 4490403 N, 595963 E

DISCUSSION

Mosby Mountain - Trend Study No. 9-16

The Mosby Mountain study samples a sagebrush-grass type with scattered serviceberry and bitterbrush at an elevation of about 7,900 feet. Slope varies from 8-10% with a southerly aspect. The relatively high elevation may limit or prohibit big game use during severe winters. The study site is in close proximity to the Mosby Mountain big game enclosure and pellet group transect. Soon after the reading of this study in August 1988, the area was burned by a wildfire. During the 1995 reading, it was noted that belts 1 and 5 from the original baseline were not burned while belts 2, 3, and 4 were burned. As a result, most of the shrubs on the burned belts were eliminated. Past and present cattle use is heavy with cattle still on the site during the 1995, 2000, and 2005 readings. The area is managed by the U.S. Forest Service as part of the Mosby Mountain cattle allotment. Pellet group data from 2000 estimated 9 deer, 20 elk, and 36 cows days use/acre (22 ddu/ha, 50 edu/ha, and 89 cdu/ha). Pellet group data from 2005 estimated 13 deer, 13 elk, and 46 cows days use/acre (33 ddu/ha, 33 edu/ha, and 115 cdu/ha).

Soil is relatively shallow and rocky with deeper soil further down slope. Effective rooting depth is estimated at just over 9 inches. Soils are loam to sandy clay loam in texture and are fairly high in organic matter at nearly 5%. Soil is slightly acidic with a pH of 6.4. Phosphorus is moderately high at 27.8 ppm, values less than 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). On nearby steeper slopes, noticeable soil movement was reported in 1988. Bare ground has been around 13-16% relative cover in previous readings, but increased to 28% relative cover in 2005. Abundant herbaceous vegetation, litter, and rock cover have kept erosion at minimal levels. The erosion condition class determined soil movement as stable in 2005.

Browse species are scattered partially due to the spotty burn in 1988. The most abundant shrub is mountain big sagebrush. Density estimated 3,599 plants/acre before the fire in 1988. Density decreased to 1,600 in 1995 after the fire. The much larger sample size utilized in 1995 may also account for some of the difference in density estimates. Mountain big sagebrush density slightly increased in 2000 to 1,900 plants/acre, then slightly decreased in 2005 to 1,540 plants/acre. Utilization is light to moderate and vigor is predominately good. Decadency in 2005 was moderately low at 18% and typically had been lower in previous years. Young recruitment has been good and has averaged 16% since 1982. Seedlings were very abundant in 2005. The percentage of sagebrush plants dying increased slightly from 4% in 2000 to 14% in 2005. Years previous to 2000, there had been no dying plants recorded.

Secondary browse species consist of serviceberry and bitterbrush. Density of serviceberry declined after the fire. Serviceberry density was estimated to be 1,265 plants/acre in 1988 and has remained around 400 plants/acre since the fire. Serviceberry has showed moderate to heavy use in all readings, but vigor has been good. Decadence has been low and young recruitment has varied from 20% in 2000 to 5% in 2005. Bitterbrush density before the fire was 599 plants/acre and decreased to 240 plants/acre after the fire. Bitterbrush density has remained at 300 plants/acre since 2000. Utilization is heavy, but plants display good vigor. No decadency or young recruitment was observed in 2000 or 2005. Bitterbrush plants have a prostrate growth form and may not be available during deep snow. Other palatable species include Fendler ceanothus, Wyeth eriogonum, and blue elderberry.

The herbaceous understory is quite diverse and averaged 72% of the total vegetative cover since 1995. Grasses provided 17% cover in 1995, 23% in 2000, and 17% in 2005. All grasses had moderate use in 2005, which made identification difficult on some plants (46 cow days use/acre). The dominant grasses include: thickspike wheatgrass, mutton bluegrass, and needle-and-thread. Nested frequency of thickspike wheatgrass significantly decreased in 2000 and remained similar in 2005. Percent cover for thickspike wheatgrass decreased from 11% in 2000 to 4% in 2005, most likely due to heavy grazing in some areas. Mutton bluegrass

provided between 3-5% cover between 1995 and 2005. Needle-and-thread significantly increased in 2005 and cover nearly doubled from almost 3% cover in 2000 to 5% cover in 2005. Other perennial species include: Kentucky bluegrass, Sandberg bluegrass, squirreltail, and Letterman needlegrass. Cheatgrass was moderately abundant in 1995 and 2005, but was not sampled in 2000, probably due to dry conditions. Forbs are diverse and increased in average cover from 7% in 1995 to 11% in 2000 and 2005. Sum of nested frequency for perennial forbs dipped in 2000, although recovered in 2005 with normal precipitation. The most common perennial forb species include: hooker balsamroot, trailing fleabane, silver lupine, and aster. Annual forbs were abundant in 1995 and 2005, with normal precipitation, but had nearly disappeared in 2000 with drought. Many of the forb species are weedy increasers.

1982 APPARENT TREND ASSESSMENT

Within the immediate area of the study site, soil trend appears stable to declining. On nearby steeper sites, the trend would be more downward. Vegetative condition is below optimum. Browse density, especially of the more preferred species, is substandard. Animal use is almost certainly one of the more causative factors. Many increaser species of all vegetative classes are present and may be expanding. Range trend appears to be slightly downward.

1988 TREND ASSESSMENT

The soil trend appears fairly stable. Percent bare ground increased slightly, while percent litter cover declined. However, basal vegetative cover increased from 7% to 13%. Mountain big sagebrush has increased in density due to a significant increase in the number of seedlings and young plants. Decadence increased from 5% to 28%, but vigor is generally good. The majority of the sagebrush is lightly hedged so this increase in decadency is more a reflection of the age of the stand in conjunction with drought. The more preferred serviceberry and bitterbrush show improved recruitment. Serviceberry displays heavy use on 100% of the mature plants with an increased rate of decadency. Overall trend for browse is stable. Trend for the herbaceous understory is significantly improved. Quadrat frequency of grasses and forbs nearly doubled since 1982. Quadrat frequency of thickspike wheatgrass and mutton grass increased from 52% and 53% respectively to 92% and 95%.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Trend for soil is slightly up with a good stand of rhizomatous grasses to help prevent erosion. Trend for key browse mountain big sagebrush is down. The fire that burned in 1988 reduced the density of shrubs by almost 50%, but did not eliminate them. The remaining stand of mountain big sagebrush and serviceberry, though smaller, are healthier with less decadence. Use is still heavy yet vigor is good. Trend for the herbaceous understory is slightly down. Sum nested frequency of perennial grasses and perennial forbs has declined since 1988. The Desirable Components Index rated this site as fair to good with a score of 63 due to low browse cover, low decadence, and excellent forb and grass cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Fair to Good (63) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Erosion remains minimal as herbaceous vegetation is abundant. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil increased slightly, but not enough to make a change in trend. This ratio indicates high nested frequency values for vegetation and litter and well dispersed protective ground cover over the site. Trend for browse is stable. Mountain big sagebrush has good recruitment at 12%, mostly good vigor, and moderate decadence at 14%. Use is light to moderate. Serviceberry has moderately high recruitment at 20%, no decadence and good vigor. Bitterbrush displays good vigor and no decadence. Use is moderate to heavy on both serviceberry and bitterbrush. However, these species can tolerate higher levels of use and don't appear to be negatively affected at the present time. Trend for the herbaceous understory is slightly down as sum of nested frequency for both perennial grasses and forbs slightly decreased in 2000. The Desirable Components Index rated this site as good with a score of 72 due to moderate browse cover, low decadence, and excellent forb and grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Good (72) Mid-level Potential scale

2005 TREND ASSESSMENT

Trend for soil is slightly down. Erosion is minimal with the abundant herbaceous understory. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil decreased to 2.5:1, similar to the 1995 reading. Trend for key browse mountain big sagebrush, serviceberry, and bitterbrush is slightly down. Mountain big sagebrush has moderate decadence and low percent dying. The density of sagebrush decreased 19%, all of which was in the mature age class. Young and seedling recruitment is good and utilization is moderate. Serviceberry and bitterbrush densities have not changed since 2000. Use is moderate to heavy and percent decadence is low. Trend for the herbaceous understory is slightly up. Sum of nested frequency for perennial grasses is did not change much, but increased substantially for perennial forbs. Annual grasses and forbs both increased in frequency with improved precipitation. The Desirable Components Index rated this site as good with a score of 69 due to moderate browse cover, low decadence, and excellent forb and grass cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly down (-1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Good (69) Mid-level Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 16

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	ab ²⁶⁰	b ²⁶⁶	a ²¹¹	a ²²⁴	8.28	11.19	4.03
G	Bromus tectorum (a)	-	c ¹¹⁵	a ⁻	b ⁷⁴	1.28	-	2.12
G	Poa fendleriana	c ²⁷⁷	a ¹⁴⁹	b ²⁰⁰	ab ¹⁷⁷	2.87	4.78	4.42

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Poa pratensis</i>	a4	c105	b42	ab23	1.05	1.29	.29
G	<i>Poa secunda</i>	b182	a33	a30	a52	.31	.58	1.10
G	<i>Sitanion hystrix</i>	a16	a19	b58	a17	.09	1.87	.11
G	<i>Stipa comata</i>	a21	b63	b70	c107	1.77	2.75	4.87
G	<i>Stipa lettermani</i>	b53	b58	a7	a11	.84	.30	.13
Total for Annual Grasses		0	115	0	74	1.28	0	2.12
Total for Perennial Grasses		813	693	618	611	15.22	22.78	14.98
Total for Grasses		813	808	618	685	16.51	22.78	17.10
F	<i>Agoseris glauca</i>	-	3	-	10	.00	-	.07
F	<i>Allium</i> sp.	a3	b60	a-	b76	.15	-	.18
F	<i>Antennaria rosea</i>	c61	ab31	bc56	a17	.93	3.15	.16
F	<i>Arabis</i> sp.	c60	b12	a-	b16	.03	-	.05
F	<i>Artemisia ludoviciana</i>	-	-	-	1	-	.00	.00
F	<i>Astragalus purshii</i>	b28	ab7	a-	b10	.06	-	.13
F	<i>Aster</i> sp.	68	65	75	85	.95	1.70	2.24
F	<i>Astragalus</i> sp.	19	2	3	1	.00	.01	.00
F	<i>Balsamorhiza hookeri</i>	c157	b104	a60	ab83	1.15	2.28	2.70
F	<i>Camelina microcarpa</i> (a)	a-	a7	a-	b23	.02	-	.05
F	<i>Calochortus nuttallii</i>	3	-	-	-	-	-	-
F	<i>Cirsium</i> sp.	-	-	-	1	-	-	.00
F	<i>Collomia linearis</i> (a)	-	b75	a-	c163	.24	-	.47
F	<i>Comandra pallida</i>	a-	a-	ab3	b12	-	.15	.05
F	<i>Collinsia parviflora</i> (a)	-	b60	a9	c113	.27	.02	.67
F	<i>Crepis acuminata</i>	a-	b18	a-	a-	.07	-	-
F	<i>Cryptantha</i> sp.	-	1	-	1	.00	-	.00
F	<i>Descurainia pinnata</i> (a)	b23	b27	a2	ab17	.10	.00	.44
F	<i>Draba</i> sp. (a)	-	a-	a-	b8	-	-	.05
F	<i>Eriogonum alatum</i>	b122	a3	a11	a-	.01	.24	-
F	<i>Erigeron divergens</i>	-	-	-	3	-	-	.07
F	<i>Erigeron flagellaris</i>	a19	a30	b92	b71	.09	2.88	1.43
F	<i>Eriogonum racemosum</i>	-	-	-	6	-	-	.02
F	<i>Eriogonum umbellatum</i>	ab6	ab1	a-	b10	.03	-	.02
F	<i>Heterotheca villosa</i>	a-	b13	b12	ab8	.20	.16	.49
F	<i>Lappula occidentalis</i> (a)	-	1	-	9	.00	-	.02
F	<i>Lactuca serriola</i>	-	5	-	-	.01	-	-
F	<i>Lepidium densiflorum</i> (a)	-	b92	a-	a4	.25	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Lithospermum ruderales	8	15	7	4	.41	.08	.18
F	Lomatium sp.	a-	a ³	a ³	b ²⁵	.00	.00	.13
F	Lupinus argenteus	ab ¹⁷	a ³	b ²³	b ²⁸	.06	.35	2.38
F	Microsteris gracilis (a)	-	a ⁴	a-	b ⁶⁶	.01	-	.37
F	Orobancha sp.	-	-	-	2	-	-	.00
F	Penstemon sp.	15	8	9	13	.01	.10	.15
F	Phlox longifolia	b ²⁴	ab ¹⁶	a ²	ab ¹³	.03	.00	.03
F	Polygonum douglasii (a)	-	c ¹⁷⁷	a ⁴	b ¹³⁵	1.08	.00	.34
F	Potentilla gracilis	-	1	2	2	.00	.15	.03
F	Sedum lanceolatum	5	1	-	-	.00	-	-
F	Senecio multilobatus	-	-	1	-	-	.00	-
F	Sphaeralcea coccinea	ab ¹³	b ¹⁹	a ³	ab ⁷	.11	.06	.04
F	Taraxacum officinale	a-	c ²⁸	ab ⁶	bc ¹⁹	.16	.06	.22
F	Thermopsis montana	-	-	-	3	-	-	.06
F	Tragopogon dubius	ab ¹⁰	ab ⁶	a ⁵	b ¹⁸	.04	.04	.16
F	Zigadenus paniculatus	-	-	-	9	-	-	.05
Total for Annual Forbs		23	443	15	538	1.98	0.02	2.45
Total for Perennial Forbs		638	455	373	554	4.59	11.47	11.12
Total for Forbs		661	898	388	1092	6.57	11.50	13.57

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

BROWSE TRENDS --

Management unit 09 , Study no: 16

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	22	19	19	1.81	2.75	2.69
B	Artemisia tridentata vaseyana	41	43	43	3.40	4.54	5.44
B	Ceanothus fendleri	7	7	7	1.92	2.12	3.45
B	Chrysothamnus nauseosus graveolens	0	1	0	-	-	-
B	Chrysothamnus viscidiflorus lanceolatus	4	3	3	.18	.03	.00
B	Eriogonum heracleoides	12	6	11	.56	.30	1.05
B	Gutierrezia sarothrae	3	7	9	-	.15	.56
B	Opuntia sp.	6	5	4	-	.03	-
B	Purshia tridentata	10	12	12	.03	1.00	.93
B	Symphoricarpos oreophilus	6	6	5	.06	.15	.15
Total for Browse		111	109	113	7.98	11.09	14.30

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 16

Species	Percent Cover
	'05
Amelanchier utahensis	5.58
Artemisia tridentata vaseyana	7.38
Ceanothus fendleri	4.71
Chrysothamnus viscidiflorus lanceolatus	.03
Eriogonum heracleoides	.46
Purshia tridentata	2.58
Symphoricarpos oreophilus	.03

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 16

Species	Average leader growth (in)
	'05
Amelanchier utahensis	3.6
Artemisia tridentata vaseyana	2.2
Purshia tridentata	2.8

BASIC COVER --

Management unit 09 , Study no: 16

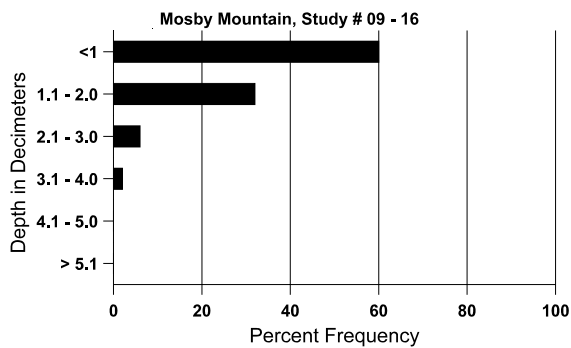
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	7.00	13.00	39.93	49.49	47.52
Rock	.25	2.50	6.85	7.48	5.47
Pavement	.50	1.00	.23	.60	.35
Litter	72.00	56.50	49.51	50.47	25.79
Cryptogams	.75	5.25	.00	.46	.05
Bare Ground	19.50	21.75	14.68	20.87	30.02

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 16, Study Name: Mosby Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
9.3	59.2 (10.0)	6.4	50.9	28.8	20.3	4.5	27.8	316.8	1.4

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 16

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	3	-	17
Moose	-	1	-
Horse	1	-	-
Elk	21	13	17
Deer	16	11	15
Cattle	24	7	21

Days use per acre (ha)	
'00	'05
-	-
-	-
-	-
20 (50)	13 (33)
9 (22)	13 (33)
36 (88)	46 (115)

BROWSE CHARACTERISTICS --
Management unit 09 , Study no: 16

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
82	1066	-	266	800	-	-	38	63	0	-	6	23/25
88	1265	133	666	333	266	-	21	32	21	-	5	35/37
95	460	40	20	420	20	80	39	39	4	-	0	23/34
00	400	-	80	320	-	-	50	25	0	-	0	31/43
05	380	-	20	340	20	-	11	84	5	-	0	33/47
<i>Artemisia tridentata vaseyana</i>												
82	2933	-	400	2400	133	-	7	0	5	-	0	16/21
88	3599	133	666	1933	1000	-	19	0	28	-	2	25/29
95	1600	60	120	1360	120	220	61	20	8	-	0	14/21
00	1900	-	220	1420	260	120	28	0	14	4	4	13/23
05	1540	1520	240	1020	280	240	45	6	18	14	14	19/34
<i>Ceanothus fendleri</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	260	-	-	260	-	-	0	0	-	-	0	9/54
00	200	-	-	200	-	-	0	0	-	-	0	11/67
05	420	-	-	420	-	20	0	0	-	-	0	9/51
<i>Chrysothamnus nauseosus graveolens</i>												
82	66	-	-	66	-	-	0	0	-	-	0	19/15
88	66	-	-	66	-	-	0	0	-	-	100	29/9
95	0	-	-	-	-	-	0	0	-	-	0	13/11
00	20	-	-	20	-	-	0	0	-	-	0	15/19
05	0	-	-	-	-	-	0	0	-	-	0	16/15
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
82	399	-	133	266	-	-	0	0	-	-	0	10/14
88	666	-	266	400	-	-	0	0	-	-	60	7/9
95	80	-	-	80	-	-	0	25	-	-	0	8/13
00	60	-	-	60	-	-	0	0	-	-	0	6/10
05	60	-	-	60	-	-	0	0	-	-	0	11/21

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Eriogonum heracleoides</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	266	-	66	200	-	-	25	0	-	-	0	4/7
95	540	-	180	360	-	-	0	0	-	-	0	5/16
00	220	-	80	140	-	-	0	0	-	-	0	4/11
05	460	-	20	440	-	-	17	0	-	-	0	10/14
<i>Gutierrezia sarothrae</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	120	-	-	120	-	-	0	0	-	-	0	9/12
00	320	20	20	300	-	-	0	0	-	-	0	7/8
05	560	-	-	560	-	-	0	0	-	-	0	8/10
<i>Opuntia sp.</i>												
82	133	-	-	133	-	-	0	0	0	-	0	1/12
88	666	66	266	400	-	-	0	0	0	-	20	4/9
95	140	-	-	140	-	-	0	0	0	-	29	3/14
00	200	-	40	40	120	-	0	0	60	10	10	2/12
05	80	-	-	80	-	-	0	0	0	-	0	2/11
<i>Purshia tridentata</i>												
82	333	-	-	333	-	-	60	40	-	-	0	7/19
88	599	66	266	333	-	-	33	33	-	-	0	10/19
95	240	-	60	180	-	-	50	17	-	-	0	10/32
00	300	-	-	300	-	-	60	27	-	-	0	12/42
05	300	-	-	300	-	-	0	100	-	-	0	13/45
<i>Sambucus cerulea</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	47/69
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Symphoricarpos oreophilus</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	66	-	-	66	-	-	0	0	0	-	0	16/14
95	200	-	80	120	-	-	10	30	0	-	0	11/19
00	140	-	-	140	-	-	0	0	0	-	0	15/21
05	140	20	40	80	20	-	0	14	14	14	14	15/32

Trend Study 9-17-05

Study site name: Farm Creek .

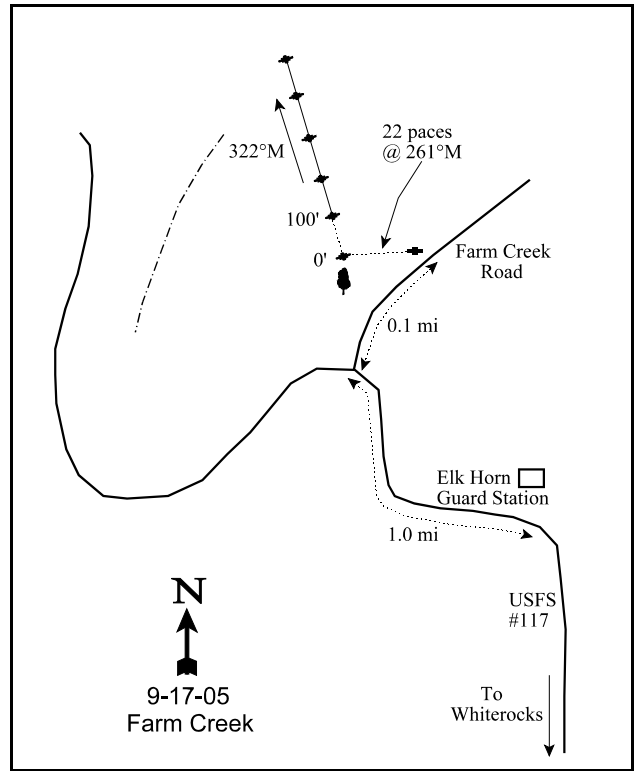
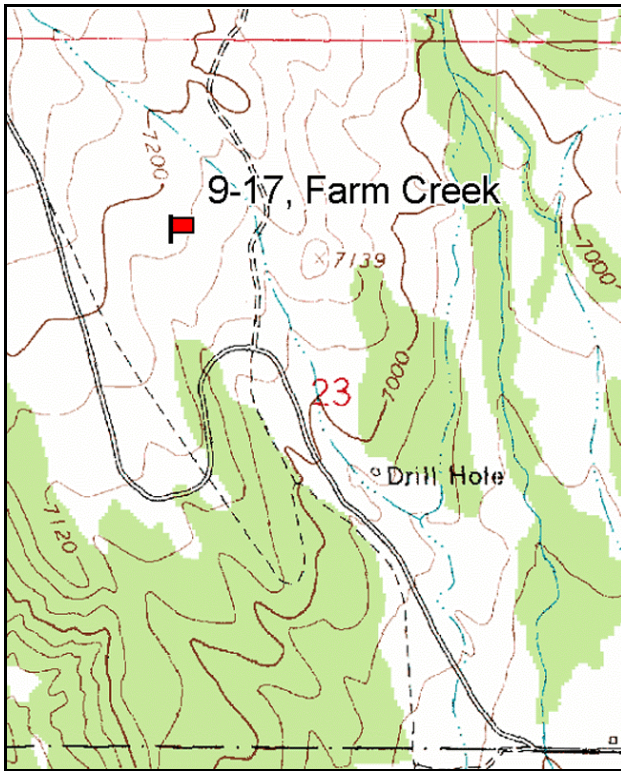
Vegetation type: Mountain Big Sagebrush .

Compass bearing: frequency baseline 322 degrees magnetic.

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

LOCATION DESCRIPTION

From Whiterocks, drive east on 11500 N (Tridell HWY) to the junction of 5500 E (Whiterocks Loop Rd). Turn left (north) and drive 7.9 miles to the Elkhorn Guard Station located north of Whiterocks. The main road will bend west, continue on this USFS road (Farm Creek Road) for 1 mile. At the first switchback turn right (north) and travel 0.1 miles to the witness located on the left (west) side of the road. From the witness post walk 22 paces at 261°M to the 0 foot baseline stake.



Map Name: Ice cave Peak

Diagrammatic Sketch

Township 2N, Range 1W, Section 23

GPS: NAD 27, UTM 12T 4490101 N, 587600 E

DISCUSSION

Farm Creek - Trend Study No. 9-17

The Farm Creek study was established in 1995 to replace the trend study in Cart Hollow which is now inaccessible with a road enclosure. This site monitors a sagebrush grass type in the Ashley National Forest. Elevation is approximately 7,100 feet with a southern exposure and slope of 6% to 8%. The area is considered winter range, but use by big game has been light. Pellet group data from 2000 estimated 27 deer, 8 elk, and 15 cow days use/acre (66 ddu/ha, 20edu/ha, and 36 cedu/ha). Pellet group data from 2005 estimated 17 deer, 1 elk, and 38 cow days use/acre (41 ddu/ha, 3 edu/ha, and 93 cdu/ha). This area is in the Farm Creek/Buck Ridge allotment which is grazed by cattle on a 4-unit rest-rotation system from June 11 to September 10.

Soils are sandy loam in texture and very rocky in the profile. Effective rooting depth is estimated at just over 10 inches. Rooting depth does not appear to be restricted as mountain big sagebrush, a deep rooted species, is dominant on the site. The soil pH is neutral (6.8). Soil phosphorus levels are moderately high at 19.2 ppm, values less than 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Bare ground has increased since establishment in 1995 from 7% in 1995, to 12% in 2000, and 16% in 2005. Vegetation and litter are abundant, with mountain big sagebrush, bitterbrush and crested wheatgrass dominating the site. Pedestaling of soil around bunch grasses is minimal, but soil appears stable. The erosion condition class determined soil movement as stable in 2005.

The dominant browse species are mountain big sagebrush and antelope bitterbrush. These two species combine to provide over 47% of the total vegetative cover. Mountain big sagebrush had an average cover of 15% in 2000 and 2005. Population density was estimated at 2,860 plants/acre in 1995, 3,560 in 2000, and 3,100 in 2005. Sagebrush young recruitment averaged 8% of the population in 1995 and 2005, and slightly higher in 2000 at 11%. Decadency showed a large increase from 1% in 1995 to 29% in 2000 and 2005. Use on sagebrush has been light to moderate and the increase in decadency may be attributed to drought conditions from 2000 to 2003. Other sagebrush sites in the region also show an increase in decadency in 2000 with the dry conditions. The percentage of the sagebrush population classified as dying increased from 1% in 2000 to 15% by 2005. Sagebrush vigor decreased slightly in 2005, but still remains fairly good. Average leader growth on sagebrush estimated 1 inch in 2000 and just over 2 inches in 2005.

The more preferred antelope bitterbrush averaged just over 2,000 plants/acre from 1995 to 2005. Its average cover was 7% in 1995, increasing in 2000 to 11%, then declining in 2005 to 8%. The shrubs have a prostrate growth form averaging 17 inches in height and a crown of 38 inches. Use is moderate to heavy but bitterbrush can tolerate much heavier levels of use than sagebrush. With a low amount of deer and elk sign in 2000 and 2005, some of the use on bitterbrush is likely from livestock. Vigor remains good, percent decadency has slightly decreased from 13% in 1995 and 2000, to 9% in 2005. Bitterbrush seedlings are rare, but recruitment from young plants has been fairly good at 16% in 1995, then dropping somewhat to 9% in 2000, and 6% in 2005. Average leader growth estimated 4 inches in 2000 and 2005 with moderate seed production. Other browse found were increaser species consisting of pricklypear cactus, mountain low rabbitbrush, and broom snakeweed.

Crested wheatgrass dominates the understory. It has provided almost 18% average cover in 1995 and 2005, and slightly higher in 2000 at 27%. Nested frequency decreased significantly in 2005, although still fairly high. Crested wheatgrass is vigorous and was sampled in almost every quadrat during all three sampling years. It received moderate use in 2005. Bulbous bluegrass is the second most abundant grass. This species significantly decreased in nested frequency in 2000 and provided only about 1% cover. In 2005, it increased significantly and cover increased to 5%. Cheatgrass is present, but in low numbers. Both bulbous bluegrass and cheatgrass should be watched closely for increases in abundance. Forbs are diverse but provided under 2% average cover all three sampling years. Sum of nested frequency for perennial forbs decreased by 57% in 2000, because of dry conditions, but returned to previous estimates by 2005.

1995 APPARENT TREND ASSESSMENT

The soil trend appears stable as long as vegetation and litter cover remain high. No erosion is currently occurring. The browse trend appears stable for mountain big sagebrush due to low decadency rates, the lack of dead plants, and adequate numbers of seedlings and young. Trend for bitterbrush also appears stable. Use is mostly moderate and decadency rates low (13%). The herbaceous understory is in good condition but species composition is poor. The seeded species, crested wheatgrass, is abundant but the other perennial grasses are rare. Forbs are diverse but scarce. The Desirable Components Index rated this site as good to excellent with a score of 81 due to excellent browse cover, low decadence, and excellent perennial grass cover.

winter range condition (DC Index) - Good to Excellent (81) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Protective cover from vegetation and litter are abundant. Bare ground is relatively low. Trend for browse is stable. Mountain big sagebrush experienced a large increase in decadency from 1% to 29% with only light use, which increase is drought related. Recruitment is good at 11%. Bitterbrush is stable in density and decadency. It has moderate recruitment numbers at 9%. Vigor is good for both species. Trend for the herbaceous understory is stable. Although sum of nested frequency of perennial forbs significantly decreased in 2000, forbs only provide 3% of the vegetative cover and this decrease does not warrant a downward trend. Nested frequency of the dominant species, crested wheatgrass, increased which counters the loss of perennial forbs. The Desirable Components Index rated this site as good with a score of 77 due to excellent browse cover, low decadence, and excellent perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Good (77) Mid-level Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Protective cover from vegetation and litter are abundant. Bare ground has increased slightly, but remains low. Trend for key browse, mountain big sagebrush is slightly down. Population density has decreased slightly from 3,560 plants/acre in 2000 to 3,100 in 2005. Percent decadency increased to 29% in 2000 and has remained there in 2005. The proportion of plants classified as dying was estimated at 15% in 2005 compared to 1% in 2000. Antelope bitterbrush has remained stable, but utilization appears to have increased slightly. Trend for herbaceous understory is slightly up. Perennial grasses have slightly increased in sum of nested frequency, due to an increase in bulbous bluegrass. Cheatgrass is low in numbers, but has increased and should be watch closely. Forbs are diverse but are not very abundant, but also increased. The Desirable Components Index rated this site as good with a score of 74 due to excellent browse cover, moderate decadence, and excellent perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Good (74) Mid-level Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 17

Type	Species	Nested Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
G	<i>Agropyron cristatum</i>	_{ab} 387	_b 405	_a 367	17.89	26.90	17.95
G	<i>Agropyron dasystachyum</i>	3	8	13	.00	.05	.07
G	<i>Bromus tectorum</i> (a)	_b 17	_{a-}	_c 43	.05	-	.77
G	<i>Festuca ovina</i>	-	-	2	-	-	.03
G	<i>Poa bulbosa</i>	_b 85	_a 51	_c 137	2.67	.85	5.15
G	<i>Poa fendleriana</i>	5	8	7	.06	.04	.06
G	<i>Poa pratensis</i>	5	-	-	.03	-	-
G	<i>Poa secunda</i>	2	-	6	.00	-	.04
Total for Annual Grasses		17	0	43	0.05	0	0.76
Total for Perennial Grasses		487	472	532	20.67	27.85	23.32
Total for Grasses		504	472	575	20.72	27.85	24.09
F	<i>Agoseris glauca</i>	-	-	3	-	-	.03
F	<i>Allium</i> sp.	_b 20	_{a-}	_b 25	.06	-	.14
F	<i>Antennaria rosea</i>	-	4	1	-	.38	.03
F	<i>Arabis</i> sp.	_b 14	_a 3	_{ab} 11	.06	.00	.03
F	<i>Artemisia ludoviciana</i>	_b 27	_a 7	_{ab} 20	.18	.18	.09
F	<i>Astragalus convallarius</i>	7	2	6	.21	.03	.12
F	<i>Balsamorhiza hookeri</i>	4	3	5	.01	.06	.21
F	<i>Castilleja linariaefolia</i>	1	-	-	.00	-	.00
F	<i>Calochortus nuttallii</i>	-	-	2	-	-	.00
F	<i>Conyza canadensis</i> (a)	6	-	-	.01	-	-
F	<i>Collomia linearis</i> (a)	_c 48	_{a-}	_b 5	.16	-	.03
F	<i>Collinsia parviflora</i> (a)	-	4	-	-	.00	-
F	<i>Cryptantha</i> sp.	5	-	-	.01	-	-
F	<i>Delphinium nuttallianum</i>	-	-	1	-	-	.03
F	<i>Descurainia pinnata</i> (a)	-	-	2	-	-	.00
F	<i>Draba reptans</i> (a)	_b 64	_a 1	_b 37	.11	.00	.10
F	<i>Erigeron eatonii</i>	-	6	3	-	.01	.03
F	<i>Erigeron flagellaris</i>	_a 4	_b 13	_{a-}	.00	.22	-
F	<i>Eriogonum racemosum</i>	10	4	9	.14	.07	.15
F	<i>Heterotheca villosa</i>	12	5	5	.33	.18	.01
F	<i>Lappula occidentalis</i> (a)	9	-	5	.02	-	.01
F	<i>Lactuca serriola</i>	2	-	-	.00	-	-
F	<i>Lepidium densiflorum</i> (a)	_b 55	_{a-}	_b 66	.17	-	.24

T y p e	Species	Nested Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
F	Lithospermum ruderales	-	4	3	.03	.18	.15
F	Lomatium sp.	3	-	2	.01	-	.01
F	Lupinus argenteus	-	4	3	-	.04	.03
F	Microsteris gracilis (a)	1	-	-	.00	-	-
F	Orobancha sp.	2	-	-	.00	-	-
F	Penstemon sp.	-	-	3	-	-	.00
F	Phlox longifolia	14	-	6	.02	-	.01
F	Polygonum douglasii (a)	_b 49	_a -	_a 5	.12	-	.01
F	Schoenocrambe linifolia	9	-	7	.01	-	.01
F	Sphaeralcea coccinea	21	11	18	.10	.12	.29
F	Tragopogon dubius	1	-	-	.00	-	-
F	Trifolium gymnocarpon	_{ab} 9	_a 3	_b 20	.05	.03	.13
F	Zigadenus paniculatus	1	2	3	.00	.00	.03
Total for Annual Forbs		232	5	120	0.60	0.00	0.40
Total for Perennial Forbs		166	71	156	1.30	1.51	1.58
Total for Forbs		398	76	276	1.90	1.52	1.99

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

BROWSE TRENDS --

Management unit 09 , Study no: 17

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	1	1	1	-	-	-
B	Artemisia tridentata vaseyana	66	77	76	13.01	15.14	14.89
B	Chrysothamnus viscidiflorus lanceolatus	2	0	0	-	-	-
B	Gutierrezia sarothrae	14	26	22	.04	.88	.09
B	Opuntia sp.	21	18	19	.39	.16	.13
B	Pediocactus simpsonii	2	1	2	-	-	.00
B	Pinus edulis	0	0	0	.00	-	-
B	Purshia tridentata	51	54	53	6.77	11.37	8.26
Total for Browse		157	177	173	20.23	27.55	23.39

CANOPY COVER, LINE INTERCEPT --
 Management unit 09 , Study no: 17

Species	Percent Cover
	'05
Amelanchier utahensis	.11
Artemisia tridentata vaseyana	21.06
Gutierrezia sarothrae	.30
Opuntia sp.	.11
Purshia tridentata	7.51

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 09 , Study no: 17

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	2.2
Purshia tridentata	3.8

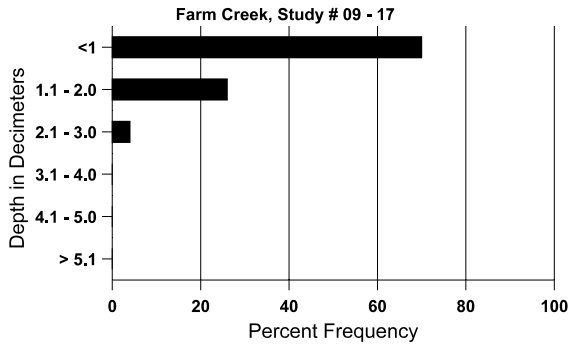
BASIC COVER --
 Management unit 09 , Study no: 17

Cover Type	Average Cover %		
	'95	'00	'05
Vegetation	45.22	52.87	48.65
Rock	10.75	10.65	10.05
Pavement	.50	.92	.28
Litter	56.27	58.82	38.82
Cryptogams	.39	1.21	.23
Bare Ground	7.24	11.98	16.14

SOIL ANALYSIS DATA --
 Herd Unit 09, Study # 17, Study Name: Farm Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
10.6	63.4 (11.0)	6.8	58.9	22.8	18.3	3.7	19.2	211.2	1.0

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 17

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	10	16	10
Elk	4	2	2
Deer	9	2	7
Cattle	22	11	16

Days use per acre (ha)	
'00	'05
-	-
8 (20)	1 (3)
27 (66)	17 (41)
15 (36)	38 (93)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 17

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
95	20	-	-	20	-	-	0	100	-	-	100	8/22
00	20	-	-	20	-	-	0	0	-	-	0	22/27
05	20	-	-	20	-	-	0	100	-	-	0	23/36
Artemisia tridentata vaseyana												
95	2860	60	240	2600	20	-	23	.69	1	-	0	24/41
00	3560	60	380	2160	1020	20	19	0	29	1	1	28/39
05	3100	260	220	1980	900	140	21	0	29	15	15	29/40
Chrysothamnus viscidiflorus lanceolatus												
95	140	-	20	120	-	-	0	0	-	-	0	14/23
00	0	-	-	-	-	-	0	0	-	-	0	15/28
05	0	-	-	-	-	-	0	0	-	-	0	17/28

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Gutierrezia sarothrae</i>												
95	500	20	-	500	-	-	0	0	0	-	0	9/12
00	2280	-	40	2200	40	-	0	0	2	-	0	7/8
05	940	-	20	920	-	-	0	0	0	-	0	9/9
<i>Opuntia sp.</i>												
95	1060	20	-	1060	-	-	0	0	0	-	0	5/9
00	680	-	60	560	60	-	0	0	9	3	3	2/9
05	680	-	40	600	40	20	0	0	6	3	3	3/8
<i>Pediocactus simpsonii</i>												
95	40	-	-	40	-	-	0	0	-	-	0	2/3
00	20	-	-	20	-	-	0	0	-	-	0	2/3
05	100	-	20	80	-	-	0	0	-	-	0	2/3
<i>Purshia tridentata</i>												
95	2100	-	340	1480	280	280	43	41	13	.95	.95	13/37
00	2080	40	180	1660	240	60	58	21	12	2	2	19/42
05	1980	-	120	1680	180	100	11	86	9	2	2	18/34

Trend Study 9-18-05

Study site name: Gooseberry Spring.

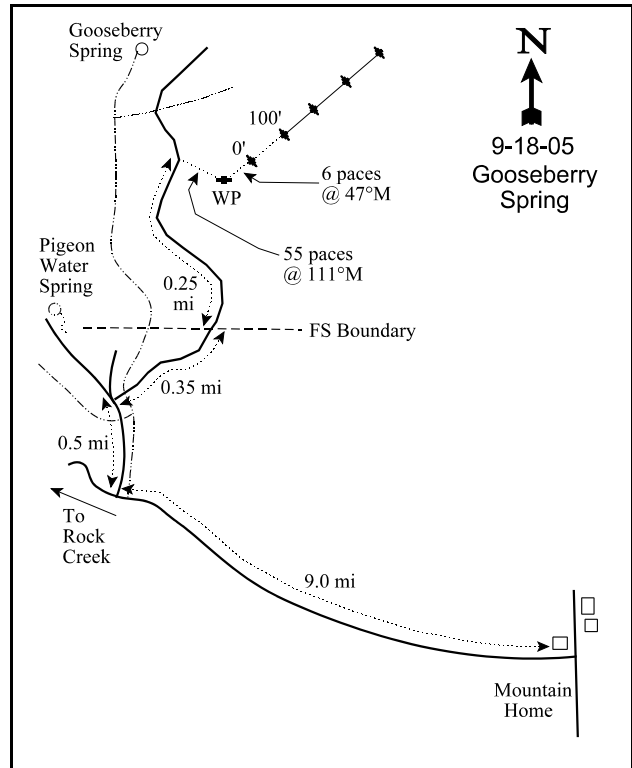
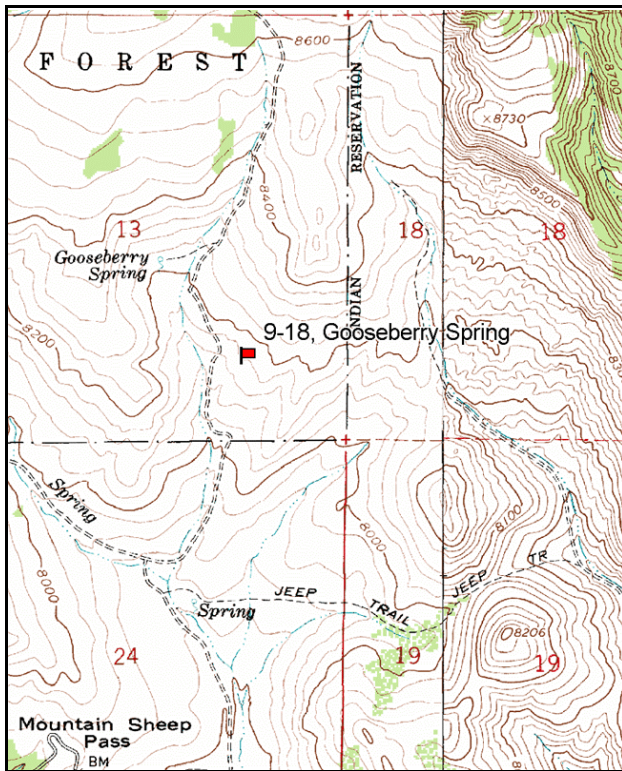
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 47 degrees magnetic.

Frequency belt placement: line 1 (16 & 92ft), line 2 (30ft), line 3 (47ft), line 4 (66ft).

LOCATION DESCRIPTION

From the town of Mountain Home, travel in a northwest direction towards Rock Creek. Approximately 9.0 miles from Mountain Home, you will come to a dirt road to the right (north). Before the road, there is a sign which points to Pigeon Water Spring. Take the dirt road to the north for 0.5 miles to a 3-way fork. Take the right fork for 0.35 miles to the forest boundary. From the fence, continue 0.25 miles to a bend in the road in a small drainage. From the road, the 0-foot baseline stake is approximately 55 paces up the drainage @ 111°M. The frequency baseline stakes are marked by green, 18 inch tall fenceposts. The 0-foot baseline stake is marked with browse tag, #7196.



Map Name: Dry Mountain

Diagrammatic Sketch

Township 1N, Range 6W, Section 13

GPS: NAD 27, UTM 12T 4480675 N, 541631 E

DISCUSSION

Gooseberry Spring - Trend Study No. 9-18

This trend study is located on high winter range near Gooseberry Spring on the Ashley National Forest. Elevation is approximately 8,160 feet. The aspect is to the southwest with a slope of 13%. The range type is mixed mountain brush with a strong black sagebrush component. The baseline runs up a small draw which contains a large number of serviceberry, snowberry and mountain big sagebrush. The side hills are drier and dominated by nearly pure stands of black sagebrush. Intense animal use from deer, elk, cattle and possibly domestic sheep was reported in 1982. However, quadrat frequency of deer and elk pellet groups were moderately low in 1988 and 1995. Pellet group data from 2000 estimated 12 deer, 48 elk, and 7 cows days use/acre (30 ddu/ha, 117 edu/ha, and 18 cdu/ha). Pellet group data from 2005 estimated 43 deer, 44 elk, and 10 cow days use/acre (106 ddu/ha, 107 edu/ha, and 25 cdu/ha). The Forest Service manages this land as part of the Pigeon Water allotment which is grazed by cattle from June 16 to September 25 on a rest-rotation system.

Soils have a clay texture and are variable in depth. Soil depth is relatively shallow on the sides of the draws, increasing in the drainage bottoms. In the draw where the site is located, effective rooting depth is estimated at nearly 15 inches. Phosphorus is low at 4.8 ppm, values below 6 ppm can limit normal plant growth and development (Tiedemann and Lopez 2004). Vegetation and litter cover have been abundant and bare ground has been moderately low, between 6 and 12% from 1995 to 2005. Rock cover has been high with a relative cover of 10% since 1995. The erosion condition class determined soil movement as stable in 2005, but pedestaling and rills are present on the steeper slopes.

The browse composition is diverse and has provided over half the total vegetation cover since 1995. The preferred key species include: mountain big sagebrush, black sagebrush, serviceberry, and bitterbrush. Snowberry is also abundant and provides more cover than any other species. Serviceberry density was estimated at 1,240 plants/acre in 1995 and 1,380 in 2000 and 2005. Serviceberry has averaged 6.5% cover since 1995 and averaged nearly 3.5 feet in both height and crown. Utilization has been moderate to heavy since the site was established in 1982. Vigor is generally good and percent decadency has remained at or below 14%. Young recruitment is fair and has averaged 20% since 1995. Average leader growth was estimated at less than 2 inches in 2000 and just over 2 inches in 2005.

Mountain big sagebrush density estimated nearly 2,400 plants/acres in 1995 and 2000, but declined to 1,640 in 2005. Utilization has typically been moderate and was slightly higher in 1995. Twenty-five percent of the population displayed poor vigor in 2000 and 2005, an increase from 9% in 1995. Decadency increased from 10% in 2000 to nearly half the population (40%) in 2005. Young recruitment was moderate (6% in 1995, 13% in 2000, and 11% in 2005), but in 2005, 26% of population was classified as dying. This was the first time that the number of dying individuals was higher than young within the population. Leader growth on big sagebrush averaged 3 inches in 2000 and almost 2 inches in 2005.

Bitterbrush density estimated 520 plants/acre in 1995, 420 in 2000, and 520 again in 2005. The population has good vigor and few decadent plants. Moderate and heavy use have been present since 1982 with slight fluctuation. Young recruitment estimated 4% in 1995, 10% in 2000, and none in 2005. Leader growth averaged about 3 inches in 2000 and nearly 2 inches in 2005. Black sagebrush density has been slowly declining since 1995. Mature and decadent plants averaged 3,166 plants/acre in 1995, 2,860 in 2000, and 2,500 in 2005. Young recruitment has fluctuated from an estimated 1,200 young plants/acre in 1995, to only 40 in 2000, to 720 in 2005. Vigor is good on black sagebrush plants and percent decadency is moderately low at or below 18% since 1995. Although not a preferred forage species, snowberry is abundant and averaged 4,400 plants/acre since 1995. Use is light, vigor is good, and only a few decadent plants have ever been sampled.

The herbaceous understory is diverse for both grasses and forbs. Dominant grasses are mutton bluegrass and thickspike wheatgrass. Kentucky bluegrass, Sandberg bluegrass, a sedge, and prairie junegrass are also present. Sum of nested frequency for these perennial grass species decreased by 20% in 2000, but recovered in 2005. Grass cover has increased from 10% in 1995, to 14% in 2000, to 16% in 2005. Many forb species are present on the site, yet none are very abundant. Sum of nested frequency for perennial forbs decreased by 53% in 2000 due to drought, but returned to previous values in 2005 with above average precipitation. Total average cover for forbs decreased some in 2000, with 9% cover in 1995, 8% in 2000, and 17% in 2005. Low growing and increaser species are prominent and include: rose pussytoes, desert phlox, fleabane, aster, and dandelion. The forb composition is indicative of many years of heavy grazing.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable. There is little evidence for any extensive soil movement. Vegetative trend, at least with respect to the browse component, is more questionable. A stable condition may currently exist, but the potential for a decline is present. The area is receiving heavy use over a large part of the year, the effect of which is unclear at present. Careful monitoring of shrub populations should provide some answers in the near future.

1988 TREND ASSESSMENT

Ground cover percentages are fairly constant. Slight increases in vegetative, litter and rock cover led to a decrease in the percentage of bare soil to about 17%. Soil movement is minimal. Browse trend is up. The age structure of snowberry and serviceberry suggest that the populations are increasing. Serviceberry did increase significantly in density since 1982. Eighty percent of the serviceberry were classified as seedlings or young shrubs, as were 71% of the snowberry. The age structure of the sagebrush population has not changed since 1982 and it has declined slightly in numbers. The most significant trend is the reduction in the number of heavily hedged shrubs; down from 21% in 1982 to 3% in 1988. Vigor is apparently improving. Another indicator of a positive trend is the prevalence of young plants in the populations of the key browse species. There is not much sign of recent use by big game. Trend for the herbaceous understory is up with increased frequency for grasses and forbs. A total of 40 species of forbs were encountered in the nested frequency plots, up from 20 species in 1982. Most occur only occasionally, but as a group, the forbs constitute an important source of forage at this high-elevation winter range site. Eaton fleabane, desert phlox, lupine, rock goldenrod, and looseflower milkvetch continue to top the list of the most frequent forbs. The increase in total forb sum of nested frequency is significant, changing from 169 to 457.

TREND ASSESSMENT

soil - stable (0)

browse - up (+2)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Trend for ground cover is slightly improved. Percent bare ground declined to only 7%, down from almost 17%. Percent cover of litter declined, however litter and vegetation cover are adequate to protect the soil surface. Trend for browse is improved slightly for the key species due to reduced heavy use, improved vigor and lower decadency rates. Trend for the herbaceous understory is down for grasses and stable for forbs. Overall, the herbaceous trend is slightly down but will likely rebound with normal precipitation patterns. The Desirable Components Index rated this site as good with a score of 78 due to excellent browse cover, low decadence, moderate perennial grass cover, and excellent forb cover.

TREND ASSESSMENT

soil - up slightly (+1)

browse - slightly up (+1)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Good (78) High Potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable even with the slight increase in bare soil. Relative cover for bare ground increased slightly from 6% to 12%, while vegetation and litter cover both slightly decreased. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil decreased slightly as a result of these ground cover changes, but it still remains fairly high at 3.5:1. Despite the decrease in the ratio, erosion is minimal. Trend for browse is stable. The key species all appear to have stable populations and for the most part, good vigor and low decadency. The exception is mountain big sagebrush which has 24% of its population classified as having poor vigor. Recruitment is good for serviceberry, mountain big sagebrush and bitterbrush, but low for black sagebrush. The key browse component appears to be in good condition. It is not showing as many negative changes as some other browse communities on the unit, as a result of the dry conditions of this year. Trend for the herbaceous understory is down due to drought. Sum of nested frequency of perennial grasses and forbs declined by 20% and 53% respectively. The Desirable Components Index rated this site as good with a score of 86 due to excellent browse cover, low decadence, and excellent perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - Good (86) High Potential scale

2005 TREND ASSESSMENT

Trend for soil continues to appear stable. Percent bare soil was estimated 12% cover and is very similar to 2000. Vegetation increased from 49% to 63%, while litter cover slightly decreased, but should increase later with the increase in vegetation. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil is high (4:1), which was the level in 1995. Trend for key browse is slightly down. Mountain big sagebrush density has decreased from 2,360 plants/acre to 1,640. Almost half (40%) of the plants were classified as decadent and 26% were classified as dying. Black sagebrush density has slightly decreased. Bitterbrush and serviceberry are both stable and doing well, even with considerable hedging. Young recruitment is good for all species except bitterbrush, which had no young plants sampled. Trend for herbaceous understory is up. The accumulative sum of nested frequency for perennial grasses and forbs increased by 47%. The Desirable Components Index rated this site as good with a score of 83 due to excellent browse cover, moderate decadence, and excellent perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - up (+2)

winter range condition (DC Index) - Good (83) High Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 18

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	<i>Agropyron dasystachyum</i>	237	200	195	212	2.40	3.74	4.42
G	<i>Agropyron spicatum</i>	-	2	-	5	.03	-	.21
G	<i>Bouteloua gracilis</i>	b13	a-	a-	ab8	-	-	.44
G	<i>Bromus anomalus</i>	3	-	4	3	-	.01	.03
G	<i>Carex sp.</i>	b99	b93	a41	a45	.35	.65	.32
G	<i>Koeleria cristata</i>	a19	a18	a39	b68	.15	1.14	1.37
G	<i>Oryzopsis hymenoides</i>	-	-	-	3	-	-	.03
G	<i>Poa fendleriana</i>	-	192	205	190	4.03	6.61	6.17
G	<i>Poa pratensis</i>	c113	b76	a20	a30	1.81	.75	1.31
G	<i>Poa secunda</i>	b264	a67	a46	a60	.92	.76	1.33
G	<i>Sitanion hystrix</i>	-	1	-	5	.00	-	.04
G	<i>Stipa comata</i>	a2	c27	ab8	bc24	.29	.18	.52
G	<i>Stipa lettermani</i>	c20	bc25	a2	ab8	.11	.15	.22
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		770	701	560	661	10.13	14.01	16.45
Total for Grasses		770	701	560	661	10.13	14.01	16.45
F	<i>Agoseris glauca</i>	ab3	b13	a-	b8	.03	-	.03
F	<i>Alyssum alyssoides (a)</i>	-	-	-	4	-	-	.01
F	<i>Allium cernuum</i>	b24	b17	a-	a-	.07	-	-
F	<i>Antennaria rosea</i>	a1	b22	b34	b27	.22	1.04	1.07
F	<i>Androsace septentrionalis (a)</i>	-	-	-	1	-	-	.00
F	<i>Arabis sp.</i>	ab4	a2	ab9	b14	.00	.07	.06
F	<i>Astragalus convallarius</i>	b61	ab34	a16	b59	.42	.32	1.29
F	<i>Astragalus spatulatus</i>	ab10	a-	ab11	b13	-	.71	.14
F	<i>Astragalus tenellus</i>	c71	b29	a6	ab11	.56	.06	.31
F	<i>Aster sp.</i>	39	47	40	46	.35	.25	.64
F	<i>Astragalus sp.</i>	7	-	-	-	-	-	-
F	<i>Balsamorhiza hookeri</i>	b23	ab30	a7	b25	.40	.07	.46
F	<i>Balsamorhiza sagittata</i>	-	-	-	2	-	-	.15
F	<i>Castilleja chromosa</i>	ab13	b20	a-	a-	.26	-	.01
F	<i>Castilleja linariaefolia</i>	a4	b22	a5	ab10	.18	.03	.07
F	<i>Calochortus nuttallii</i>	a-	b39	a1	b24	.49	.00	.10
F	<i>Chaenactis douglasii</i>	1	3	3	2	.03	.03	.00
F	<i>Cirsium undulatum</i>	b14	ab9	ab7	a2	.07	.09	.18

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Collomia linearis</i> (a)	-	_b 27	_a -	_b 22	.16	-	.08
F	<i>Comandra pallida</i>	53	50	27	39	.21	.36	.41
F	<i>Collinsia parviflora</i> (a)	-	35	9	17	.29	.07	.04
F	<i>Cordylanthus ramosus</i> (a)	-	_a -	_a -	_b 9	-	-	.02
F	<i>Crepis acuminata</i>	_a 14	_b 43	_a 9	_b 61	.32	.07	1.29
F	<i>Cryptantha</i> sp.	-	-	-	2	-	-	.00
F	<i>Cymopterus</i> sp.	_a 2	_b 57	_a -	_b 50	.16	-	.75
F	<i>Cynoglossum officinale</i>	-	2	-	7	.00	-	.04
F	<i>Eriogonum alatum</i>	7	28	9	10	.10	.07	.13
F	<i>Erigeron eatonii</i>	_c 97	_b 55	_a 13	_{ab} 37	.53	.10	.63
F	<i>Eriogonum umbellatum</i>	5	14	9	11	.27	.09	.33
F	<i>Euphorbia brachycera</i>	1	-	-	-	-	-	-
F	<i>Geranium richardsonii</i>	-	1	-	-	.03	-	.00
F	<i>Hedysarum boreale</i>	-	-	-	1	-	-	.03
F	<i>Hymenoxys acaulis</i>	_b 24	_{ab} 4	_a 1	_{ab} 8	.06	.03	.04
F	<i>Leucelene ericoides</i>	-	-	-	6	-	-	.04
F	<i>Lesquerella</i> sp.	3	-	-	-	-	-	-
F	<i>Linum lewisii</i>	3	-	-	2	-	-	.00
F	<i>Lithospermum</i> sp.	_b 14	_{ab} 8	_a 5	_a 1	.01	.03	.00
F	<i>Lupinus argenteus</i>	77	54	56	69	.98	.89	4.28
F	<i>Lychnis drummondii</i>	_a -	_{ab} 5	_a 3	_b 11	.01	.03	.10
F	<i>Lygodesmia grandiflora</i>	-	1	-	-	.01	-	-
F	<i>Machaeranthera canescens</i>	-	-	4	-	-	.00	-
F	<i>Microsteris gracilis</i> (a)	-	-	-	3	-	-	.00
F	<i>Orthocarpus tolmiei</i> (a)	_b 11	_b 19	_a -	_b 13	.16	-	.03
F	<i>Penstemon caespitosus</i>	10	10	7	17	.10	.09	.28
F	<i>Penstemon dolius</i>	8	7	-	-	.21	-	-
F	<i>Penstemon fremontii</i>	-	-	-	6	-	-	.16
F	<i>Penstemon humilis</i>	-	-	-	17	-	-	.22
F	<i>Penstemon</i> sp.	23	28	-	-	.16	-	-
F	<i>Penstemon pachyphyllus</i>	-	1	8	-	.01	.21	-
F	<i>Petradoria pumila</i>	_b 59	_a 24	_a 33	_a 32	.72	.70	1.02
F	<i>Penstemon watsonii</i>	-	-	-	4	-	-	.18
F	<i>Phlox austromontana</i>	_c 93	_{bc} 71	_a 34	_{ab} 48	.94	1.39	.60
F	<i>Phlox longifolia</i>	_{bc} 53	_c 63	_a 9	_{ab} 27	.22	.09	.16
F	<i>Physaria</i> sp.	-	3	-	-	.00	-	-

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Polygonum douglasii</i> (a)	-	_b 16	_a -	_b 7	.03	-	.02
F	<i>Potentilla gracilis</i>	18	17	7	16	.13	.04	.29
F	<i>Schoenocrambe linifolia</i>	-	3	-	1	.00	-	.00
F	<i>Senecio multilobatus</i>	_b 70	_a 6	_a 5	_a 4	.01	.01	.04
F	<i>Sphaeralcea coccinea</i>	31	20	19	26	.10	.41	.30
F	<i>Taraxacum officinale</i>	16	16	10	14	.05	.07	.15
F	<i>Tragopogon dubius</i>	_a -	_a -	_a -	_b 15	-	-	.28
F	<i>Trifolium gymnocarpon</i>	-	-	3	5	-	.03	.01
F	<i>Viguiera multiflora</i>	3	-	-	-	-	-	-
F	<i>Zigadenus elegans</i>	_a -	_a 3	_a -	_b 11	.00	-	.06
Total for Annual Forbs		11	97	9	76	0.66	0.07	0.23
Total for Perennial Forbs		959	881	410	801	8.54	7.45	16.47
Total for Forbs		970	978	419	877	9.20	7.52	16.70

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

BROWSE TRENDS --

Management unit 09 , Study no: 18

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Amelanchier utahensis</i>	48	51	53	6.88	6.53	6.52
B	<i>Artemisia frigida</i>	0	0	1	-	-	-
B	<i>Artemisia nova</i>	43	35	38	4.39	3.34	4.17
B	<i>Artemisia tridentata vaseyana</i>	64	67	58	8.00	6.43	5.02
B	<i>Chrysothamnus depressus</i>	4	5	3	.06	.16	.18
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	57	44	46	2.43	1.68	2.28
B	<i>Echinocereus</i> sp.	2	1	0	.01	.03	-
B	<i>Eriogonum corymbosum</i>	1	0	1	.15	-	.03
B	<i>Gutierrezia sarothrae</i>	17	17	25	.18	.16	1.27
B	<i>Mahonia repens</i>	1	1	2	.18	-	.18
B	<i>Pediocactus simpsonii</i>	0	0	4	-	-	.04
B	<i>Purshia tridentata</i>	19	16	17	2.84	3.32	2.61
B	<i>Quercus gambelii</i>	0	1	0	-	-	-
B	<i>Ribes cereum cereum</i>	1	0	1	.03	-	.63
B	<i>Symphoricarpos oreophilus</i>	63	70	70	11.79	10.39	12.44
B	<i>Tetradymia canescens</i>	5	3	5	.03	.00	.06
Total for Browse		325	311	324	36.99	32.08	35.47

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 18

Species	Percent Cover
	'05
<i>Amelanchier utahensis</i>	10.48
<i>Artemisia frigida</i>	.01
<i>Artemisia nova</i>	4.80
<i>Artemisia tridentata vaseyana</i>	5.44
<i>Chrysothamnus viscidiflorus lanceolatus</i>	3.45
<i>Eriogonum corymbosum</i>	.05
<i>Gutierrezia sarothrae</i>	1.63
<i>Purshia tridentata</i>	4.30
<i>Ribes cereum cereum</i>	.36
<i>Symphoricarpos oreophilus</i>	20.91

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 09 , Study no: 18

Species	Average leader growth (in)
	'05
Amelanchier utahensis	2.2
Artemisia tridentata vaseyana	1.9
Purshia tridentata	1.6

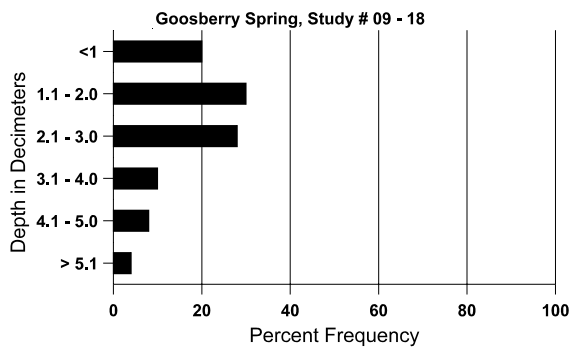
BASIC COVER --
Management unit 09 , Study no: 18

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	8.50	13.00	50.28	48.70	62.87
Rock	6.50	9.00	11.72	12.62	9.74
Pavement	2.25	4.50	.95	2.19	1.36
Litter	54.75	57.00	48.87	47.49	28.22
Cryptogams	1.75	0	.01	.16	.10
Bare Ground	25.50	16.50	7.05	14.61	12.23

SOIL ANALYSIS DATA --
Herd Unit 09, Study # 18, Study Name: Gooseberry Spring

Effective rooting depth (in)	Temp °F (depth)	pH	% sand	% silt	% clay	%OM	ppm P	ppm K	dS/m
14.6	52.0 (11.5)	7.0	37.9	20.8	41.3	2.2	4.8	240.0	0.8

Stoniness Index



PELLET GROUP DATA --
 Management unit 09 , Study no: 18

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	2	-	7
Elk	20	10	17
Deer	12	7	18
Cattle	4	1	3

Days use per acre (ha)	
'00	'05
-	-
48 (117)	44 (107)
17 (41)	43 (106)
7 (18)	10 (25)

BROWSE CHARACTERISTICS --
 Management unit 09 , Study no: 18

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
82	2133	133	400	1533	200	-	31	56	9	-	3	45/18
88	3265	1666	2266	733	266	-	31	18	8	-	8	47/31
95	1240	40	320	900	20	20	27	21	2	-	0	35/41
00	1380	80	260	980	140	20	26	35	10	6	6	33/34
05	1380	20	240	940	200	20	16	74	14	7	9	43/43
<i>Artemisia frigida</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	40	-	-	40	-	-	0	0	-	-	0	7/9
<i>Artemisia nova</i>												
82	1933	-	800	933	200	-	45	7	10	-	10	12/15
88	1798	66	866	666	266	-	30	0	15	2	11	9/14
95	4360	200	1200	2900	260	260	47	6	6	5	5	10/21
00	2900	200	40	2580	280	100	3	.68	10	3	3	12/20
05	3220	460	720	1920	580	300	3	0	18	10	11	10/17
<i>Artemisia tridentata vaseyana</i>												
82	3533	-	533	2200	800	-	38	13	23	.56	26	18/16
88	3066	-	400	1866	800	-	22	2	26	-	9	18/14
95	2420	-	140	2080	200	60	60	8	8	4	9	21/29
00	2360	60	300	1820	240	240	18	4	10	3	24	21/27
05	1640	220	180	800	660	440	39	15	40	26	26	21/32

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus												
82	533	-	-	533	-	-	0	100	-	-	38	2/6
88	532	-	466	66	-	-	0	0	-	-	0	4/5
95	100	-	60	40	-	-	0	0	-	-	0	6/12
00	180	-	20	160	-	-	0	0	-	-	0	4/9
05	220	-	-	220	-	-	18	0	-	-	0	3/7
Chrysothamnus viscidiflorus lanceolatus												
82	4266	-	466	3800	-	-	22	61	0	-	22	8/12
88	6798	66	4666	2066	66	-	.98	0	1	-	.98	10/12
95	3220	-	540	2680	-	-	1	0	0	-	0	12/13
00	2160	-	640	1440	80	-	5	6	4	-	0	9/10
05	2240	-	180	2020	40	-	0	0	2	.89	.89	11/14
Echinocereus sp.												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	20	20	-	-	0	0	-	-	0	2/4
00	20	-	20	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Eriogonum corymbosum												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	-	40	-	-	0	0	-	-	0	7/12
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	7/6
Gutierrezia sarothrae												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	580	-	140	440	-	-	0	0	-	-	0	8/10
00	1040	-	40	1000	-	20	0	0	-	-	0	4/5
05	2120	-	340	1780	-	-	0	0	-	-	0	7/9
Mahonia repens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	-	40	-	-	0	0	-	-	0	5/6
00	60	-	-	60	-	-	0	0	-	-	0	-/-
05	200	-	-	200	-	-	0	0	-	-	0	4/5

		Age class distribution (plants per acre)					Utilization						
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)	
Pediocactus simpsonii													
82	0	-	-	-	-	-	0	0	-	-	0	-/-	
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	0	-	-	-	-	-	0	0	-	-	0	-/-	
05	160	-	-	160	-	-	0	0	-	-	0	1/2	
Purshia tridentata													
82	333	-	-	333	-	-	0	100	0	-	0	13/19	
88	399	-	133	266	-	-	33	67	0	-	0	17/23	
95	520	-	20	480	20	-	62	4	4	-	0	16/38	
00	420	-	40	380	-	-	24	24	0	-	0	19/41	
05	520	-	-	480	40	-	4	96	8	-	0	22/51	
Quercus gambelii													
82	0	-	-	-	-	-	0	0	-	-	0	-/-	
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	80	-	-	80	-	-	0	0	-	-	0	-/-	
05	0	-	-	-	-	-	0	0	-	-	0	-/-	
Ribes cereum cereum													
82	0	-	-	-	-	-	0	0	-	-	0	-/-	
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	20	-	-	20	-	-	0	0	-	-	0	29/52	
00	0	-	-	-	-	-	0	0	-	-	0	-/-	
05	20	-	-	20	-	-	0	0	-	-	0	39/47	
Symphoricarpos oreophilus													
82	14133	400	3933	10000	200	-	30	4	1	-	3	19/23	
88	14065	2266	9266	4666	133	-	5	.47	1	-	3	18/17	
95	4400	20	1840	2560	-	-	20	5	0	-	0	16/28	
00	4240	220	780	3460	-	20	.94	0	0	-	0	15/32	
05	4720	-	580	4060	80	-	0	0	2	1	1	15/28	
Tetradymia canescens													
82	66	-	66	-	-	-	0	100	-	-	0	-/-	
88	666	-	466	200	-	-	10	0	-	-	0	4/3	
95	240	-	100	140	-	-	0	0	-	-	0	9/8	
00	60	-	40	20	-	-	0	33	-	-	0	6/6	
05	140	-	100	40	-	-	14	0	-	-	0	8/10	

Trend Study 9-19-05

Study site name: Mosby Mountain South.

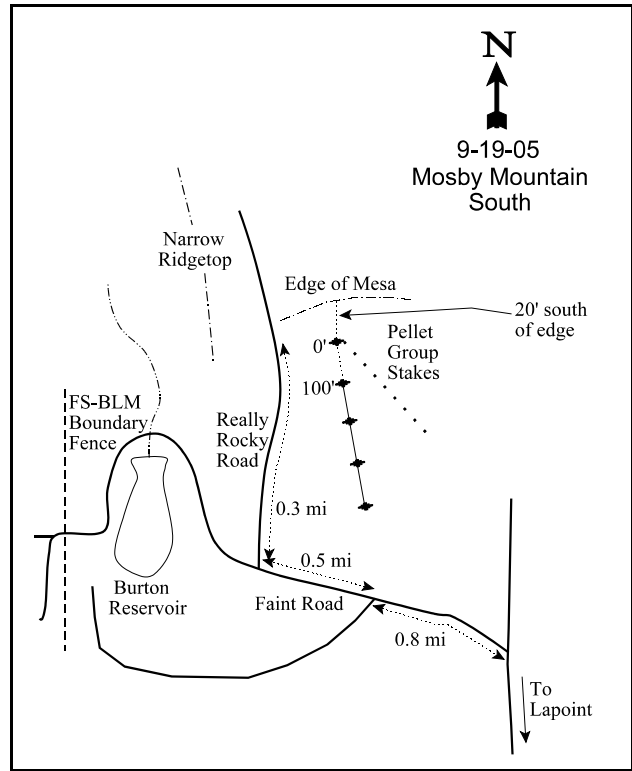
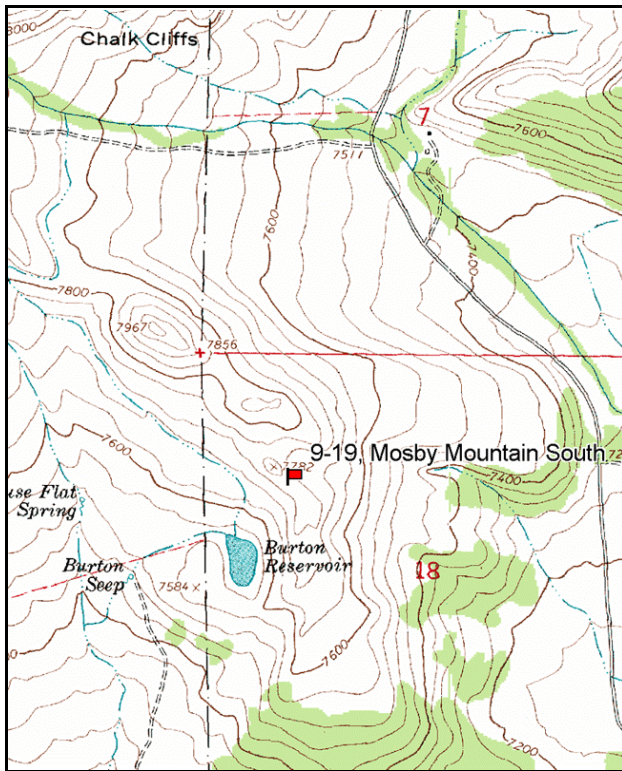
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 167 degrees magnetic.

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

LOCATION DESCRIPTION

Just east of Lapoint, turn north onto Paradise Park Rd from highway 121. Go 6.9 miles to a fork, keep left toward Mosby Mountain. Proceed 4.8 miles and turn left onto a dirt road heading west. Go 0.15 miles to a 3-way intersection, bear left on the main road. Continue 0.45 miles to a fork, stay left. Go 0.2 miles to another fork, stay to the right. Go 0.5 miles to an intersection on the ridge above Burton Reservoir. Drive 0.25 miles north on a very rocky road to the study site. A tall, bent, and twisted fencepost is the 0-foot baseline stake. It is marked by browse tag #7870. The frequency baseline stakes are short green fenceposts.



Map Name: Lake Mountain

Diagrammatic Sketch

Township 3S Range 19E, Section 18

GPS: NAD 27, UTM 12T 4490149 N, 598273 E

DISCUSSION

Mosby Mountain South - Trend Study No. 9-19

The Mosby Mountain South study was established in 1988 on BLM land and is located on a narrow ridge top which drops off sharply to Burton Reservoir on the west. To the east is a sagebrush and pinyon-juniper valley. The slope is gentle (2-3%) with a southeast aspect at an elevation of 7,600 feet. A large fire burned the entire area after the initial reading in 1988 and the majority of the sagebrush was eradicated. Springs are common in the area and most have been developed for cattle. According to Forest Service personnel, the area between this study and study #9-14 (Red Pine Canyon) is an important wintering area for several hundred elk. A pellet group transect from 2000 estimated 15 elk, 7 deer, and 9 cow days use/acre (36 edu/ha, 17ddu/ha, and 22cdu/ha). Sage grouse abundance was indicated by 35 pellet groups/acre (86 pellet groups/ha) and evidence of sage grouse was observed during transect establishment. Pellet group data from 2005 estimated 4 elk, 22 deer, and 22 cow days use/acre (10 edu/ha, 55 ddu/ha, and 54 cdu/ha). Sage grouse abundance was estimated with 52 pellet groups/acre (129 pellets/ha). The BLM manages this land as the Mosby allotment and cattle were on the site in 2000, however it was noted that most of the cattle were distributed close to the reservoir about ½ mile away.

The soil is very rocky and has a sandy loam texture. The soil reaction is neutral (pH of 6.6). Phosphorus was measured at 19.6, values less than 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Rocks of all sizes are distributed throughout the soil profile and continuously over the surface. They are cobble type rocks from alluvial deposits from the Uinta mountains. Effective rooting depth is estimated at about 7 inches due to the rocky profile. However, the presence of deep rooted shrubs suggest that roots are able to penetrate down through the rock to deeper levels. Rock cover was moderately high in 1988 at 17%, but increased after the fire to 26% in 1995 and has changed very little since then. There was a considerable amount of litter cover (67%) in addition to the extensive shrub cover in 1988, providing good soil protection. Litter cover declined after the fire to 46% in 1995 and has continued to decrease from 37% in 2000 to 21% in 2005. The erosion condition class determined soil movement as stable in 2005.

Mountain big sagebrush is the dominant shrub and estimated 7,533 plants/acre in 1988. After the fire in 1988, the population has stabilized around 1,320 plants/acre for the last 10 years. Percent decadency was high in 1988 and 1995 (34% and 30%), but decreased to 5% in 2000 and then up to 14% by 2005. Seedling production and young recruitment have fluctuated from year to year. Utilization has decreased in recent years. In 1995, utilization was considered moderate, but has been estimated at only light to moderate use since. Vigor has been good during all sample years and average annual leader growth was estimated at 3 inches in 2000 and 2 inches in 2005. Black sagebrush was abundant in 1988 prior to the fire with an estimated 2,866 plants/acre. Following the fire, density was estimated at 240 plants/acre in 1995, 120 in 2000, and 180 in 2005. Utilization is much like mountain big sagebrush, in that moderate to heavy use was recorded in 1995 and 2000, but decreased in 2005 to light to moderate use.

Bitterbrush and serviceberry are scattered throughout the area in relatively lower densities. Bitterbrush is slightly more abundant than serviceberry and has continued to increase since the fire. In 1995, density was estimated at 320 plants/acre. By 2005, density had increased to 420 plants/acre. Utilization has been heavy with good vigor during all sampling years. Serviceberry density has averaged 200 plants/acre since the fire and also has received moderate to heavy use in all sampling years.

In 1995, a substantial amount of cheatgrass was reported in the understory. Cheatgrass had the highest nested frequency of any species in 1995 and accounted for 21% of the grass cover. Drought conditions in 2000 reduced cheatgrass to almost 0% and was only sampled in 2 quadrats. Above normal precipitation in 2005 returned cheatgrass to 1995 levels. Perennial grasses consist of a mix of native and seeded species which include: several wheatgrass's (crested, thickspike, intermediate, and bluebunch); needle-and-thread;

squirreltail; Kentucky and mutton bluegrass; and a sedge species. Crested wheatgrass and needle-and-thread are the dominant species. Bluebunch wheatgrass and squirreltail, both native, increased significantly in nested frequency. Perennial grasses increased to an all-time high in sum of nested frequency in 2005 after a drop in 2000. Utilization was moderate to heavy on most species in 2000 and 2005. Perennial forbs are moderately diverse, but only hairy goldaster and silver lupine are common. These two species provided between 86-95% of the total forb cover since 1995. Annual forbs are small and infrequent, especially in 2000 when conditions were very dry.

1995 TREND ASSESSMENT

The soil trend is stable. Litter cover declined due to the fire but there is still adequate soil protection. Currently, percent bare ground is only 4%. The browse trend is down with reduced densities of all species encountered in 1988. The key species, mountain big sagebrush, declined in density and has a moderately high rate of decadency (34%). This species is not tolerant of fire, as some of the other species are. Recruitment is also poor with no seedlings encountered and estimated only 140 young plants/acre. Vigor was good on most other browse, with the density expected to eventually increase in time. Trend for the preferred bitterbrush was slightly up due to a relatively abundant mature population, low decadency, reduced heavy use, and more tolerance of the fire. Trend for the herbaceous understory is up with increased sum of nested frequency for both grasses and forbs. The Desirable Components Index rated this site as fair with a score of 56 due to moderate browse cover, low decadence, and excellent perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - up (+2)

winter range condition (DC Index) - Fair (56) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable. Percent relative bare soil increased slightly from 3% to 8%, while litter cover decreased from 46% to 37% in 2000. Rock cover remains moderately high at 26%. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil decreased. Trend for browse is stable. All of the preferred browse species show stable to slightly increasing populations in 2000. Recruitment is low for all species except bitterbrush, but all species show low and improving decadency rates and good vigor. Trend for the herbaceous understory is slightly down. Sum of nested frequency for perennial grasses as a group decreased in 2000, but the dominant species, crested wheatgrass and needle-and-thread, remained at fairly stable frequencies. Also, cheatgrass was nearly non-existent in 2000 due to drought. Sum of nested frequency of perennial forbs slightly increased with drought in 2000 which offset some of the losses of the grasses but not enough to keep from a change in trend slightly downward. The Desirable Components Index rated this site as good with a score of 69 due to increased browse cover, low decadence, and excellent perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Good (69) Mid-level Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has remained similar to previous levels. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil has remained similar to 2000. Litter continues to decrease, but with higher vegetative cover this year, it should be higher. Trend for key browse mountain big sagebrush is stable. Density has changed very little, although percent decadency increased from 5% to 14%. It still remains within reasonable limits. Utilization remains light to moderate and seedlings were fairly abundant. Serviceberry and bitterbrush both have stable densities and utilization is moderate to heavy with good vigor. Trend for herbaceous understory is up. Perennial grasses sum of nested frequency increased by 44% and perennial forbs remained steady, but only contribute to about 34% of the total herbaceous cover. Cheatgrass returned to similar nested frequency values as before the drought. The Desirable Components Index rated this site as good with a score of 73 due to moderate browse cover, low decadence, and excellent perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - up (+2)

winter range condition (DC Index) - Good (73) Mid-level Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 19

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	a ⁻	b ¹⁴⁴	b ¹⁵⁹	b ¹⁷⁵	3.26	5.83	6.80
G	Agropyron dasystachyum	a ⁻	b ⁷⁴	a ⁴	b ⁴⁸	1.99	.04	.56
G	Agropyron intermedium	a ⁻	b ³²	a ²	a ¹³	.32	.00	.31
G	Agropyron spicatum	c ⁹³	ab ³¹	a ¹⁶	b ⁵⁶	.61	.36	2.08
G	Bouteloua gracilis	b ²⁷	a ³	a ⁻	a ⁻	.03	-	-
G	Bromus japonicus (a)	-	-	-	2	-	-	.00
G	Bromus tectorum (a)	-	c ²⁹⁸	a ⁵	b ²³⁹	3.60	.03	3.37
G	Carex sp.	7	9	11	7	.02	.10	.06
G	Festuca ovina	-	-	-	3	-	-	.03
G	Koeleria cristata	-	-	-	7	-	-	.36
G	Oryzopsis hymenoides	-	-	-	-	-	-	.00
G	Poa fendleriana	a ⁻	ab ⁴	b ²²	c ⁴³	.03	.30	1.29
G	Poa pratensis	ab ²⁵	b ⁴⁰	a ⁵	a ⁵	.88	.18	.06
G	Poa secunda	b ⁶⁶	a ²	a ¹⁸	a ⁵	.00	.30	.04
G	Sitanion hystrix	c ¹⁵⁵	a ⁴⁰	a ¹⁸	b ⁹⁸	.31	.51	2.39
G	Sporobolus cryptandrus	-	2	7	-	.00	.04	-
G	Stipa comata	a ³¹	b ¹⁸¹	b ²⁰⁵	b ²¹¹	5.77	11.26	8.69
Total for Annual Grasses		0	298	5	241	3.60	0.03	3.38
Total for Perennial Grasses		404	562	467	671	13.25	18.95	22.70

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
	Total for Grasses	404	860	472	912	16.86	18.99	26.08
F	Agoseris glauca	-	-	-	6	-	-	.03
F	Allium sp.	a-	a5	a-	b19	.01	-	.07
F	Arabis sp.	ab7	a3	a2	b13	.00	.03	.08
F	Artemisia ludoviciana	-	-	3	-	-	.15	-
F	Astragalus purshii	8	-	-	-	-	-	-
F	Aster sp.	a-	ab4	b10	a-	.01	.10	-
F	Balsamorhiza hookeri	-	3	-	1	.04	-	.15
F	Castilleja linariaefolia	-	-	-	2	-	-	.03
F	Chenopodium leptophyllum(a)	-	b14	a-	a-	.02	-	-
F	Collomia linearis (a)	-	c29	a-	b9	.07	-	.02
F	Comandra pallida	3	-	1	4	-	.03	.03
F	Collinsia parviflora (a)	-	a8	a2	b30	.01	.00	.13
F	Cryptantha sp.	-	1	-	-	.00	-	-
F	Cymopterus sp.	-	-	-	3	-	-	.03
F	Descurainia pinnata (a)	-	8	-	-	.01	-	-
F	Draba sp. (a)	-	1	-	6	.03	-	.01
F	Erigeron divergens	-	-	-	7	-	-	.12
F	Erigeron eatonii	-	-	-	1	-	-	.00
F	Erigeron flagellaris	-	1	2	2	.03	.03	.03
F	Eriogonum racemosum	b25	ab6	a3	ab9	.16	.06	.10
F	Heterotheca villosa	a18	b142	c171	bc143	4.69	6.92	7.59
F	Hymenoxys acaulis	2	1	-	-	.00	-	-
F	Lappula occidentalis (a)	-	3	-	1	.01	-	.00
F	Lepidium densiflorum (a)	-	b44	a2	a7	.15	.03	.02
F	Lithospermum sp.	-	-	4	-	-	.01	-
F	Lomatium sp.	-	-	-	6	-	-	.09
F	Lupinus argenteus	a13	b41	c72	b37	1.75	2.72	3.26
F	Machaeranthera grindelioides	-	-	-	1	-	-	.03
F	Oenothera pallida	1	-	-	-	-	-	-
F	Penstemon sp.	5	5	-	4	.04	-	.06
F	Petradoria pumila	8	3	-	4	.15	-	.06
F	Phlox longifolia	9	-	-	-	-	-	-
F	Polygonum douglasii (a)	-	c29	a-	b10	.07	-	.02
F	Sedum lanceolatum	1	-	-	-	-	-	-
F	Senecio multilobatus	1	4	8	3	.01	.06	.06

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Sphaeralcea coccinea</i>	5	11	2	11	.09	.01	.08
F	<i>Taraxacum officinale</i>	-	3	-	3	.01	-	.03
F	<i>Tragopogon dubius</i>	_a -	_b 10	_a -	_a 1	.06	-	.01
Total for Annual Forbs		0	136	4	63	0.39	0.03	0.22
Total for Perennial Forbs		106	243	278	280	7.09	10.14	12.00
Total for Forbs		106	379	282	343	7.49	10.18	12.23

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

BROWSE TRENDS --

Management unit 09 , Study no: 19

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Amelanchier utahensis</i>	10	11	8	1.94	2.63	3.87
B	<i>Artemisia nova</i>	7	4	5	.18	.03	.53
B	<i>Artemisia tridentata vaseyana</i>	33	34	43	2.27	3.00	6.06
B	<i>Ceanothus fendleri</i>	0	0	1	-	-	-
B	<i>Chrysothamnus nauseosus graveolens</i>	0	0	0	-	.03	-
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	3	0	2	.15	-	-
B	<i>Eriogonum heracleoides</i>	3	6	4	.66	.41	.38
B	<i>Gutierrezia sarothrae</i>	12	23	32	.31	.63	.76
B	<i>Opuntia sp.</i>	19	24	38	.41	.41	.49
B	<i>Pediocactus simpsonii</i>	6	3	1	.45	.03	.03
B	<i>Purshia tridentata</i>	14	19	18	1.16	2.05	1.81
Total for Browse		107	124	152	7.55	9.25	13.94

CANOPY COVER, LINE INTERCEPT --
Management unit 09 , Study no: 19

Species	Percent Cover
	'05
Amelanchier utahensis	4.46
Artemisia nova	.26
Artemisia tridentata vaseyana	7.01
Eriogonum heracleoides	.13
Gutierrezia sarothrae	1.31
Opuntia sp.	.43
Purshia tridentata	2.41

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 09 , Study no: 19

Species	Average leader growth (in)
	'05
Amelanchier utahensis	3.5
Artemisia tridentata vaseyana	1.9
Purshia tridentata	2.7

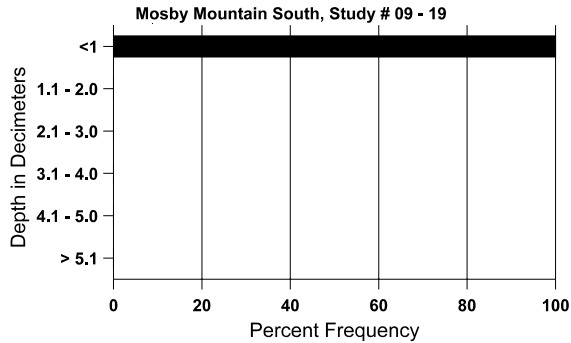
BASIC COVER --
Management unit 09 , Study no: 19

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	7.50	40.06	42.06	50.70
Rock	16.50	26.87	26.17	30.12
Pavement	1.00	2.96	5.90	3.72
Litter	67.00	46.25	37.31	20.71
Cryptogams	0	.12	.15	.01
Bare Ground	8.00	3.95	10.04	7.76

SOIL ANALYSIS DATA --
Herd Unit 09, Study # 19, Study Name: Mosby Mountain South

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
6.8	67.4 (8.7)	6.6	72.0	13.4	14.6	8.0	19.6	208.0	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 19

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	3	13	42
Grouse	-	1	4
Elk	30	12	10
Deer	19	6	16
Cattle	1	7	10

Days use per acre (ha)	
'00	'05
-	-
35/acre	53/acre
15 (37)	4 (10)
7 (17)	22 (55)
9 (22)	22 (54)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 19

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	600	-	600	-	-	-	22	67	-	-	44	-/-
95	220	-	-	220	-	40	64	18	-	-	9	25/34
00	220	-	-	220	-	20	45	18	-	-	0	27/47
05	180	-	20	160	-	-	44	44	-	-	0	31/57
Artemisia nova												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	2866	200	1000	266	1600	-	47	5	56	.69	5	12/20
95	240	-	40	160	40	-	67	33	17	-	0	7/18
00	120	-	-	120	-	-	17	33	0	-	0	18/28
05	180	-	-	160	20	-	11	0	11	11	11	11/21

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	7533	200	2400	2600	2533	-	47	4	34	.26	2	14/21
95	1380	-	140	820	420	900	72	3	30	1	1	10/16
00	1280	60	-	1220	60	60	36	5	5	2	2	14/23
05	1320	440	140	1000	180	60	29	3	14	6	6	18/32
<i>Ceanothus fendleri</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	9/31
00	0	-	-	-	-	-	0	0	-	-	0	10/41
05	20	-	-	20	-	-	0	0	-	-	0	6/10
<i>Chrysothamnus nauseosus graveolens</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	24/24
00	0	-	-	-	-	-	0	0	-	-	0	27/41
05	0	-	-	-	-	-	0	0	-	-	0	26/36
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	60	-	-	60	-	-	0	0	0	-	0	12/17
00	0	-	-	-	-	-	0	0	0	-	0	7/17
05	40	-	-	20	20	-	0	0	50	-	0	10/13
<i>Eriogonum heracleoides</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	140	-	-	140	-	-	0	0	-	-	0	5/22
00	180	-	-	180	-	-	11	0	-	-	0	3/17
05	100	-	-	100	-	-	0	0	-	-	0	3/22
<i>Gutierrezia sarothrae</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	1999	-	-	1933	66	-	0	0	3	-	0	6/6
95	440	40	20	420	-	-	0	0	0	-	0	7/9
00	1980	-	-	1980	-	-	0	0	0	-	0	6/8
05	1860	-	20	1780	60	20	1	0	3	1	1	8/9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	1732	600	1666	66	-	-	0	0	0	-	8	2/10
95	580	-	140	440	-	-	0	0	0	-	0	3/10
00	800	-	60	720	20	-	0	0	3	-	0	2/10
05	1220	-	360	780	80	-	0	0	7	3	3	2/9
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	120	-	40	80	-	-	0	0	-	-	0	2/3
00	60	-	-	60	-	-	0	0	-	-	0	1/3
05	20	-	-	20	-	-	0	0	-	-	0	2/2
Purshia tridentata												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	466	-	133	333	-	-	0	86	-	-	0	12/43
95	320	20	20	300	-	-	44	44	-	-	0	7/26
00	380	-	80	300	-	-	11	84	-	-	0	7/33
05	420	-	-	420	-	-	5	95	-	-	0	9/39

Trend Study 9-20-05

Study site name: Seep Hollow .

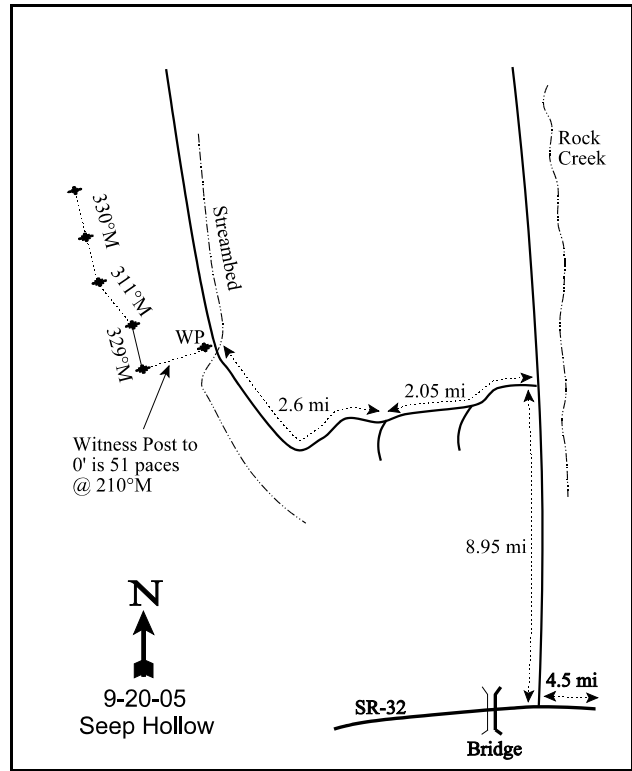
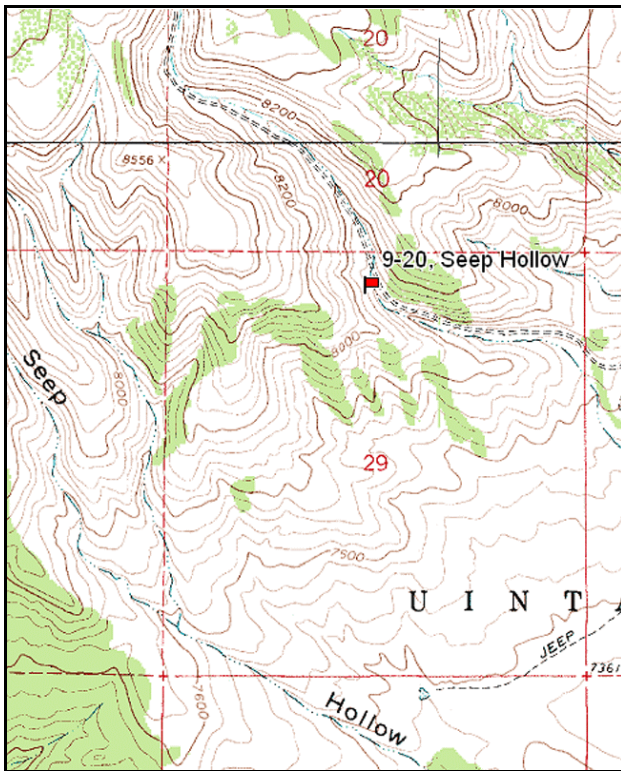
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 329 degrees magnetic.

Frequency belt placement: line 1 (7 & 86ft), line 2 (25ft), line 3 (59ft), line 4 (39ft). No rebar marking belt placement.

LOCATION DESCRIPTION

From highway SR 87, turn west onto highway SR 32 and travel 3.4 miles to Rock Creek Road, which is just east of mile marker 59 and the bridge over the Duchesne River. Turn right (north) onto Rock Creek Road and go north for 8.95 miles to a road on the left. Turn and travel west 2.05 miles to a fork. Bear right and proceed 2.6 miles to a streambed. From the intersection of the road and the streambed, the 0-foot baseline stake is 51 paces away at the heading of 210°M. The frequency baseline stakes are marked by green fenceposts 12-18 inches in height.



Map Name: Blacktail Mountain

Diagrammatic Sketch

Township 1S, Range 6W, Section 29

GPS: NAD 27, UTM 12T 4468681 N, 535104 E

DISCUSSION

Seep Hollow - Trend Study No. 9-20

The Seep Hollow trend study was established in 1982 and samples a mountain brush community. The land is owned by the Ute Indian Tribe and is on deer and elk winter range in the Seep Hollow-Dry Mountain Hollow area. Elevation is slightly below 8,000 feet on a northeast exposure with a steep slope of 50% to 60%. The site may not be accessible to wildlife during severe winters. Pellet group data from 2000 estimated 44 deer and 15 elk days use/acre (107 ddu/ha and 36 edu/ha). Pellet group data from 2005 estimated 92 deer and 54 elk days use/acre (227 ddu/ha and 134 edu/ha).

Soils are sandy loam in texture and very rocky on the surface and throughout the profile. Rocks range in size from a few inches to more than a foot in diameter. Due to the rockiness of the site, effective rooting depth is estimated at only 8 inches. Excluding rock cover, litter and vegetation cover are excellent and considering steepness of the slope, erosion is minimal. Bare ground is quite low at about 10% of the ground surface. The erosion condition class determined soil movement as stable in 2005.

Browse species are dominant and have provided over half of the total vegetation cover since 1995. Key species include: serviceberry, mountain big sagebrush, true mountain mahogany, and bitterbrush. Serviceberry density has increased during every sampling year since 1988 and has averaged 11% cover. In 2005, the population was estimated at 1,920 plants/acre. Young recruitment has been high during every year sampled, 30% of the population in 1995, 40% in 2000, and 44% in 2005. The average height is 4 feet and the crown is roughly the same. A small portion of the mature serviceberry were classified as unavailable to deer due to its height. Percent decadence has been low with vigor good during all years sampled. Utilization has been light to moderate since the site was established.

Mountain big sagebrush density has remained fairly stable until 2005, when it decreased from 2,340 plants/acre in 2000 to 1,600 in 2005. The percent of plants classified as dying increased from 5% in 2000 to 33% in 2005. Percent decadence has been moderate (22% on average) in preceding years, but in 2005 just under half the population was classified as decadent. Severe drought conditions were observed from 2000 to 2003 and other sagebrush stands in this herd unit have had similar decreases in sagebrush density. Seedlings were observed in low numbers, but it appears this population is becoming very mature with limited reproduction. Utilization is light to moderate with a few plants showing heavy use.

True mountain mahogany density have fluctuated slightly with changes in young recruitment. Population density estimated 680 plants/acre in 1995, 500 in 2000, and reached a high of 700 in 2005. Plants averaged 3.5 feet high and 4 feet wide with some plants only partially available to wildlife. Utilization has been moderate to heavy with good vigor. Percent decadency increased from 4% in 2000 to 26% in 2005. Young recruitment has been good and accounted for 24% of the population in 1995, 8% in 2000, and 14% in 2005. Bitterbrush density has steadily increased since 1982 with an estimated 840 plants/acre in 2005. The population is predominately mature with only a few young or decadent plants. Utilization is moderate to heavy with good vigor. Plants display a prostrate growth form.

The herbaceous understory is dominated by perennial grasses. Bluebunch wheatgrass, needle-and-thread, and mutton bluegrass are the most common. Bluebunch wheatgrass sum of nested frequency increased significantly in 2005, while mutton bluegrass decreased significantly. Other species that occur less frequently include: thickspike wheatgrass, a sedge species, Sandberg bluegrass, and squirreltail. Cheatgrass sum of nested frequency increased significantly in 2005, but still remains fairly uncommon with a low quadrat frequency. Forbs are somewhat diverse, but relatively scarce. The most common forbs include: biscuitroot, littleflower collinsia, and tapertip hawksbeard. Perennial forb sum of nested frequency increased by 44% in 2005 because of above normal precipitation. Annual forbs were almost non-existent in 2000, but returned in 2005 to 1995 levels with increased precipitation levels.

1982 APPARENT TREND ASSESSMENT

Soil and vegetative trend both appear stable. Although the site is on a steep slope, a good vegetative and litter cover helps limit soil loss. The browse component is in generally good condition and does not suffer from heavy use. A reasonable management objective might be to encourage expansion of true mountain mahogany and antelope bitterbrush. Hopefully, this could be achieved at the expense of low rabbitbrush and pricklypear.

1988 TREND ASSESSMENT

On this steep slope, ground cover is especially important for soil protection. Distribution of ground cover is almost unchanged from 1982 and currently soil erosion is not a problem. The community is basically stable, but data comparisons between readings in 1982 and 1988 do indicate a few significant changes. There was a rather large decrease in the number of snowberry encountered on the density plots, but the other large browse species have remained fairly stable. Mountain big sagebrush appears to be more moderately hedged in recent years, in contrast to the lightly hedged growth form reported in 1982. Still, the key browse species have good vigor and adequate recruitment. In the understory, there has been an increase in the frequency and density of western wheatgrass. A decrease in forb density was noted, along with an increase in the number of several small shrubs such as slenderbush eriogonum, Oregon grape, low rabbitbrush and pricklypear cactus.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

1995 TREND ASSESSMENT

Trend for soil is slightly improved with a decline in percent bare ground from about 14% to almost 4%. Nested frequency of grasses and forbs also increased providing additional soil protection. Trend for key browse species is improving slightly for serviceberry, true mountain mahogany, bitterbrush, and snowberry. However, the trend is stable for the most abundant shrub, mountain big sagebrush which provides 27% of the browse cover. The population of sagebrush is becoming increasingly mature with no seedlings and few young observed. Density of the less desirable shrubs like mountain low rabbitbrush and wyeth eriogonum appear stable. Trend for the herbaceous understory is up with increased sum of nested frequency for perennial grasses and forbs. The 4 most abundant grasses all increased in nested frequency since 1988. The Desirable Components Index rated this site as good with a score of 85 due to excellent browse cover, low decadence, high young recruitment, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - slightly up (+1)

herbaceous understory - up (+2)

winter range condition (DC Index) - Good (85) High Potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable even though there has been some slight changes. Erosion remains minimal due to good protective cover from vegetation and litter. Percent bare soil increased slightly, yet relative value is still only at 7%. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil decreased slightly from 6.5:1 to 5.3:1. Trend for browse is stable overall. The preferred species: serviceberry, true mountain mahogany, and bitterbrush show stable trends with good vigor, low decadency and acceptable levels of use. Mountain big sagebrush shows a slightly downward trend with increased decadency from 14%

to 26%, increased poor vigor from 6% to 28% and low recruitment. These downward parameters are drought related and should improve with better precipitation in the future. Trend for the herbaceous understory is slightly down as sum of nested frequency of perennial grasses and forbs decreased in 2000 due to drought. The Desirable Components Index rated this site as good to excellent with a score of 89 due to excellent browse cover, low decadence, high young recruitment, and excellent perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Good to Excellent (89) High Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Bare ground, litter, rock, and vegetation have all remained similar to 2000 values. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil remained good at 5:1. Trend for key browse species overall is slightly up. The preferred species: serviceberry, true mountain mahogany, and bitterbrush all show upward trends with increased density and good young recruitment. Mountain big sagebrush is down. Density decreased by 32% and percent decadency reached a high of 45%. Young recruitment is low and 33% of the population was classified as dying. Trend for the herbaceous understory is slightly up. Perennial grasses sum of nested frequency improved slightly, while perennial forbs increased by 48%. Forbs species richness was high at 32 species and seems to fluctuate with available moisture. The Desirable Components Index rated this site as excellent with a score of 93 due to excellent browse cover, low decadence, high young recruitment, and excellent perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly up (-1)

winter range condition (DC Index) - Excellent (93) High Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 20

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	b ₈₂	b ₆₆	a ₂₂	a ₂₀	.93	.19	.14
G	Agropyron spicatum	ab ₁₅₇	ab ₁₆₀	a ₁₂₂	b ₂₀₂	2.94	4.10	6.57
G	Bromus tectorum (a)	a ₋	a ₁₄	a ₂	b ₃₈	.08	.00	.36
G	Carex sp.	a ₂₁	b ₅₈	a ₃₂	a ₂₈	1.12	.96	.41
G	Koeleria cristata	9	2	9	2	.04	.36	.03
G	Oryzopsis hymenoides	b ₁₃	ab ₁	ab ₁	a ₋	.03	.03	-
G	Poa fendleriana	b ₁₂₂	b ₁₂₄	b ₁₄₂	a ₇₂	2.27	4.82	2.38
G	Poa secunda	a ₁₅	ab ₂₃	ab ₃₅	b ₅₂	.48	.51	.96
G	Sitanion hystrix	-	11	5	5	.08	.03	.19
G	Stipa comata	68	119	109	116	4.09	5.21	4.32

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
	Total for Annual Grasses	0	14	2	38	0.07	0.00	0.36
	Total for Perennial Grasses	487	564	477	497	12.01	16.23	15.02
	Total for Grasses	487	578	479	535	12.09	16.24	15.38
F	Allium sp.	-	3	-	3	.00	-	.01
F	Antennaria rosea	-	11	4	7	.07	.06	.04
F	Arabis sp.	ab ²	a ⁻	a ⁻	b ¹⁰	-	-	.07
F	Artemisia ludoviciana	-	4	3	3	.18	.15	.15
F	Astragalus sp.	-	5	1	3	.01	.00	.00
F	Balsamorhiza sagittata	-	1	2	2	.15	.03	.53
F	Castilleja linariaefolia	b ¹⁷	ab ⁵	b ¹³	a ⁻	.06	.52	-
F	Calochortus nuttallii	a ⁻	b ¹³	a ⁻	b ¹⁸	.04	-	.05
F	Chenopodium leptophyllum(a)	-	2	-	-	.01	-	-
F	Cirsium sp.	7	7	2	3	.21	.15	.01
F	Collomia linearis (a)	-	b ¹¹⁹	a ⁻	b ¹¹⁹	.62	-	.40
F	Comandra pallida	34	29	28	22	.21	.26	.13
F	Collinsia parviflora (a)	-	b ²⁴⁴	a ¹²	b ²²⁷	1.53	.04	1.94
F	Crepis acuminata	a ⁻	bc ¹⁹	ab ⁷	c ²⁵	.21	.07	.80
F	Cryptantha sp.	7	-	-	1	-	-	.00
F	Descurainia pinnata (a)	-	b ¹¹	a ⁻	ab ³	.05	-	.03
F	Draba sp. (a)	-	b ⁶⁷	a ⁻	a ⁶	.20	-	.03
F	Erigeron eatonii	-	1	-	2	.00	-	.15
F	Erigeron flagellaris	4	4	4	6	.04	.18	.53
F	Eriogonum racemosum	-	7	3	2	.04	.03	.03
F	Eriogonum umbellatum	-	-	7	-	-	.15	-
F	Gayophytum ramosissimum(a)	-	5	-	3	.01	-	.00
F	Hackelia patens	-	-	-	1	-	-	.00
F	Heuchera parvifolia	a ⁻	b ⁴¹	b ²⁴	b ³⁶	.93	.37	.60
F	Heterotheca villosa	-	-	8	-	-	.16	-
F	Lappula occidentalis (a)	-	3	-	2	.01	-	.00
F	Lithospermum ruderales	-	5	4	6	.21	.06	.33
F	Lomatium sp.	a ²⁰	b ⁸³	ab ⁴⁹	c ⁸⁷	1.55	.39	2.46
F	Lupinus argenteus	-	-	3	1	-	.03	.41
F	Penstemon sp.	ab ¹¹	ab ³	a ⁻	b ¹⁴	.15	-	.42
F	Penstemon procerus	a ⁻	b ¹¹	b ⁸	a ⁻	.12	.36	-
F	Petradoria pumila	-	3	1	-	.03	.03	-
F	Phlox longifolia	-	-	-	2	-	-	.06

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Polygonum douglasii</i> (a)	-	_c 20	_a -	_b 15	.05	-	.03
F	<i>Schoenocrambe linifolia</i>	-	-	-	5	-	.03	.03
F	<i>Senecio integerrimus</i>	13	12	12	17	.05	.05	.44
F	<i>Sedum lanceolatum</i>	-	4	-	-	.01	-	-
F	<i>Senecio multilobatus</i>	-	-	3	1	-	.00	.00
F	<i>Sphaeralcea coccinea</i>	-	2	2	3	.03	.00	.03
F	<i>Stellaria jamesiana</i>	-	4	-	-	.01	-	-
Total for Annual Forbs		0	471	12	375	2.48	0.04	2.45
Total for Perennial Forbs		115	277	188	280	4.36	3.15	7.35
Total for Forbs		115	748	200	655	6.84	3.19	9.80

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

BROWSE TRENDS --

Management unit 09 , Study no: 20

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Amelanchier utahensis</i>	30	37	36	9.44	12.58	10.85
B	<i>Artemisia tridentata vaseyana</i>	76	72	48	8.63	6.60	4.52
B	<i>Cercocarpus montanus</i>	24	19	27	5.23	5.76	3.91
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	37	28	40	.88	1.20	1.43
B	<i>Eriogonum heracleoides</i>	51	50	53	2.42	2.65	2.00
B	<i>Mahonia repens</i>	2	6	4	.00	.22	.30
B	<i>Opuntia</i> sp.	24	18	25	.37	.25	.58
B	<i>Pediocactus simpsonii</i>	3	0	2	.03	-	.03
B	<i>Pinus edulis</i>	0	4	7	1.04	.56	.78
B	<i>Prunus virginiana</i>	0	0	1	.03	-	-
B	<i>Purshia tridentata</i>	20	28	25	2.42	4.71	3.28
B	<i>Symphoricarpos oreophilus</i>	46	42	46	3.95	4.66	4.33
B	<i>Tetradymia canescens</i>	0	0	1	-	-	-
Total for Browse		313	304	315	34.46	39.23	32.05

CANOPY COVER, LINE INTERCEPT --
Management unit 09 , Study no: 20

Species	Percent Cover
	'05
Amelanchier utahensis	21.43
Artemisia tridentata vaseyana	5.83
Cercocarpus montanus	6.30
Chrysothamnus viscidiflorus lanceolatus	2.91
Eriogonum heracleoides	2.21
Mahonia repens	.05
Opuntia sp.	.18
Pinus edulis	1.86
Purshia tridentata	5.91
Symphoricarpos oreophilus	10.58

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 09 , Study no: 20

Species	Average leader growth (in)
	'05
Amelanchier utahensis	4.1
Artemisia tridentata vaseyana	1.9
Cercocarpus montanus	4.6
Purshia tridentata	2.6

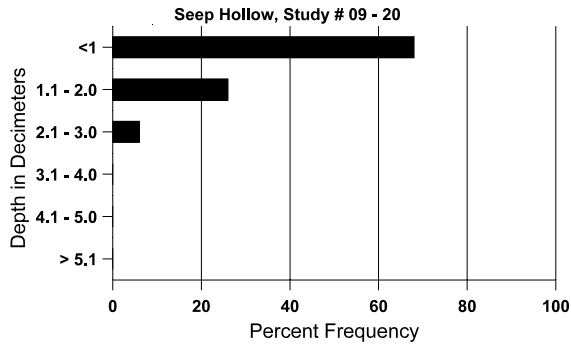
BASIC COVER --
Management unit 09 , Study no: 20

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	8.50	7.50	43.34	58.95	48.67
Rock	10.50	14.00	14.42	14.38	14.96
Pavement	0	0	.07	1.13	.59
Litter	64.25	64.25	60.95	66.43	51.56
Cryptogams	1.25	0	.33	1.05	.45
Bare Ground	15.50	14.25	4.36	9.90	8.44

SOIL ANALYSIS DATA --
Herd Unit 09, Study # 20, Study Name: Seep Hollow

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
8.4	57.6 (9.5)	6.7	73.3	16.2	10.6	4.7	9.6	102.4	0.7

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 20

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	5	3	8
Elk	9	9	14
Deer	27	15	28

Days use per acre (ha)	
'00	'05
-	-
15 (37)	54 (134)
44 (107)	92 (227)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 20

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	799	-	466	333	-	-	17	0	0	-	0	16/14
88	466	-	400	66	-	-	14	0	0	-	0	56/32
95	920	40	280	640	-	-	35	2	0	-	0	58/75
00	1400	-	560	820	20	40	24	3	1	-	0	52/63
05	1920	60	840	1040	40	20	19	6	2	1	1	47/49
Artemisia tridentata vaseyana												
82	2666	-	-	2266	400	-	18	5	15	.75	13	19/24
88	2732	-	400	1466	866	-	49	2	32	.73	5	17/22
95	2440	-	20	2080	340	560	51	2	14	4	6	21/31
00	2340	20	60	1660	620	220	11	3	26	5	28	22/28
05	1600	120	60	820	720	1020	26	9	45	33	33	23/33

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
82	533	-	-	533	-	-	38	0	0	-	25	33/21
88	466	66	133	333	-	-	100	0	0	-	0	28/39
95	680	-	160	520	-	20	59	9	0	-	0	44/47
00	500	40	40	440	20	-	28	48	4	-	4	36/38
05	700	20	100	420	180	20	3	83	26	3	3	44/48
Chrysothamnus viscidiflorus lanceolatus												
82	733	-	-	733	-	-	0	0	0	-	0	11/9
88	1332	-	266	800	266	-	10	0	20	-	0	11/11
95	1060	-	20	1040	-	-	0	0	0	-	0	15/16
00	860	-	-	820	40	-	0	0	5	-	5	14/13
05	1260	-	80	1160	20	-	0	0	2	-	0	15/19
Eriogonum corymbosum												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	13/13
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Eriogonum heracleoides												
82	1933	-	-	1933	-	-	0	0	0	-	0	13/10
88	3066	-	1800	1266	-	-	0	0	0	-	30	5/7
95	2720	-	380	2340	-	-	0	0	0	-	0	8/15
00	2660	-	60	2540	60	-	0	0	2	2	2	6/9
05	2440	-	60	2380	-	-	.81	0	0	-	0	6/13
Mahonia repens												
82	1066	-	-	1066	-	-	0	0	-	-	0	4/6
88	2866	133	2533	333	-	-	0	0	-	-	7	3/5
95	280	-	-	280	-	-	0	0	-	-	0	5/7
00	340	-	20	320	-	-	0	0	-	-	0	4/5
05	320	-	-	320	-	-	0	0	-	-	0	3/5
Opuntia sp.												
82	1332	-	466	866	-	-	0	0	0	-	0	4/8
88	2466	66	1466	1000	-	-	0	0	0	-	14	4/9
95	960	20	40	880	40	40	0	0	4	-	0	3/8
00	620	-	80	540	-	-	0	0	0	-	0	2/5
05	1040	-	60	980	-	-	0	0	0	-	2	4/11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	60	-	-	60	-	-	0	0	-	-	0	2/4
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	40	-	-	40	-	-	0	0	-	-	0	4/6
Pinus edulis												
82	66	-	-	66	-	-	0	0	-	-	0	69/59
88	66	-	-	66	-	-	0	0	-	-	0	83/47
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	80	-	60	20	-	-	0	0	-	-	0	-/-
05	140	-	100	40	-	-	0	0	-	-	0	-/-
Prunus virginiana												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	20	-	-	-	0	0	-	-	0	24/32
Purshia tridentata												
82	333	-	-	333	-	-	80	0	0	-	0	12/16
88	465	-	66	333	66	-	57	0	14	-	0	24/21
95	540	-	60	480	-	-	44	0	0	-	0	16/37
00	720	20	20	700	-	-	31	22	0	-	0	17/44
05	840	-	60	720	60	-	31	33	7	2	2	17/40
Symphoricarpos oreophilus												
82	1599	-	200	1266	133	-	4	0	8	-	8	16/27
88	932	-	666	133	133	-	36	0	14	-	0	28/22
95	2340	40	400	1940	-	-	0	0	0	-	0	16/30
00	2360	20	320	2000	40	-	0	0	2	-	0	13/21
05	3140	-	560	2540	40	-	0	0	1	-	0	18/28
Tetradymia canescens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	40	-	-	40	-	-	0	0	-	-	0	-/-

Trend Study 9-21-05

Study site name: Browns Park River Corridor-Cattle .

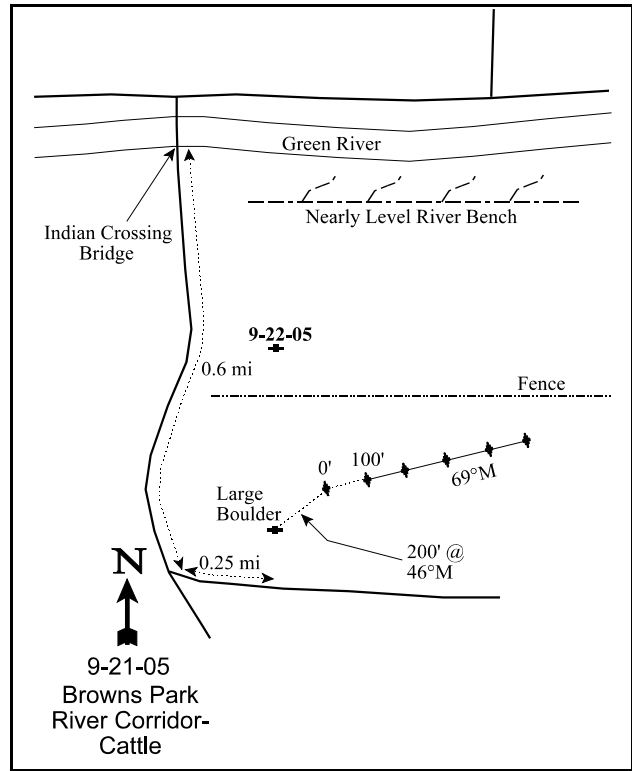
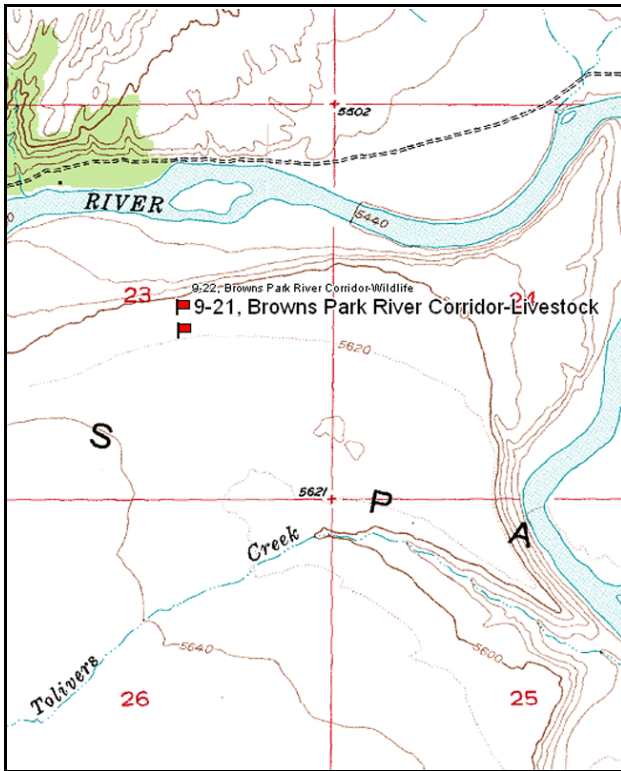
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 69 degrees magnetic.

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

LOCATION DESCRIPTION

From the Indian Crossing bridge at Browns Park travel south for 0.6 miles to a fork. Turn left onto a small road and proceed 0.25 miles. There is a large boulder on the north side of the road. From the boulder the 0-foot baseline stake is 200 feet away at a bearing of 46°M. The frequency baseline stakes are marked by green fenceposts 12-18 inches in height.



Map Name: Clay Basin

Diagrammatic Sketch

Township 2N, Range 24E, Section 23

GPS: NAD 27, UTM 12T 4528357 N, 654031 E

DISCUSSION

Brown's Park River Corridor-Livestock - Trend Study No. 9-21

The Brown's Park River Corridor-Livestock study was established in 2000. This study was placed to monitor differences between livestock and wildlife use on two sides of a fence line that was built in 1963. The fence was built to exclude cattle grazing on one side of the fence line, while allowing grazing on the other side. Wildlife are not excluded from either side of the fence line and Brown's Park River Corridor-Wildlife (#9-22) study samples the other side. The area is approximately ½ mile south of the Green River at Brown's Park on a sagebrush-grass flat. This study samples the south side of the fence that is accessible to livestock and wildlife. The area is nearly flat with a slope of 1-2% and a north aspect. Elevation is 5,600 feet. Cattle did not graze the site in 2000. Pellet group data from 2000 estimated 31 deer days use/acre (76 ddu/ha). The cattle pats sampled in the quadrats were from the previous year and thus were not counted in the pellet transect in 2000. Pellet group data from 2005 estimated 58 deer, 5 elk, and 7 cow days use/acre (144 ddu/ha, 12 edu/ha, and 16 cdu/ha). Cattle pats were from last season.

Soils are sandy loam in texture and moderately deep with an estimated effective rooting depth of nearly 14 inches. The effective rooting depth was estimated closer to shrubs as the interspaces were much more shallow (8 inches). Moderate pedestaling around shrub stems is common. Shrub interspaces between sagebrush contain a lot of bare soil and pavement. Percent bare soil (relative values) covered 43% of the ground surface in 2000 and 52% in 2005, while pavement covered 25% in 2000 and 16% in 2005. Litter and vegetation cover are low and with so much bare soil, erosion would be much higher if not for the nearly level terrain. Phosphorus is low at 4.1 ppm, values less than 6 ppm may be limiting to normal plant growth and development (Tiedemann and Lopez 2004). Soil is slightly alkaline with a pH of 7.8. The erosion condition class determined soil movement as stable in 2005.

Wyoming big sagebrush is the dominant species and provided 9% cover in 2000 and 2005. On average, sagebrush contributes to 80% of the browse cover. Density was estimated at 3,740 plants/acre in 2000. Density has slightly decreased to 3,420 plants/acre in 2005. Percent decadency has been moderately high at around 30% both years sampled. This condition may have been accentuated by drought conditions in 2000 through 2003. Young recruitment was estimated at 7% of the population in 2000 and 6% in 2005. Utilization is moderate to heavy with fairly good vigor. Leader growth was extremely low in 2000 at 1 inch, but increased to 4 inches in 2005.

Shadscale is also moderately abundant with an estimated density of 1,720 plants/acre in 2000 and 2005. Percent decadency was moderately high in 2000 at 37%, but decreased to 7% by 2005. Vigor was good both years, with some improving values. The high decadency of shadscale was drought related and improved with above normal precipitation in 2005. Broom snakeweed decreased dramatically from 39,460 plants/acre in 2000 to 1,360 in 2005. Cover averaged 7% in 2000 and decreased to under 1% in 2005. Most plants were small in stature in 2000 and have remained relatively small in 2005.

Herbaceous vegetation is not very diverse and is dominated by needle-and-thread grass. This species provided 6% cover in 2000 and 2005, although the sum of nested frequency decreased significantly in 2005. Other, less abundant perennial grasses include squirreltail bottlebrush, sand dropseed, and Indian ricegrass. Two annual grasses were sampled in 2000, cheatgrass and sixweeks fescue. In 2005, cheatgrass was not sampled and sixweeks fescue increased significantly. Forbs are nearly non-existent during both sample years. Only two perennial species were sampled in 2000 and no annuals, but in 2005, five annual forbs appeared with the increased precipitation.

2000 APPARENT TREND ASSESSMENT

Soil trend appears to be downward and in poor condition. Bare ground and pavement cover are high. Protective ground cover from herbaceous vegetation and litter is sparse. Currently, erosion is not excessive, but only because of the nearly level terrain. Trend for browse also appears down as broom snakeweed occurs at a very high density and Wyoming big sagebrush has high decadency. The herbaceous understory has a poor composition with only needle-and-thread grass being abundant. Forbs are nearly non-existent and will probably never be important at this site. The Desirable Components Index rated this site as fair with a score of 40 due to moderate browse cover, high decadence, fair young recruitment, and fair perennial grass cover.

winter range condition (DC Index) - Fair (40) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soil is slightly down with a substantial increase in relative percent bare soil. Percent bare soil and pavement continue to be high, with protective cover from herbaceous vegetation and litter still sparse. Trend for key browse, Wyoming big sagebrush, is slightly down. Population density decreased from 3,740 plants/acre in 2000 to 3,420 in 2005, almost a 10% decrease. Percent decadency remains moderate, but it did increase, along with increases in those classified with poor vigor, and number of individuals classified as dying. Leader growth increased with improved precipitation. Utilization is light to moderate and broom snakeweed decreased dramatically in 2005. Trend for the herbaceous understory is slightly down. Needle-and-thread sum of nested frequency decreased significantly, while cover remained at 6%. Squirreltail and Indian ricegrass sum of nested frequency increased significantly, but average cover is less than 2% for the two species combined. Annual grasses are present, but in very low numbers. The Desirable Components Index rated this site as good with a score of 49 due to moderate browse cover, moderate decadence, fair young recruitment, and fair perennial grass cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly down (-1)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Good (49) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 21

T y p e	Species	Nested Frequency		Average Cover %	
		'00	'05	'00	'05
G	Bromus tectorum (a)	b11	a-	.02	-
G	Oryzopsis hymenoides	a-	b5	-	.05
G	Sitanion hystrix	a21	b50	.18	1.83
G	Sporobolus cryptandrus	20	3	.36	.00
G	Stipa comata	b300	a242	6.61	6.39
G	Vulpia octoflora (a)	a3	b195	.00	.40
Total for Annual Grasses		14	195	0.03	0.40
Total for Perennial Grasses		341	300	7.16	8.28

Type	Species	Nested Frequency		Average Cover %	
		'00	'05	'00	'05
	Total for Grasses	355	495	7.19	8.68
F	Descurainia pinnata (a)	-	6	-	.01
F	Lappula occidentalis (a)	_a -	_b 60	-	.32
F	Lepidium sp. (a)	_a -	_b 54	-	.33
F	Navarretia intertexta (a)	_a -	_b 118	-	.58
F	Salsola iberica (a)	_a -	_b 30	-	.07
F	Sphaeralcea coccinea	8	17	.01	.10
F	Townsendia incana	7	10	.01	.02
	Total for Annual Forbs	0	268	0	1.32
	Total for Perennial Forbs	15	27	0.03	0.12
	Total for Forbs	15	295	0.03	1.45

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

BROWSE TRENDS --

Management unit 09 , Study no: 21

Type	Species	Strip Frequency		Average Cover %	
		'00	'05	'00	'05
B	Artemisia tridentata wyomingensis	76	80	9.28	8.72
B	Atriplex confertifolia	56	52	1.25	3.11
B	Gutierrezia sarothrae	99	40	7.10	.43
B	Opuntia sp.	7	10	.18	.21
	Total for Browse	238	182	17.84	12.48

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 21

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	9.80
Atriplex confertifolia	4.58
Gutierrezia sarothrae	1.78
Opuntia sp.	.38

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 09 , Study no: 21

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	4.2

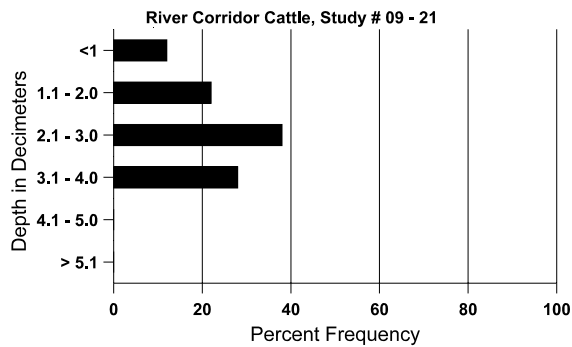
BASIC COVER --
Management unit 09 , Study no: 21

Cover Type	Average Cover %	
	'00	'05
Vegetation	25.92	20.60
Rock	.28	.09
Pavement	31.00	17.22
Litter	12.51	14.71
Cryptogams	1.50	.41
Bare Ground	54.47	56.34

SOIL ANALYSIS DATA --
Herd Unit 09, Study # 21, Study Name: River Corridor Cattle

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.9	62 (13.9)	7.8	63.6	18.1	18.2	0.8	4.1	131.2	0.5

Stoniness Index



PELLET GROUP DATA --
 Management unit 09 , Study no: 21

Type	Quadrat Frequency		Days use per acre (ha)	
	'00	'05	'00	'05
Rabbit	5	44	-	-
Elk	-	4	-	5 (12)
Deer	28	37	31 (76)	58 (144)
Cattle	7	3	-	7 (16)

BROWSE CHARACTERISTICS --
 Management unit 09 , Study no: 21

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
00	3740	-	260	2380	1100	480	51	10	29	12	12	11/25
05	3420	40	220	2060	1140	440	26	28	33	19	19	15/29
<i>Atriplex confertifolia</i>												
00	1720	20	100	980	640	60	9	3	37	10	10	7/12
05	1740	120	220	1400	120	80	0	0	7	5	5	13/23
<i>Gutierrezia sarothrae</i>												
00	39460	160	960	36420	2080	1700	0	0	5	4	12	4/6
05	1360	100	-	1360	-	20	0	0	0	-	0	9/12
<i>Opuntia sp.</i>												
00	160	-	-	140	20	-	0	0	13	-	0	3/12
05	220	-	-	200	20	-	0	0	9	-	0	4/16

Trend Study 9-22-05

Study site name: Browns Park River Corridor-Wildlife.

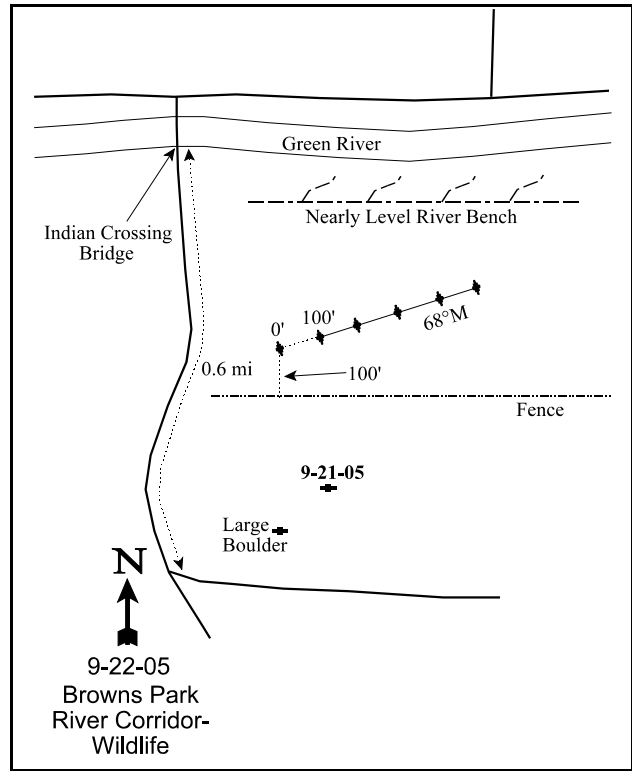
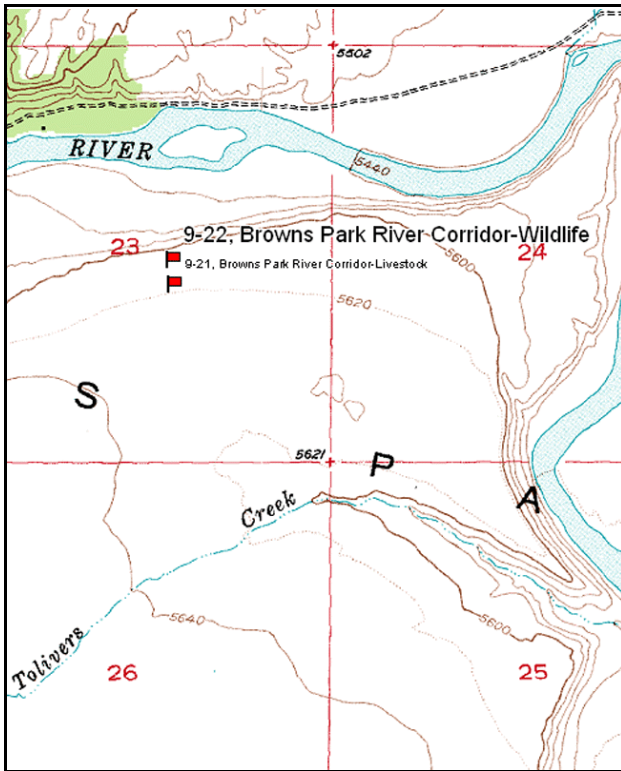
Vegetation type: Wyoming Big Sagebrush.

Compass bearing: frequency baseline 68 degrees magnetic.

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

LOCATION DESCRIPTION

From the Indian Crossing bridge at Browns Park travel south for 0.6 miles to a fork. Turn left onto a small road and proceed 0.25 miles. There is a large boulder on the north side of the road. From the boulder walk north to the fence at a bearing of 0°M. From the fence the 0-foot baseline stake is another 100 feet away. The frequency baseline stakes are marked by green fenceposts 12-18 inches in height.



Map Name: Clay Basin

Diagrammatic Sketch

Township 2N, Range 24E, Section 23

GPS: NAD 27, UTM 12T 4528447 N, 654014 E

DISCUSSION

Brown's Park River Corridor-Wildlife - Trend Study No. 9-22

The Brown's Park River Corridor-Wildlife study was established in 2000. This study was placed to monitor differences between livestock-wildlife use and wildlife use on two sides of a fence line that was built in 1963. The fence was built to exclude cattle grazing on one side of the fence line while allowing grazing on the other side. Wildlife are not excluded from either side of the fence line and Brown's Park River Corridor-Livestock (#9-21) monitors the livestock side. This study samples the north side of the fence that is not accessible to livestock. The area is approximately ½ mile south of the Green River at Brown's Park on a sagebrush-grass flat. The site is nearly flat with a slope of 1-2% and a north aspect. Elevation is 5,600 feet. Pellet group data from 2000 estimated 40 deer days use/acre (99 ddu/ha). Pellet group data from 2005 estimated 29 deer and 1 elk days use/acre (73 ddu/ha and 2 edu/ha).

Soil is a sandy loam in texture and moderately deep with an estimated effective rooting depth of over 13 inches. Soil is moderately alkaline with a pH of 7.9 and phosphorus is low at 3.9 ppm. Phosphorus levels below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Bare soil was moderately high in 2000 at 32% relative cover and increased in 2005 to 46%. These values are moderately high, but not as high as those on the livestock side. Relative protective cover from vegetation and litter are moderately low and pavement is abundant on the surface with an estimated 15% relative cover. Erosion was minimal due to the gentle slope and the abundance of grass cover. The erosion condition class determined soil movement as stable in 2005.

Wyoming big sagebrush is not the dominant key browse species as on average it only contributes to about 30% of the total browse cover. Shadscale actually produces on average about 70% of the browse cover for this site. Average cover for sagebrush was 3% in 2000 and 2% in 2005. Population density was estimated at 2,240 plants/acre in 2000 and decreased by 43% in 2005 to 1,280 plants/acre. Percent decadency was high in 2000 at 46%, which increased to 58% by 2005. In 2000, 29% of the population was classified as dying. This increased to 55% in 2005. The drop in density and increase in dying plants suggest that the sagebrush population is dying. Young recruitment was low in 2000 and none were sampled in 2005. A fair number of seedlings were observed in 2005, but with rigorous competition from needle-and-thread and very low precipitation, young plants will have a difficult time becoming established. Utilization was light to moderate during both sampling years and over half the population had poor vigor in 2005. Drought conditions persisted for 4 years (2000-2003) and declining sagebrush has been observed in several areas in this region and throughout the state. The shadscale density was estimated at 2,340 plants/acre in 2000 and 2,260 in 2005. Percent decadency was moderately high in 2000 at 36%, but decreased in 2005 to 9%. Shadscale is more drought tolerant than Wyoming big sagebrush and appears to be recovering more quickly with increased precipitation in 2005. Average cover increased from 2% in 2000 to 10% in 2005. Utilization is light and vigor increased to good for most plants in 2005.

Other browse sampled include broom snakeweed, and pricklypear cactus. Broom snakeweed density decreased from 1,740 plants/acre in 2000, to almost being nonexistent in 2005. Broom snakeweed was not nearly as abundant as it was on study 9-21 across the fence line on the livestock side.

The herbaceous understory is comprised mainly of one species, needle-and-thread grass. This species provided 19% average cover in 2000, but decreased to 8% in 2005. Nested frequency also decreased significantly in 2005. However, quadrat frequency remained fairly similar, from 96% down to 86%. It is still very abundant across the site. Other perennial grasses include squirreltail (which also decreased significantly), mutton bluegrass, sand dropseed, and Indian ricegrass. Cheatgrass was observed in low numbers in 2000, but was the sampled in 2005. Forbs are very rare and only two species were sampled in 2000. In 2005, five more low growing annual forbs and one perennial were sampled.

2000 TREND ASSESSMENT

Trend for soil appears stable. Although litter and vegetation cover are moderately low and bare ground is abundant, erosion is not severe due to the gentle slope and abundant cover from needle-and-thread grass. Browse is in poor condition with high decadency and poor vigor on Wyoming big sagebrush and shadscale. Recruitment from young plants is low for both species. Drought and possibly high competition are apparently the key factors influencing these downward parameters. The herbaceous understory appears stable, but composition is poor with needle-and-thread dominating the site. All other species, both grasses and forbs, are insignificant on this site. The Desirable Components Index rated this site as fair with a score of 41 due to low browse cover, high decadency, poor young recruitment, and excellent perennial grass cover.

winter range condition (DC Index) - Fair (41) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soil is slightly down. Vegetation, litter, and cryptogram cover all decreased slightly, which a corresponding increase in percent bare soil. The ratio of protective cover (vegetation, litter, and cryptograms) to bare ground also decreased. Trend for the key browse is slightly down. Contrary from the livestock site, the key browse on this site is shadscale which contributes on average to about 70% of the total browse cover. Its numbers are almost the same as last read. Other characteristics of note for shadscale is that percent decadence has gone from 36% down to 9%, percent dying from 13% down to 3%, those with poor vigor has gone from 15% down to 4%, and percent cover has increased from about 2% up to almost 10%. Wyoming big sagebrush has a downward trend, but on average it only contributed about 30% of the browse cover in 2005. Density decreased by 43%, percent decadency increased from 46% to 58%, and over half the population was classified as dying. This population has been affected by four years of drought and with no young recruitment, is beginning to die off. Trend for herbaceous understory is down. Needle-and-thread provided 95% of the herbaceous cover and it decreased from 19% to 8% average cover. An indication of how low annual precipitation was at this time. Nested frequency also indicated a significant decrease in abundance for needle-and-thread. However, it should be noted that quadrat frequency only changed from 96% down to 86%. Indicating that it is still very abundant throughout the site. Squirreltail also decreased significantly in nested frequency and it was the next most abundant species. The Desirable Components Index rated this site as poor to fair with a score of 44 due to an increase in shadscale cover, high decadent sagebrush, poor young recruitment, and fair perennial grass cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly down (-1)

herbaceous understory - down (-2)

winter range condition (DC Index) - Poor to Fair (44) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 22

Type	Species	Nested Frequency		Average Cover %	
		'00	'05	'00	'05
G	Bromus tectorum (a)	8	-	.04	-
G	Oryzopsis hymenoides	-	4	-	.03
G	Poa fendleriana	-	5	-	.03

Type	Species	Nested Frequency		Average Cover %	
		'00	'05	'00	'05
G	<i>Sitanion hystrix</i>	_b 42	_a 11	.80	.14
G	<i>Sporobolus cryptandrus</i>	-	7	-	.01
G	<i>Stipa comata</i>	_b 324	_a 210	18.66	7.96
G	<i>Vulpia octoflora</i> (a)	_a 4	_b 224	.03	.54
Total for Annual Grasses		12	224	0.07	0.54
Total for Perennial Grasses		366	237	19.47	8.18
Total for Grasses		378	461	19.54	8.72
F	<i>Cryptantha</i> sp.	-	1	-	.00
F	<i>Descurainia pinnata</i> (a)	_a 5	_b 21	.00	.32
F	<i>Draba</i> sp. (a)	-	1	-	.00
F	<i>Lappula occidentalis</i> (a)	_a -	_b 37	-	.34
F	<i>Lepidium</i> sp. (a)	_a -	_b 14	-	.13
F	<i>Navarretia intertexta</i> (a)	_a -	_b 77	-	.63
F	<i>Salsola iberica</i> (a)	_a -	_b 10	-	.03
F	<i>Townsendia incana</i>	1	-	.00	-
Total for Annual Forbs		5	160	0.00	1.45
Total for Perennial Forbs		1	1	0.00	0.00
Total for Forbs		6	161	0.00	1.46

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

BROWSE TRENDS --

Management unit 09 , Study no: 22

Type	Species	Strip Frequency		Average Cover %	
		'00	'05	'00	'05
B	<i>Artemisia tridentata wyomingensis</i>	53	47	3.39	2.01
B	<i>Atriplex confertifolia</i>	72	69	2.25	9.68
B	<i>Gutierrezia sarothrae</i>	28	2	.73	.00
B	<i>Opuntia</i> sp.	10	11	.56	.71
Total for Browse		163	129	6.94	12.41

CANOPY COVER, LINE INTERCEPT --
 Management unit 09 , Study no: 22

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	2.61
Atriplex confertifolia	13.81
Opuntia sp.	.61

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 09 , Study no: 22

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	3.5

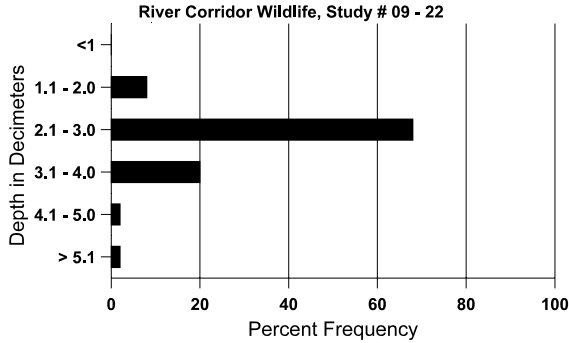
BASIC COVER --
 Management unit 09 , Study no: 22

Cover Type	Average Cover %	
	'00	'05
Vegetation	27.92	20.73
Rock	.07	.11
Pavement	20.76	16.83
Litter	30.07	19.79
Cryptogams	6.69	1.58
Bare Ground	40.15	50.43

SOIL ANALYSIS DATA --
 Herd Unit 09, Study # 22, Study Name: River Corridor Wildlife

Effective rooting depth (in)	Temp °F (depth)	pH	% sand	% silt	% clay	%OM	ppm P	ppm K	dS/m
13.5	62.2 (13.7)	7.9	59.6	23.1	17.3	0.7	3.9	150.4	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 22

Type	Quadrat Frequency		Days use per acre (ha)	
	'00	'05	'00	'05
Rabbit	9	49	-	-
Elk	-	-	-	1 (2)
Deer	24	22	40 (99)	29 (73)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 22

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
00	2240	-	20	1180	1040	2360	16	2	46	29	32	12/22
05	1280	360	-	540	740	1580	33	13	58	55	55	15/28
<i>Atriplex confertifolia</i>												
00	2340	-	40	1460	840	400	3	0	36	13	15	8/14
05	2260	-	20	2040	200	420	0	0	9	3	4	16/30
<i>Gutierrezia sarothrae</i>												
00	1740	-	-	620	1120	640	0	1	64	59	80	5/7
05	60	-	40	20	-	20	0	0	0	-	0	10/11
<i>Opuntia sp.</i>												
00	260	-	-	240	20	-	0	0	8	-	8	3/12
05	360	-	40	280	40	-	0	0	11	6	6	4/15

BROWN'S PARK RIVER CORRIDOR TREND STUDY COMPARISON

Trend studies 9-21 (River Corridor-Livestock) and 9-22 (River Corridor-Wildlife)

2000 and 2005 data comparisons

	River Corridor-Livestock (accessible to livestock)		River Corridor-Wildlife (inaccessible to livestock)	
Year	2000	2005	2000	2005
Wyoming Big Sagebrush				
Average cover (%)	9.2	8.7	3.4	2.0
Density (plants/acre)	3,740	3,420	2,240	1,280
% young	7	6	1	0
% decadent	29	33	46	58
% dying	12	19	29	55
% poor vigor	12	19	32	55
Shadscale				
Average cover (%)	1.3	3.1	2.3	9.7
Density (plants/acre)	1,720	1,740	2,340	2,260
% young	6	13	2	1
% decadent	37	7	36	9
% dying	10	5	13	3
% poor vigor	10	5	15	4
Broom Snakeweed				
Average cover (%)	7.1	0.4	0.7	0.0
Density (plants/acre)	39,460	1,360	1,740	60
Needle and Thread grass				
Average cover (%)	6.6	6.4	18.7	8.0
Nested Frequency	324	210	300	242
Ground cover				
Vegetation relative cover (%)	20.6	18.8	22.2	18.9
Litter relative cover (%)	10.0	13.5	23.9	18.1
Bare ground relative cover (%)	43.3	51.5	32.0	46.1

Although total vegetation cover was about the same on both sides of the fence line, the nature of the vegetation in 2000 was quite different. In 2000, seventy-one percent of the vegetation cover on the Livestock-accessible side came from browse (29% provided by herbaceous species). In contrast, 74% of the vegetation cover on the wildlife side was provided by herbaceous species (26% from browse). In 2005, both sides had 55% browse cover and 45% herbaceous cover. Litter cover was low on both sides of the fence, but extremely so on the side accessible to livestock grazing. Bare ground is high on both sides of the fence as well, but more so on the side where livestock grazing occurs.

Herbaceous vegetation consists primarily of one species on both sites, needle-and-thread grass. In 2000, this species provided nearly 3 times more average cover on the wildlife side, but was about the same in 2005. Drought and competition would be the primary factors that would have caused the decrease of needle-and-thread grasses on the wildlife side.

The shrub component, primarily the Wyoming big sagebrush, appears to be suffering from drought and competition. In 2000, Wyoming big sagebrush and shadscale on both sites showed high decadency and a higher than normal proportion of plants displaying poor vigor. In 2005, shadscale decadency returned to normal levels, while sagebrush decadency continued to increase, especially on the wildlife side. High decadency and poor vigor can be attributed more to drought and competition than to any other factors. Recruitment from young plants is much lower for both sagebrush and shadscale on the wildlife side of the fence because there is more bare soil on the livestock side (safe sites) for easier establishment of shrub seedlings. Shrubs also have higher competition on the wildlife side because needle-and-thread grass provided nearly 3 times more cover in 2000. Thus, there are fewer microsites available for young plants to establish due to higher perennial grass cover, and more competition for the limited resources.

The wildlife had a higher population of shadscale than the livestock side and the livestock side had a higher population of Wyoming big sagebrush both sampling years. The sagebrush on the livestock side is in better condition than on the wildlife side.

Trend Study 9-23-05

Study site name: Rock Creek.

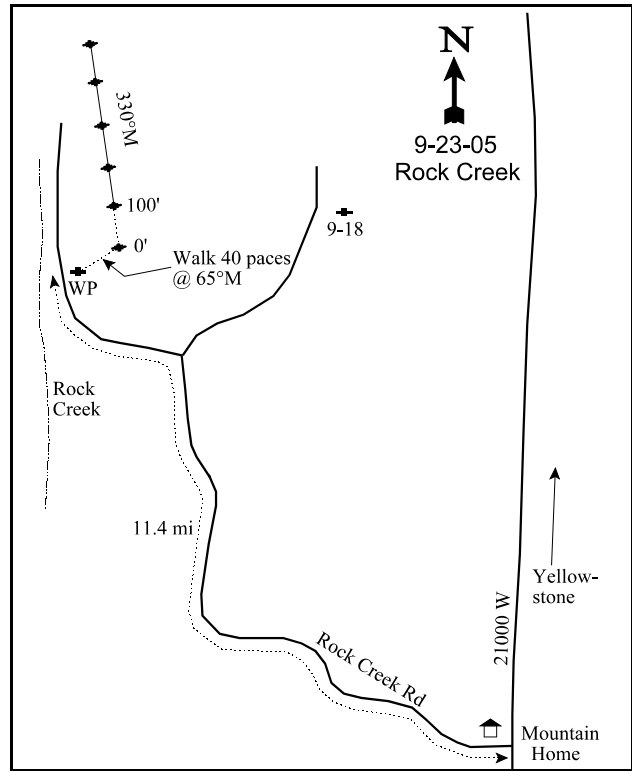
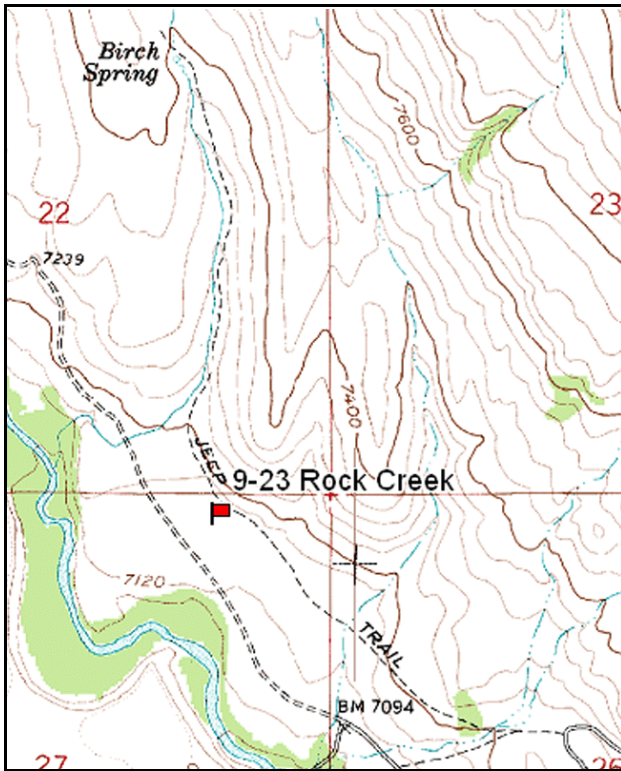
Vegetation type: Mountain Big Sagebrush.

Compass bearing: frequency baseline 330 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar for belt #4 is on the 2 foot mark.

LOCATION DESCRIPTION

From the corner store in Mountain Home (21000 W and 6750 N), travel 11.4 miles northwest toward Rock Creek. The witness post is on the right (east) side of the road. From here walk 40 paces at 65°M to the 0' stake.



Map Name: Dry Mountain

Diagrammatic Sketch

Township 1N, Range 6W, Section 27

GPS: NAD 27, UTM 12T 4478635 N, 538445 E

DISCUSSION

Rock Creek - Trend Study No. 9-23

The Rock Creek trend study was established in 2005 and samples a mountain big sagebrush community with scattered pinyon and juniper. The land is owned and managed by the Uintah and Ouray Indian Tribes and is on deer and elk winter range in the McAfee Basin area. Elevation is 7,150 feet on a southeast exposure with a slight slope of 4%. Pellet group data from 2005 estimated 22 elk and 48 deer days use/acre (55 edu/ha and 119 ddu/ha).

Soil texture is a sandy loam with a shallow effective rooting depth of 11 inches. Soil pH is neutral at 6.5. The ratio of protective cover (vegetation, litter, and cryptogams) to bare ground is moderate at 2.8 to 1. Bare ground cover is fairly high in the interspaces between the shrubs and some erosion is noticeable. Soil and litter movement were observed with slight pedestalling around shrubs. The erosion condition class determined soil movement as slight in 2005.

Mountain big sagebrush is the key browse species with a small population of antelope bitterbrush. Mountain big sagebrush cover was estimated at 20% cover with a density of 3,960 plants/acre in 2005. Percent decadency was moderately high at 32% with 20% of the population classified as dying. Young recruitment was low at 3% of the population, but seedlings were fairly abundant in 2005. The majority of the seedlings have a notoriously short half-life. Utilization was moderate to heavy with moderate vigor. The bitterbrush population contributed to just over 1% cover with a density of 420 plants/acre. Percent decadence was moderate at 29% with 14% of the population classified as dying. Young recruitment was moderate and no seedlings were observed in 2005. Utilization was heavy, but vigor was good. Other shrubs include shadscale, rubber rabbitbrush, and broom snakeweed.

The herbaceous understory was comprised mostly of perennial grasses with an estimated 12% cover. Needle-and-thread, squirreltail, and Sandberg bluegrass are the dominant perennial grasses. Cheatgrass, an annual, estimated 3.6% cover and quadrat frequency of 53% in 2005. Other grasses include: thickspike, mutton bluegrass, Indian ricegrass, and a sedge. Forbs are fairly diverse and had a species richness of 22 species in 2005, however cover was low at under 3%. Half of the forbs are low-growing annuals and most of the perennial species have small growth forms as well.

2005 APPARENT TREND ASSESSMENT

Soil shows some signs of erosion, because of high levels of bare ground within the interspaces of the shrubs. The ratio of protective cover to bare ground is fair (2.8:1) and helps prevent most soil movement. The key browse, mountain big sagebrush, has moderate decadency, a result drought conditions which have taken place since 2000. Utilization is moderate to heavy with fairly good vigor. Bitterbrush was heavily hedged, but had good vigor. The herbaceous understory is dominated by mostly perennial grasses, but cheatgrass was present at just under 4% cover. Forbs are diverse, but provide very little cover. The Desirable Components Index rated this site as fair with a score of 61 due to excellent browse cover, moderate decadency, poor young recruitment, and good perennial grass cover.

winter range condition (DC Index) - Fair (61) Mid-level Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 23

T y p e	Species	Nested Frequency	Average Cover %
		'05	'05
G	Agropyron dasystachyum	73	.71
G	Agropyron spicatum	5	.03
G	Bouteloua gracilis	3	.03
G	Bromus tectorum (a)	154	3.60
G	Carex sp.	31	.20
G	Koeleria cristata	2	.00
G	Oryzopsis hymenoides	5	.18
G	Poa fendleriana	7	.27
G	Poa secunda	157	2.47
G	Sitanion hystrix	81	1.96
G	Stipa comata	138	6.00
G	Stipa lettermani	1	.15
G	Vulpia octoflora (a)	146	.47
Total for Annual Grasses		300	4.07
Total for Perennial Grasses		503	12.03
Total for Grasses		803	16.11
F	Allium sp.	51	.26
F	Astragalus convallarius	3	.18
F	Astragalus sp.	2	.00
F	Calochortus nuttallii	2	.00
F	Collomia linearis (a)	7	.04
F	Comandra pallida	17	.69
F	Cordylanthus sp. (a)	2	.00
F	Cryptantha sp.	5	.04
F	Delphinium nuttallianum	1	.00
F	Descurainia pinnata (a)	6	.01
F	Draba sp. (a)	11	.04
F	Erigeron pumilus	7	.12
F	Gayophytum ramosissimum(a)	36	.08
F	Gilia sp. (a)	71	.25
F	Lappula occidentalis (a)	9	.02
F	Machaeranthera grindelioides	1	.00
F	Microsteris gracilis (a)	22	.11
F	Penstemon watsonii	7	.09

T y p e	Species	Nested Frequency	Average Cover %
		'05	'05
F	Plantago patagonica (a)	128	.41
F	Polygonum douglasii (a)	78	.20
F	Schoenocrambe linifolia	3	.01
F	Sphaeralcea coccinea	12	.10
Total for Annual Forbs		370	1.18
Total for Perennial Forbs		111	1.53
Total for Forbs		481	2.71

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

BROWSE TRENDS --

Management unit 09 , Study no: 23

T y p e	Species	Strip Frequency	Average Cover %
		'05	'05
B	Artemisia tridentata vaseyana	85	20.43
B	Atriplex confertifolia	3	-
B	Chrysothamnus nauseosus	1	.15
B	Eriogonum corymbosum	1	-
B	Gutierrezia sarothrae	33	1.83
B	Opuntia sp.	32	.62
B	Purshia tridentata	13	1.14
Total for Browse		168	24.18

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 23

Species	Percent Cover
	'05
Artemisia tridentata vaseyana	26.91
Eriogonum corymbosum	.08
Gutierrezia sarothrae	1.33
Opuntia sp.	.58
Purshia tridentata	2.34

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 09 , Study no: 23

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	1.5
Purshia tridentata	3.0

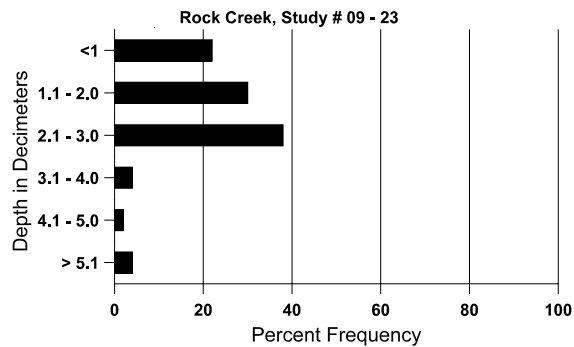
BASIC COVER --
 Management unit 09 , Study no: 23

Cover Type	Average Cover %
	'05
Vegetation	35.58
Rock	2.58
Pavement	.46
Litter	36.63
Cryptogams	3.44
Bare Ground	38.35

SOIL ANALYSIS DATA --
 Herd Unit 09, Study # 23, Study Name: Rock Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
10.8	56.4 (12.4)	6.6	55.1	13.8	31.1	1.8	14.4	147.2	0.4

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 23

Type	Quadrat Frequency	Days use per acre (ha)
	'05	'05
Rabbit	45	-
Elk	7	22 (55)
Deer	51	48 (119)

BROWSE CHARACTERISTICS --

Management unit 09 , Study no: 23

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>												
05	3960	1660	100	2580	1280	780	26	41	32	20	20	23/36
<i>Atriplex confertifolia</i>												
05	100	-	20	80	-	-	80	0	-	-	0	-/-
<i>Chrysothamnus nauseosus</i>												
05	20	-	-	-	20	-	0	0	100	100	100	17/38
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
05	0	-	-	-	-	-	0	0	-	-	0	11/8
<i>Eriogonum corymbosum</i>												
05	20	-	-	20	-	-	0	0	-	-	0	-/-
<i>Gutierrezia sarothrae</i>												
05	1500	-	20	1440	40	60	0	0	3	1	1	9/11
<i>Opuntia sp.</i>												
05	1540	-	20	1500	20	-	0	0	1	-	0	3/6
<i>Pediocactus simpsonii</i>												
05	0	-	-	-	-	-	0	0	-	-	0	3/4
<i>Purshia tridentata</i>												
05	420	-	60	240	120	-	29	62	29	14	14	21/37

Trend Study 9-24-05

Study site name: Brush Creek Substation .

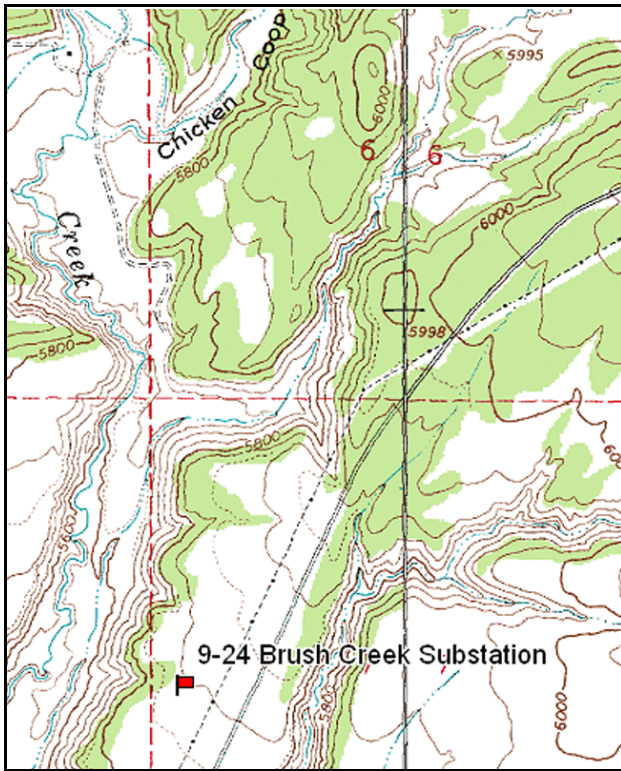
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 4 degrees magnetic.

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

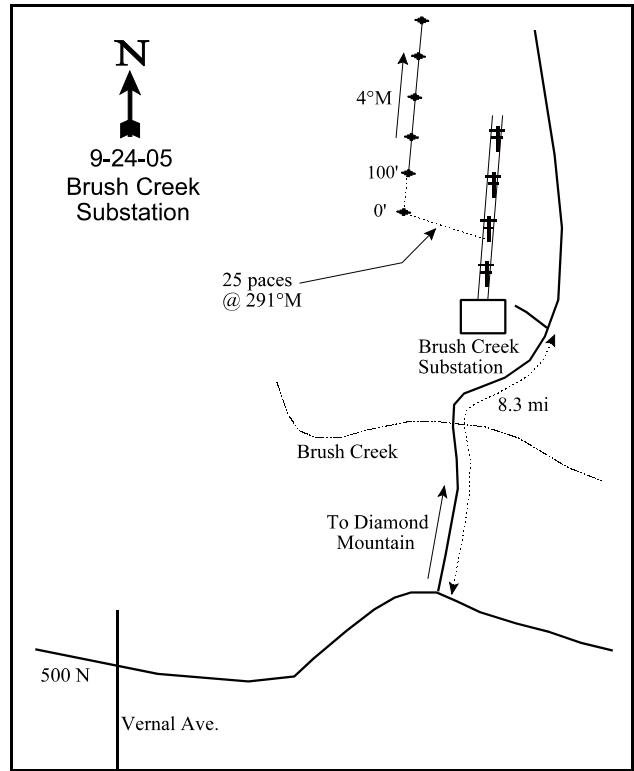
LOCATION DESCRIPTION

From the intersection of Vernal Avenue and 500 North in Vernal, head east on 500 North. Turn north on the road that leads to Diamond Mountain. Drive 8.3 miles to a short road on the left that leads to the Brush Creek Substation. Turn north and follow the power lines to the second set of power poles to power pole number 28/4. From the western most pole walk 25 paces at 291°M to the 0' stake with browse tag number 61. The study is marked with green, steel fence posts approximately 12-18 inches in height.



Map Name: Donkey Flat

Township 3S, Range 23E, Section 7



Diagrammatic Sketch

GPS: NAD 27, UTM 12T 4492533 N, 636768 E

DISCUSSION

Brush Creek Substation - Trend Study No. 9-24

The Brush Creek Substation trend study was established in 1997 and samples a Wyoming big sagebrush community. The land is managed by the BLM and is within the SJ Hatch grazing allotment. This area is an important winter range for mule deer. The site has an elevation of 5,850 feet and a southern aspect with a slight slope of 1-2%. Pellet group data from 1997 estimated 154 deer, 12 elk, and 2 cow days use/acre (380 ddu/ha, 30 edu/ha, and 5 cdu/ha). Pellet group data from 2005 estimated 45 deer, 1 elk, and 6 cows days use/acre (111 ddu/ja, 2 edu/ha, and 14 cdu/ha).

Soils have a sandy loam texture with a moderately shallow effective rooting depth of 13 inches. Soil pH was slightly alkaline at 7.9. The soil phosphorus was 8.4, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). The ratio of protective cover (vegetation, litter, and cryptograms) to bare ground is moderately low at 2.3 to 1. Bare soil is fairly high in the shrub interspaces where some erosion is noticeable. Soil and litter movement was apparent with slight pedestalling of the shrubs. The erosion condition class determined soil movement as stable in 2005.

Wyoming big sagebrush is the dominant key browse. Sagebrush cover in 1997 was estimated at 16%, but decreased to only 2.5% by 2005. This change in trend for sagebrush was observed on several sites in this region. Sagebrush density was estimated at 8,240 plants/acre in 1997, which decreased to only 1,280 plants/acre by 2005. In 1997, 16% of the population was classified as decadent. That has now increased to 84% in 2005. Furthermore, 69% of population was classified as dying. Young recruitment was minimal, although seedlings were very abundant in 2005. Seedling establishment will depend on cheatgrass cover and its ability to compete for the limited resources (Hall et al. 1999). Utilization on sagebrush was classified as moderate to heavily.

The herbaceous understory in 1997 was dominated by cheatgrass, but in 2005 many more forbs were present in the area. Cheatgrass averaged 3.5% cover in both 1997 and 2005, although nested frequency decreased significantly in 2005. Overall abundance can be illustrated by quadrat frequency, 79% in 1997 and 50% in 2005 where cover for both sampling periods was about the same. Only three perennial grasses were observed, all with less than 1% cover. These include squirreltail, Indian ricegrass, and needle-and-thread. Sum of nested frequency for perennial grasses was low in 1997, but decreased by almost 80% by 2005. Both annual and perennial forbs increased significantly with above normal precipitation in 2005. Cover for perennial and annual forbs increased from less than 1% in 1997 to 34% in 2005. Annual forb cover was almost nonexistent in 1997, but by 2005 cover was estimated at 11%. Perennial forbs contributed to less than 1% cover in 1997 and it increased to 23%. Scarlet globemallow was the dominant forb with 14% cover. Other dominate forbs included: timber poison milkvetch, tanseymustard, annual stickseed, purple aster, and Russian thistle. Most of these species are considered weedy.

1997 APPARENT TREND ASSESSMENT

Bare soil is fairly high in the interspaces of the shrubs. The ratio of protective cover to bare ground is moderately low at 2.5:1. Key browse Wyoming big sagebrush had an average cover of 16% and density estimated 8,240 plants/acre. Percent decadence is moderately low at 16%. Utilization is moderate to heavy hedging, but vigor remains fairly good. Herbaceous understory is dominated mostly by cheatgrass with a small population of squirreltail. Forbs are rare and provide less than 1% cover. The Desirable Components Index rated this site as fair with a score of 36 due to good browse cover, low decadency, but poor perennial grass and forb cover.

winter range condition (DC Index) - Fair (36) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soils is stable. Vegetation increased this year which will help protect soil from erosion. Bare ground and cryptograms decreased as a result of increase vegetation. The ratio of protective cover to bare ground is moderately low at 2.3:1 and the main difference from 1997 was the reduction in cryptogram nested frequency. Trend for key browse Wyoming big sagebrush is down. Density decreased from 8,240 plants/acre in 1997 to 1,280 in 2005. Eighty-four percent of the surviving population was classified as decadent. To further illustrate the quickly deteriorating problem on this site, 69% of the population were classified as dying. Young recruitment in minimal, although seedlings were very abundant this year. Their survival is doubtful. Trend for the herbaceous understory is slightly down. Perennial grasses are few to nonexistent and they decreased significantly in 2005. Cheatgrass decreased significantly in nested frequency, but cover remains the same. Forbs increased dramatically, but most are weedy species such as halogeton, Russian thistle, annual stickseed, and tansey mustard. Scarlet globemallow is the most abundant species and is keeping this trend from being down. Unfortunately, the forb component is of less importance on this site than the grasses. The Desirable Components Index rated this site as very poor with a score of 4 due to poor browse cover, high decadency, poor young recruitment, and poor perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Very Poor (4) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 24

T y p e	Species	Nested Frequency		Average Cover %	
		'97	'05	'97	'05
G	Bromus tectorum (a)	_b 292	_a 139	3.46	3.54
G	Oryzopsis hymenoides	-	5	-	.04
G	Sitanion hystrix	_b 146	_a 23	.92	.45
G	Stipa comata	3	3	.03	.02
Total for Annual Grasses		292	139	3.46	3.54
Total for Perennial Grasses		149	31	0.95	0.51
Total for Grasses		441	170	4.41	4.06
F	Agoseris glauca	-	1	-	.03
F	Alyssum alyssoides (a)	_a 6	_b 48	.02	.91
F	Arabis sp.	1	-	.00	-
F	Astragalus convallarius	28	46	.19	3.50
F	Chenopodium leptophyllum(a)	8	2	.01	.01
F	Chaenactis stevioides	_a -	_b 18	-	.42
F	Collinsia parviflora (a)	_a -	_b 27	-	.19
F	Cryptantha sp.	_b 15	_a 1	.03	.00
F	Descurainia pinnata (a)	_a -	_b 147	-	3.15

Type	Species	Nested Frequency		Average Cover %	
		'97	'05	'97	'05
F	Eriogonum cernuum (a)	a ¹	b ³³	.00	.45
F	Eriogonum racemosum	2	-	.06	.00
F	Gilia sp. (a)	a ⁻	b ³⁷	-	.74
F	Halogeton glomeratus (a)	a ⁻	b ⁵¹	-	.48
F	Lappula occidentalis (a)	a ¹⁴	b ¹³⁴	.03	2.14
F	Lactuca serriola	a ⁻	b ²⁴	-	.34
F	Machaeranthera canescens	a ²⁸	b ¹¹⁶	.07	3.91
F	Navarretia intertexta (a)	a ⁻	b ¹⁷	-	.35
F	Phlox longifolia	13	9	.03	.04
F	Plantago patagonica (a)	-	6	-	.03
F	Salsola iberica (a)	a ⁻	b ¹²⁴	-	2.22
F	Sisymbrium altissimum (a)	-	10	-	.38
F	Sphaeralcea coccinea	a ⁴²	b ¹⁹⁵	.13	13.68
F	Townsendia sp.	a ⁻	b ⁴¹	-	.59
Total for Annual Forbs		29	636	0.06	11.09
Total for Perennial Forbs		129	451	0.53	22.55
Total for Forbs		158	1087	0.59	33.64

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

BROWSE TRENDS --

Management unit 09 , Study no: 24

Type	Species	Strip Frequency		Average Cover %	
		'97	'05	'97	'05
B	Artemisia tridentata wyomingensis	100	34	16.13	2.45
B	Opuntia sp.	9	12	.03	.33
Total for Browse		109	46	16.17	2.78

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 24

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	3.34

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 09 , Study no: 24

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.3

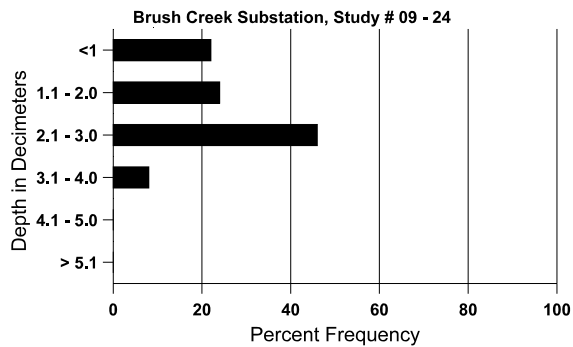
BASIC COVER --
Management unit 09 , Study no: 24

Cover Type	Average Cover %	
	'97	'05
Vegetation	18.79	35.26
Rock	.46	.35
Pavement	4.31	1.76
Litter	22.62	33.88
Cryptogams	5.05	1.14
Bare Ground	44.67	38.60

SOIL ANALYSIS DATA --
Herd Unit 09, Study # 24, Study Name: Brush Creek Substation

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.3	68.7 (12.6)	7.6	57.4	22.1	20.6	1.4	8.4	67.2	0.4

Stoniness Index



PELLET GROUP DATA --
 Management unit 09 , Study no: 24

Type	Quadrat Frequency		Days use per acre (ha)
	'97	'05	
Rabbit	9	26	-
Elk	16	1	1 (2)
Deer	61	46	45 (111)
Cattle	-	-	6 (14)

BROWSE CHARACTERISTICS --
 Management unit 09 , Study no: 24

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
97	8240	-	200	6740	1300	1460	56	42	16	7	12	14/25
05	1280	1740	60	140	1080	8160	36	61	84	69	69	13/18
<i>Opuntia sp.</i>												
97	180	-	-	160	20	-	0	0	11	11	11	4/11
05	260	-	-	160	100	-	0	0	38	23	23	4/14

Trend Study 9-25-05

Study site name: Buckhorn Canyon.

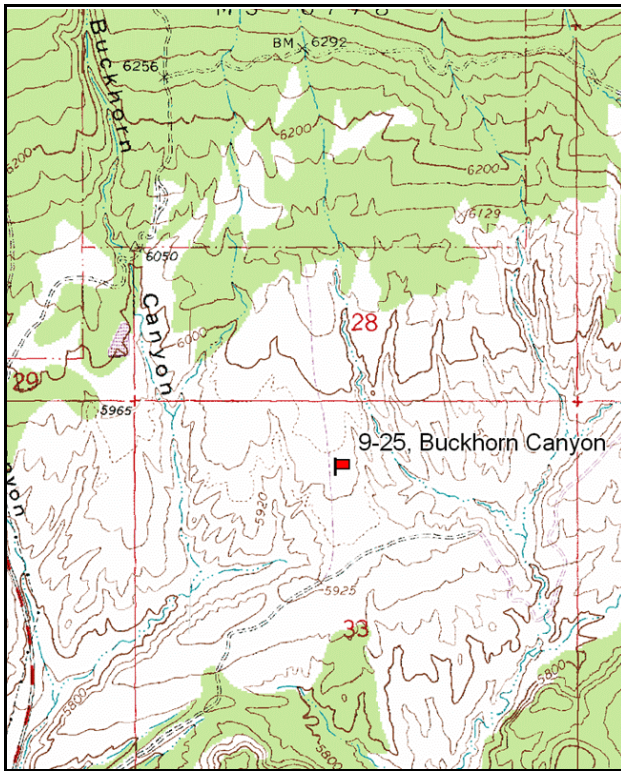
Vegetation type: Wyoming Big Sagebrush.

Compass bearing: frequency baseline 158 degrees magnetic.

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

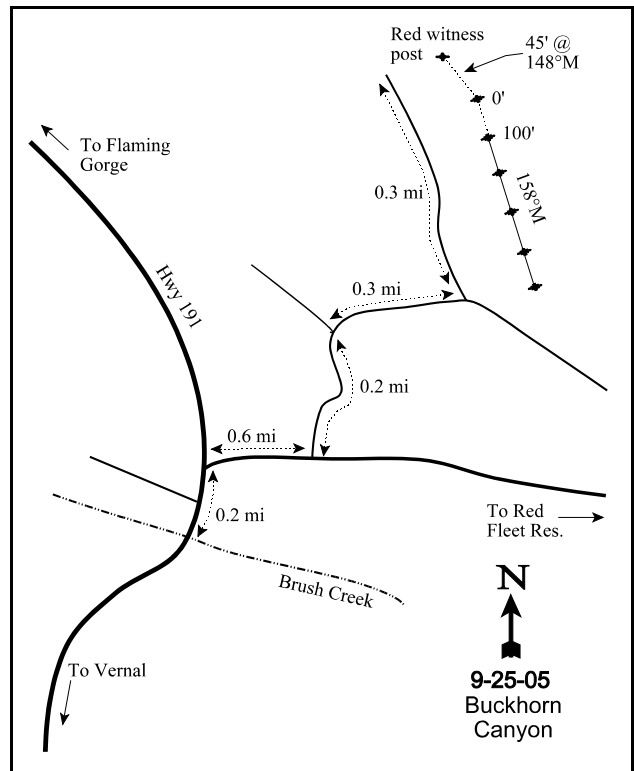
LOCATION DESCRIPTION

From Vernal proceed north on Highway 191. After Highway 191 crosses brush creek continue 0.2 miles and turn right onto the road that leads to Red Fleet Reservoir. On this road proceed 0.6 miles. Turn left onto a dirt road. Go 0.2 miles to a fork. Turn right and go 0.3 miles to another fork. Turn left and go 0.3 miles. The witness post is a red full high fence post about 50 feet to the east. The 0-foot stake is 45 to the south at 148 degrees magnetic. The 0' stake is marked with browse tag #120.



Map name: Donkey Flat

Township 3N, Range 22E, Section 33



Diagrammatic Sketch

GPS: NAD 27, UTM 12T 4495926 N 630959 E

DISCUSSION

Buckhorn Canyon - Trend Study No. 9-25

The Buckhorn Canyon study is located approximately 11 miles north of Vernal off Highway 191. The study was established in 2001 to monitor winter use by big game, primarily mule deer. The study lies on a gentle (1-2%) south-facing slope at an elevation of 5,970 feet. Deer use is heavy, with use by elk and livestock being much lighter. Pellet group data from 2001 estimated 175 deer, 28 elk, and 28 cow days use/acre (431 ddu/ha, 69 edu/ha, and 69 cdu/ha). A lot of the pellet groups sampled had been displaced by runoff and overland flow. Pellet group data from 2005 estimated 37 deer, 11 elk, and 29 cow days use/acre (91 ddu/ha, 26 edu/ha, and 72 cdu/ha). This study is managed by the BLM and is within the Brush Creek allotment.

Soils have a clay loam texture and a slightly alkaline pH (7.7). Effective rooting depth was estimated just over 13 inches. Rock and pavement occur in very low amounts. There is a layer of stone found between 8 and 12 inches below the surface. Phosphorus and potassium are both low at 4.1 ppm and 57.6 ppm, respectively. Values lower than 6 ppm for phosphorus and 60 ppm for potassium may limit plant growth and development (Tiedemann and Lopez 2004). Low amounts of herbaceous vegetation and litter cover with high amounts of bare ground allow significant erosion to occur. An erosion condition class assessment categorized soils as having slight erosion in 2005. This classification was due mostly to heavy pedestaling around sagebrush stems and surface litter translocation during recent thunderstorms.

Wyoming big sagebrush is the dominant browse. Sagebrush density was estimated at 4,900 plants/acre in 2001. By 2005 density had decreased to 3,860 plants/acre. Sagebrush averaged 21% cover in 2001, which decreased to only 6% by 2005. Percent decadence was high in 2001 at 49%, but this increased to 61% in 2005. Twenty-two percent of the population was classified as dying in 2001. This increased substantially to 46% by 2005. Recruitment of young plants was low in 2001 at only 2% (80 plants/acre), although this increased to 26% (1,020 plants/acre) in 2005. The increase in the number of young plants should help replace many of the dying population if they are able to persist. Several seedlings were also observed in 2005. Annual leader growth averaged less than 2 inches in 2001. This increased to 3.5 inches in 2005. Utilization has been moderate to heavy, whereas vigor has been fairly poor to poor.

The herbaceous understory is poor. Perennial grasses produced 5.5% cover in 2001 and 7.5% in 2005. Thickspike wheatgrass and needle-and-thread were the most abundant grasses in both years. Other perennial grasses sampled include Sandberg bluegrass, bottlebrush squirreltail, and Indian ricegrass. Needle-and-thread had a patchy distribution, while Sandberg bluegrass was found growing primarily underneath the safety of sagebrush crowns. Cheatgrass cover was less than 1% in both years, but nested frequency increased significantly in 2005. However, these values are still relatively low. Forbs increased substantially in 2005. Annual forb cover was less than 0.5% in 2001, but increased to 9.5% in 2005. Most of the species sampled were weedy species: tansey mustard, annual stickseed, bur buttercup, and Russian thistle. Perennial forbs had similar results, increasing from 1% in 2001 to 5% in 2005. Scarlet globemallow was the main perennial species that increased. A treatment to thin and restore vigor to the sagebrush population, as well as improve understory productivity, should be considered in the future.

2001 APPARENT TREND ASSESSMENT

Soils appear to have a downward trend. Bare soil is high, pedestaling is severe, and displacement of surface litter is very common. Herbaceous cover, which is best at holding soils in place, is low. The Wyoming big sagebrush population is in poor condition with high decadency and poor vigor. This is compounded by moderate to heavy use. Density will likely decline in the future with 22% of the population classified as dying and very low recruitment from young plants. The understory is sparse for a sagebrush community and will probably not improve without some type of mechanical treatment to thin the sagebrush population and restore

some of the herbaceous understory. The Desirable Components Index rated this site as fair to good with a score of 44 due to excellent browse cover, high decadency, poor young recruitment, and moderately low perennial grass cover.

winter range condition (DC Index) - Fair to Good (44) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Vegetation, bare ground, and litter all stayed similar to previous values. Cryptograms declined slightly, but the ratio of protective cover to bare ground remained at 2.3 to 1. This value is very low when compared to other sagebrush communities. Trend for key browse Wyoming big sagebrush is down. Density decreased by 21% and percent decadency increased to 61%. Almost half (46%) of the population was classified as dying in 2005. Young recruitment increased from 2% of the population to 26%. Seedlings were very abundant this year. This recruitment may help to reverse the downward trend if they are able to become established and persist. Trend for the herbaceous understory is slightly down. Sum of nested frequency for perennial grasses were similar to 2001. Cheatgrass increased significantly, although it produced less than 1% cover and still has a quadrat frequency of only 20%. Forbs increased significantly, but most are weedy species. Scarlet globemallow was the only species that increased that was not a weedy increaser. Other dominate forbs include tansey mustard, annual stickseed, bur buttersup, and Russian Thistle. The Desirable Components Index rated this site as fair to good with a score of 44 due to poor browse cover, high decadency. However, the site has excellent recruitment of young, and moderate perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Fair to Good (44) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 25

Type	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
G	Agropyron dasystachyum	187	186	2.12	4.30
G	Agropyron intermedium	-	4	-	.03
G	Bromus tectorum (a)	_a 25	_b 52	.09	.58
G	Oryzopsis hymenoides	2	5	.03	.05
G	Poa secunda	106	84	1.23	.94
G	Sitanion hystrix	57	46	.96	.26
G	Stipa comata	50	54	1.07	2.04
Total for Annual Grasses		25	52	0.09	0.58
Total for Perennial Grasses		402	379	5.42	7.64
Total for Grasses		427	431	5.51	8.22
F	Astragalus convallarius	5	5	.19	.28
F	Calochortus nuttallii	11	11	.02	.03

Type	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
F	Chenopodium leptophyllum(a)	-	4	-	.01
F	Collinsia parviflora (a)	-	2	-	.00
F	Cryptantha sp.	-	7	-	.07
F	Descurainia pinnata (a)	_a 50	_b 92	.11	1.21
F	Eriogonum cernuum (a)	-	1	-	.00
F	Gilia sp. (a)	_a -	_b 15	-	.38
F	Lappula occidentalis (a)	_a 100	_b 323	.21	7.25
F	Lomatium sp.	-	2	-	.00
F	Machaeranthera canescens	2	4	.01	.03
F	Phlox longifolia	_b 124	_a 16	.56	.07
F	Ranunculus testiculatus (a)	_a 9	_b 37	.02	.39
F	Salsola iberica (a)	_a -	_b 68	-	.37
F	Sphaeralcea coccinea	_a 67	_b 117	.25	4.64
F	Townsendia sp.	20	14	.03	.22
Total for Annual Forbs		159	542	0.35	9.63
Total for Perennial Forbs		229	176	1.07	5.36
Total for Forbs		388	718	1.43	15.00

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

BROWSE TRENDS --

Management unit 09 , Study no: 25

Type	Species	Strip Frequency		Average Cover %	
		'01	'05	'01	'05
B	Artemisia tridentata wyomingensis	73	80	21.31	6.06
B	Juniperus osteosperma	0	1	1.00	.18
B	Opuntia sp.	14	16	.45	.65
Total for Browse		87	97	22.76	6.89

CANOPY COVER, LINE INTERCEPT --
 Management unit 09 , Study no: 25

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	7.40
Juniperus osteosperma	.20
Opuntia sp.	.48

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 09 , Study no: 25

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	3.5

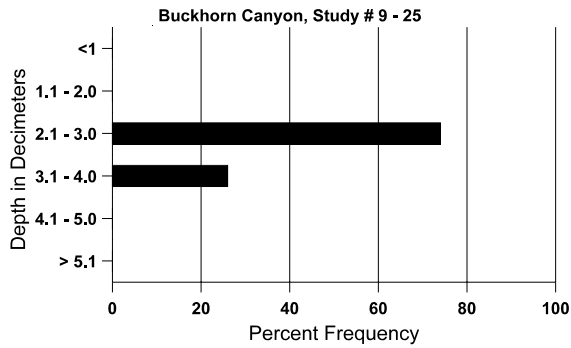
BASIC COVER --
 Management unit 09 , Study no: 25

Cover Type	Average Cover %	
	'01	'05
Vegetation	27.13	25.62
Rock	.04	.04
Pavement	.46	1.01
Litter	31.23	30.46
Cryptogams	4.40	2.79
Bare Ground	50.20	50.00

SOIL ANALYSIS DATA --
 Herd Unit 9, Study no: 25, Buckhorn Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.2	63.0 (13.1)	7.7	35.6	33.8	30.6	1.4	4.1	57.6	0.4

Stoniness Index



PELLET GROUP DATA -- Management unit 09 , Study no: 25

Type	Quadrat Frequency		Days use per acre (ha)	
	'01	'05	'01	'05
Rabbit	25	66	-	-
Elk	10	9	28 (69)	11 (26)
Deer	62	47	175 (431)	37 (91)
Cattle	10	5	28 (68)	29 (72)

BROWSE CHARACTERISTICS -- Management unit 09 , Study no: 25

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
01	4900	-	80	2400	2420	980	41	12	49	22	22	19/28
05	3860	3680	1020	480	2360	3500	25	44	61	46	47	19/27
Grayia spinosa												
01	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	24/56
Gutierrezia sarothrae												
01	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	12/15
Juniperus osteosperma												
01	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	20	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
01	420	-	40	280	100	-	0	0	24	-	0	3/11
05	640	-	20	540	80	-	0	0	13	3	22	4/15

SUMMARY

MANAGEMENT UNIT 9 - SOUTH SLOPE

Management unit 9 has 25 trend studies, of which 20 were reread in 2005. The five sites that were not reread in 2005 include: Dry Fork Mountain (burned), Rye Grass, Toliver Creek P-J, Browns Park PJ Burn, and Red Pine Canyon (road washed out). The study at Toliver Creek in the untreated pinyon-juniper was not reread because it is in very poor condition and there was very little wildlife sign on the site. This study was originally established to compare untreated woodland with the adjacent Toliver Creek Chaining study (9-10). It may be reread in the future but it is apparent that no significant changes have taken place since 1995. Rye Grass was suspended because of little sign of wildlife use. Dry Fork Canyon was suspended because it had recently burned and Red Pine Canyon was suspended because the access road had been washed out.

In 2000, the browse and herbaceous understory components, on the majority of studies in this unit, showed the negative effects due to drought. Because of the long term effects of drought, this trend continued in 2005 for the browse trend, but the herbaceous trends typically improved with above normal precipitation in 2005. Of the 20 trend studies reread in 2005:

The key browse species of Wyoming and mountain big sagebrush, especially important during the winter months of January thru March, have shown continuing increases in the number of decadent plants, continuing increases in the number of plants classified as dying, and corresponding decreases in their respective populations since 1995. Mountain big sagebrush, because of its inherently better site potential, has declining population characteristics that are not as severely depressed as those for Wyoming big sagebrush which always appears to occur on sites of poorer site potential. The following three series of values are averages listed in order of year sampled (1995, 2000, and 2005). These values best illustrate the differences between mountain big sagebrush and Wyoming big sagebrush sites and the continuous downward condition of sagebrush ranges in this management unit. These averages are as follows:

- percent decadence...15%, 25%, and 28% for mountain big sagebrush
- percent decadence...22%, 46%, and 62% for Wyoming big sagebrush
- percent dying..... 9%, 15%, and 21% for mountain big sagebrush
- percent dying.....12%, 22%, and 44% for Wyoming big sagebrush
- population changes..2,965 (1995) and 2,843 (2005) plants/acre for mountain big sagebrush
- population changes..3,413 (1995) and 2,366 (2005) plants/acre for Wyoming big sagebrush

The perennial herbaceous understories associated with mountain big sagebrush and Wyoming big sagebrush have similar correlated trends with regard to the innate site potentials of the two sagebrush subspecies. The following values show percent change in nested frequency for perennial grasses and forbs for both subspecies of sagebrush from 1995 to 2005:

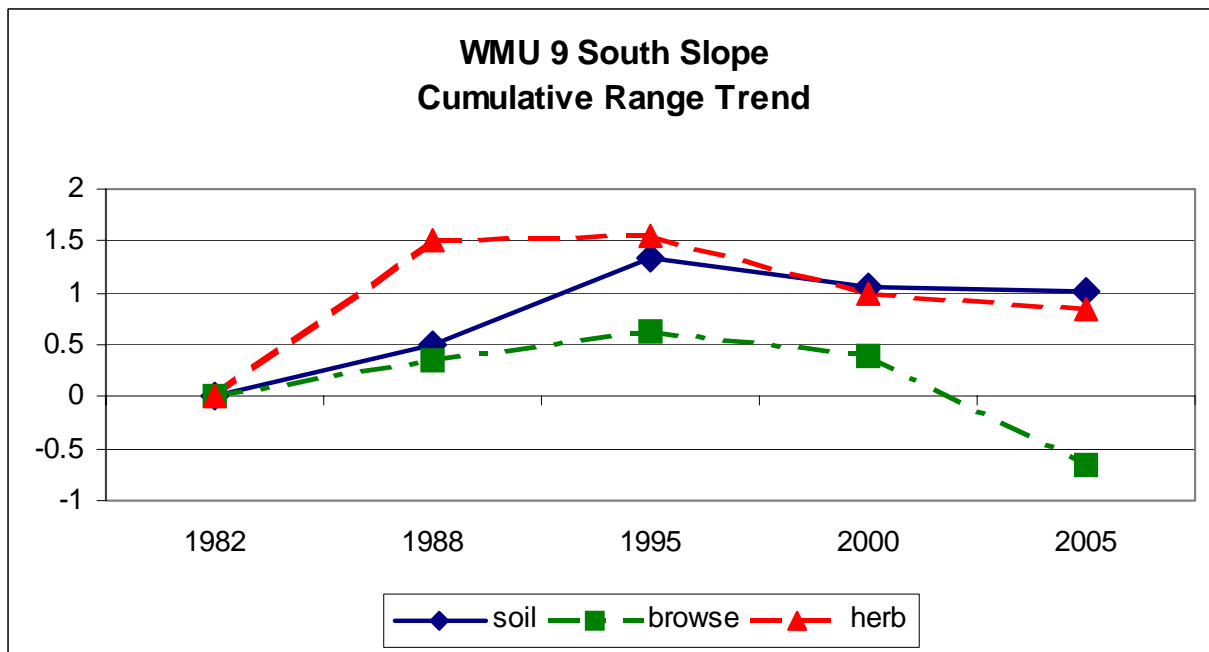
- percent change for perennial grasses... -8% for mountain big sagebrush
- percent change for perennial grasses... -20% for Wyoming big sagebrush
- percent change for perennial forbs..... -9% for mountain big sagebrush
- percent change for perennial forbs..... -29% for Wyoming big sagebrush

Increases in decadency and poor vigor in key browse populations, specifically sagebrush, resulted in a downward browse trend on over three-fourths of the studies in 2005. Above normal precipitation in 2005 helped the browse population, but several were beyond recovery levels. Seedlings were abundant on many of the sites and future observations will determine if they become established and persist in the population. The

herbaceous vegetation was more positively affected by the above normal precipitation. The trends did not necessarily reflect this change, because several of the increases were of undesirable species. Seven studies were assessed as having up or slightly up herbaceous understory trends in 2005. However, not one these sites were Wyoming sagebrush sites. Eight sites had down or slightly down trends, these were all Wyoming sagebrush sites. It should be understood that these upward trends are from 2000 are not necessarily improved from what there was in 1995. Continued normal precipitation in the future should help reduce shrub decadency and improve vigor as well. This should also result in increases in frequency and abundance for perennial herbaceous species.

Cumulative Range Trends -- WMU 9 South Slope

	1982	1988	1995	2000	2005
soil	0	0.5	1.3	1.1	1.0
browse	0	0.4	0.6	0.4	-0.7
herb	0	1.5	1.6	1.0	0.8
	14 sites	20 sites	22 sites	20 sites	20 sites



Trend Summary

	Category	1982	1988	1995	2000	2005
9-1 Red Mountain Allotment	soil	est	0	+1	0	+1
	browse	est	-1	0	-1	-2
	herbaceous understory	est	0	-1	-2	-2
9-2 Taylor Mountain	soil	est	+2	0	0	0
	browse	est	+2	0	0	-1
	herbaceous understory	est	+2	0	-1	0
9-3 Dry Fork Mountain	soil	est	+1	+1	0	NR
	browse	est	0	+1	0	NR
	herbaceous understory	est	+2	+1	0	NR
9-4 Sawtooth - Flat Spring	soil	est	+1	0	0	-1
	browse	est	+1	0	+1	0
	herbaceous understory	est	+1	0	-1	+1
9-5 Island Park	soil	est	-1	+1	0	0
	browse	est	-1	-2	-2	-2
	herbaceous understory	est	+2	+1	-2	-1
9-6 Above Steinaker Draw	soil		est	0	0	0
	browse		est	+1	-1	-2
	herbaceous understory		est	-2	-2	-1
9-7 Warren Draw	soil	est	0	0	0	0
	browse	est	+1	+1	0	-1
	herbaceous understory	est	+2	+1	-2	+1
9-8 Rye Grass	soil	est	0	+1	0	NR
	browse	est	-1	+1	0	NR
	herbaceous understory	est	+2	-2	-1	NR
9-9 Little Hole	soil	est	0	0	0	0
	browse	est	0	+1	-1	-1
	herbaceous understory	est	+2	0	-2	+2

(-2) = down, (-1), slightly down, (0) = stable, (+1) = slightly up, (+2) = up
 (est) = site established, (NR) = site not read

	Category	1982	1988	1995	2000	2005
9-10 Toliver Creek Chaining	soil		est	+1	-1	0
	browse		est	+1	+1	-1
	herbaceous understory		est	-2	+2	0
9-11 Toliver Creek P-J	soil		est	+1	NR	NR
	browse		est	-2	NR	NR
	herbaceous understory		est	+1	NR	NR
9-12 Brown's Park P-J and Burn	soil		est	+2	+1	NR
	browse		est	+2	0	NR
	herbaceous understory		est	+2	+1	NR
9-13 John Starr Flat	soil	est	0	0	0	0
	browse	est	+1	+1	0	-2
	herbaceous understory	est	0	-2	-1	0
9-14 Red Pine Canyon	soil	est	0	0	+1	NR
	browse	est	0	0	0	NR
	herbaceous understory	est	+1	-2	0	NR
9-15 Mud Springs Draw	soil	est	0	0	NR	0
	browse	est	+1	+1	NR	-1
	herbaceous understory	est	+1	-1	NR	0
9-16 Mosby Mountain	soil	est	0	+1	0	-1
	browse	est	0	-2	0	-1
	herbaceous understory	est	+2	-1	-1	+1
9-17 Farm Creek	soil			est	0	0
	browse			est	0	-1
	herbaceous understory			est	0	+1
9-18 Gooseberry Spring	soil	est	0	+1	0	0
	browse	est	+2	+1	0	-1
	herbaceous understory	est	+2	-1	-2	+2

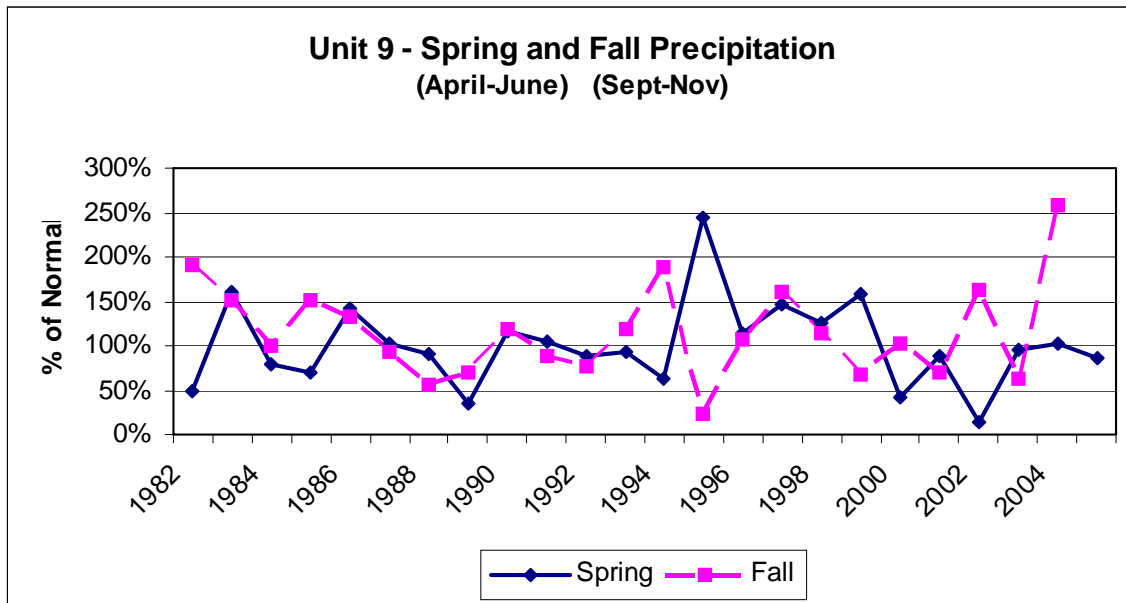
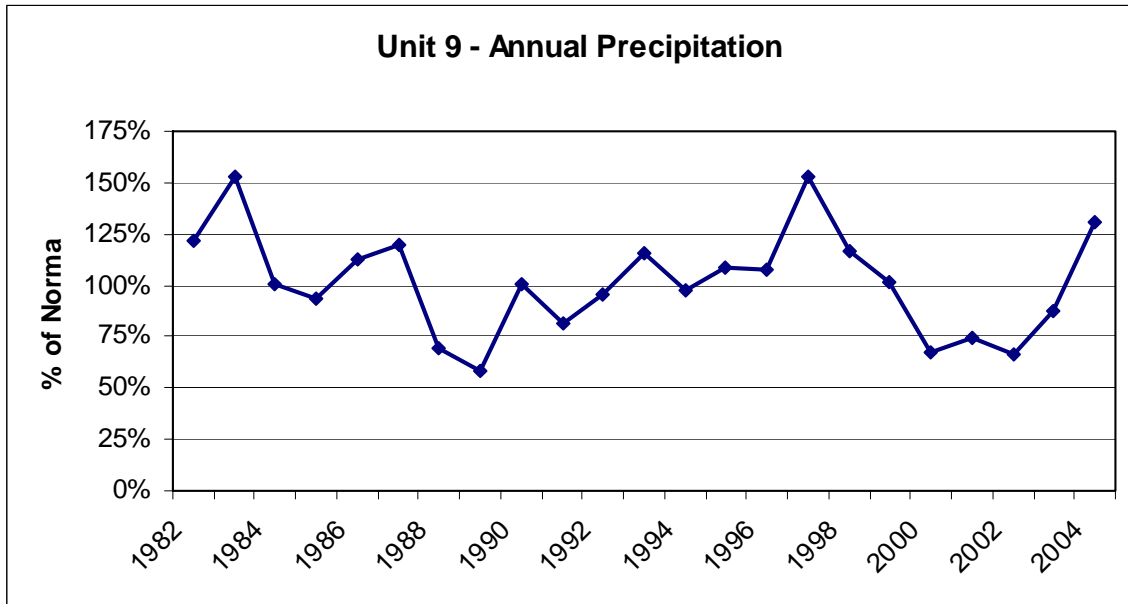
(-2) = down, (-1), slightly down, (0) = stable, (+1) = slightly up, (+2) = up
(est) = site established, (NR) = site not read

	Category	1982	1988	1995	2000	2005
9-19 Mosby Mountain South	soil		est	0	0	0
	browse		est	-2	0	0
	herbaceous understory		est	+2	-1	+2
9-20 Seep Hollow	soil	est	0	+1	0	0
	browse	est	0	+1	0	+1
	herbaceous understory	est	0	+2	-1	+1
9-21 Brown's Park River Corridor-Livestock	soil				est	-1
	browse				est	0
	herbaceous understory				est	-1
9-22 Brown's Park River Corridor-Wildlife	soil				est	-1
	browse				est	-1
	herbaceous understory				est	-2
9-23 Rock Creek	soil					est
	browse					est
	herbaceous understory					est
	Category			1997	2000	2005
9-24 Brush Creek Substation	soil			est	NR	0
	browse			est	NR	-2
	herbaceous understory			est	NR	-1
9-25 Buckhorn Canyon	soil				est	0
	browse				est	-2
	herbaceous understory				est	-1

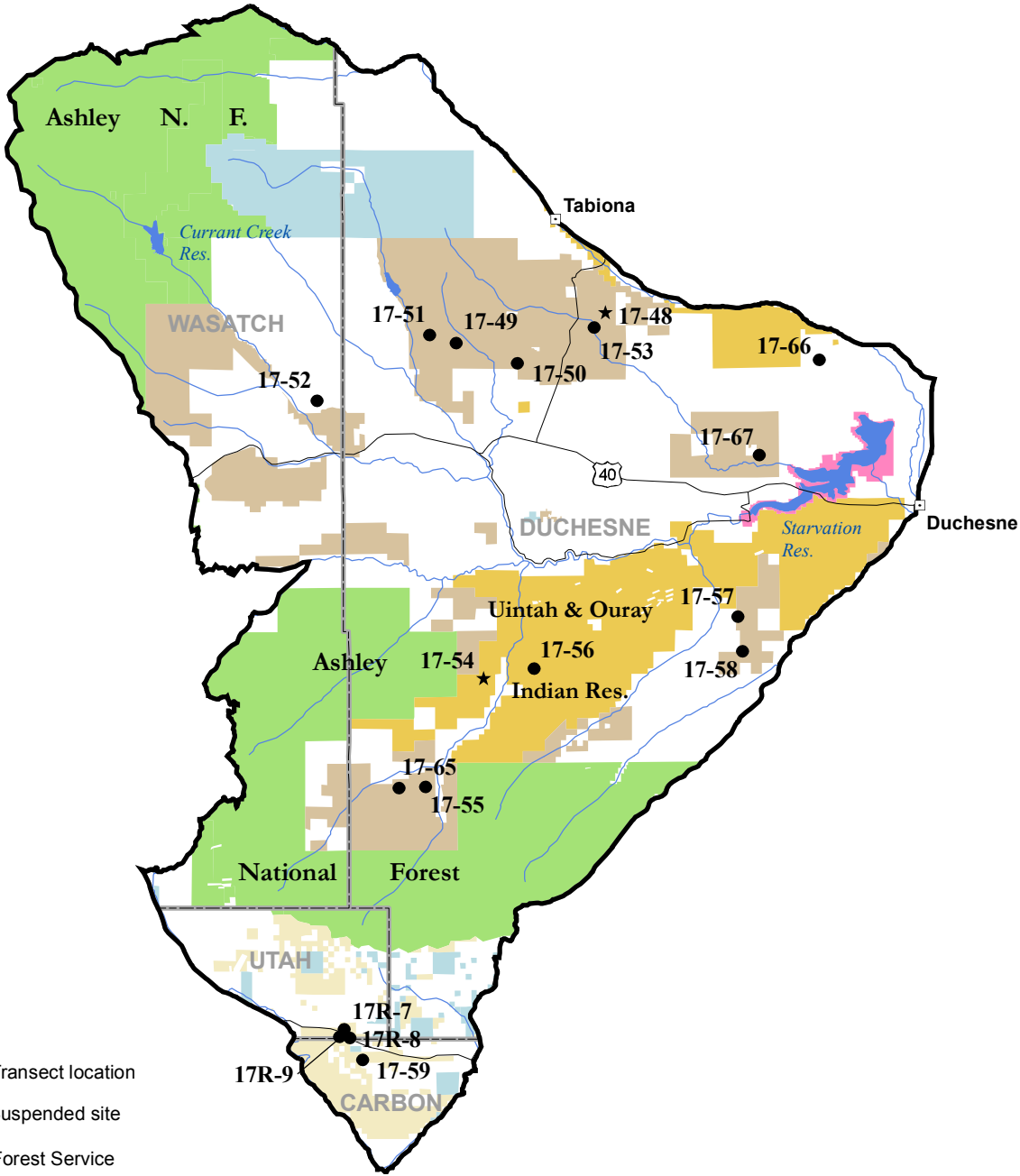
	Category	1982	1988	1995	2000	2005
Average Range Trend	soil	est	0.5	0.8	-0.3	-0.1
	browse	est	0.4	0.3	-0.2	-1.1
	herbaceous understory	est	1.5	0.1	-0.6	-0.2
Number of Sites Read		14	19	22	20	20

(-2) = down, (-1), slightly down, (0) = stable, (+1) = slightly up, (+2) = up
(est) = site established, (NR) = site not read

Precipitation graphs for the Vernal unit. Data is percent of normal precipitation averaged for weather stations in Neola, Altamont, and Vernal (Utah Climate Summaries 2005).

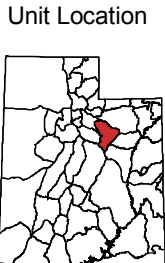


Management Unit 17



- Transect location
- ★ Suspended site
- Forest Service
- BLM
- State of Utah
- Native American
- Private
- State Park/Recreation Area
- State Wildlife Reserve
- Water body
- River or stream
- Road

Map Scale 1:500,000 (1 inch = 7.9 miles)



WILDLIFE MANAGEMENT UNIT 17 - WASATCH MOUNTAINS

Boundary Description

Salt Lake, Summit, Wasatch, Duchesne, Carbon, Utah counties - Boundary begins at the junction of Interstate 15 and Interstate 80 in Salt Lake City, then east on I-80 to Highway US-40; south on US-40 to Highway SR-32; east on SR-32 to Highway SR-35; southeast on SR-35 to Highway SR-87; south on SR-87 to Duchesne and Highway US-191; south on US-191 to Highway US-6; northeast on US-6 to I-15; north on I-15 to I-80 in Salt Lake City.

Management Unit Description

Management unit 17 is divided into eight smaller, more manageable subunits. These are: Diamond Fork, Hobble Creek, Timpanogas, Salt Lake County-East Bench, Heber, Currant Creek, Avintaquin, and Price Canyon. The Northeastern Region 2005 report covers only the Current Creek, and Avintaquin subunits. The Salt Lake County-East Bench subunit no longer contains range trend studies due to lack of access and development. The Diamond Fork, Hobble Creek, Timpanogas, and Heber subunits are monitored as part of the Division's Central Region rotation which were last read in 2002 and will be reread in 2007.

Of the total area within this management unit, 63% is summer range, 35% is winter range, and 2% is classified as year long range. The areas of most concern in this unit are the winter ranges, which are very limited in quantity and quality. Residential developments along the Wasatch Front have consumed much of the critical winter range that was available to wildlife, and this will continue in the future. Because most of the winter range in this unit now lies on private land, managing wildlife populations is a challenge. Critical issues facing management of big game in unit 17 include crop depredation, habitat quantity and quality, and highway mortality (Utah Division of Wildlife Resources 2003).

Habitat Management Objectives/Strategies

The primary habitat management objectives for this unit are: 1) maintain and/or enhance forage production through direct range improvements throughout the unit on winter range; 2) work with private landowners and federal, state, local, and tribal governments to maintain and protect critical and existing winter range from future losses; and 3) provide improved habitat security and escapement opportunities for deer. The strategies to be used to accomplish these objectives are: 1) monitor range trend studies throughout the unit, specifically those found on remaining winter ranges; 2) work cooperatively to utilize grazing, prescribed burning, and other recognized vegetative manipulation techniques to enhance deer forage quantity and quality; 3) utilize antlerless deer harvest to improve or protect forage when vegetative declines are attributed to deer overutilization; and 4) cooperate with and provide input to land management planning efforts dealing with management affecting habitat security, quality, and quantity (Utah Division of Wildlife Resources 2003).

Trend Study Description

Eleven trend studies were established in 1982 and reread in 1988, and 1995. Several studies have been added including: Emma Park (17-59) in 1994, Rabbit Gulch (17-67) in 1997, Emma Park Harrow grazed/ungrazed (17R-7 and 17R-8) in 2001, Emma Park Meadow (17R-9) in 2001, and Sand Wash (17-66) and Little Horse Ridge (17-65) in 2005. In 2000, the road to the Blacktail Ridge (17-48) was impassible to trucks so was not read. The road to Sam's Canyon, on Ute Indian land was impassible in 2000, but read in 2005. Peatross Ranch (17-54) was not read in 2005 because of low production and little wildlife use. The total number of sites read in 2005 was 16. Ten are located on lands managed by the Utah Division of Wildlife, 4 are managed by the Bureau of Land Management, 1 is on private land, and 1 on Ute Tribal land.

Trend Study 17-49-05

Study site name: Grey Wolf Mountain.

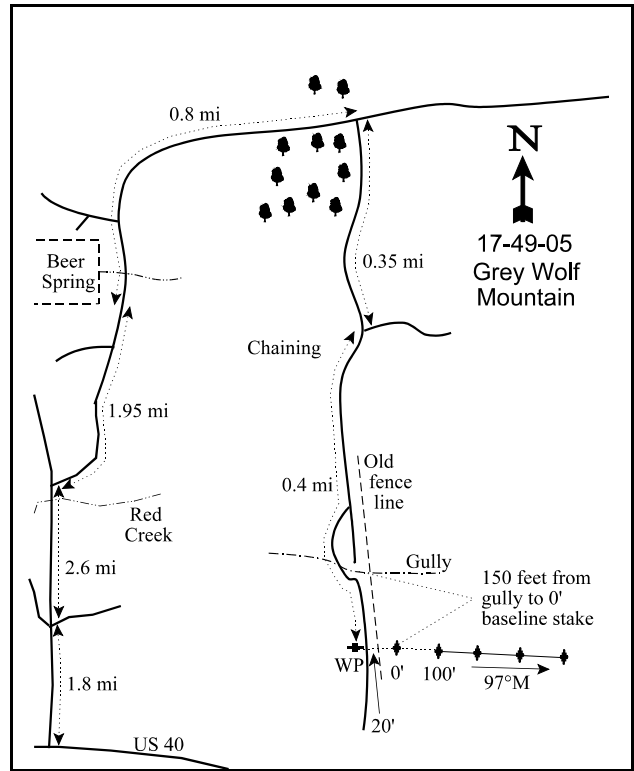
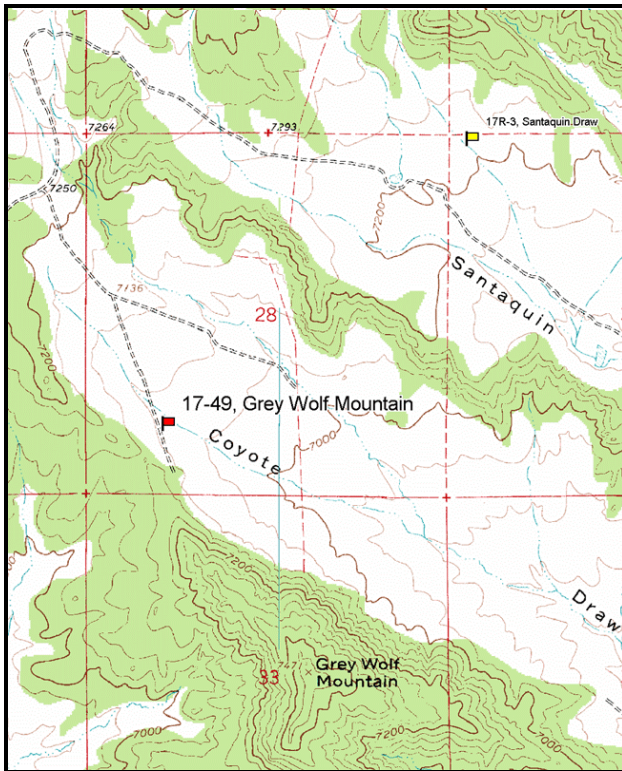
Vegetation type: Wyoming Big Sagebrush.

Compass bearing: frequency baseline 97 degrees magnetic.

Frequency belt placement: line 1 (15 & 96ft), line 2 (39ft), line 3 (52ft), line 4 (66ft).

LOCATION DESCRIPTION

From U.S. 40 in Fruitland, travel north up the Red Creek Road 1.8 miles to a 3-way fork. Take the middle fork and go 2.6 miles. After crossing Red Creek, turn right onto a dirt road. Proceed northeast on this road for 1.95 miles to Beer Spring, and the fork to Study 17-51-00. From the southwest corner of the fenced spring bear right and continue for 0.8 miles. Turn right and go 0.35 miles. Stay right and go 0.4 miles going around the gully to an old fence line to a witness post on the right. The 0-foot stake is 20 feet east of the witness. It may not be possible to drive across the deep gully. The start of the baseline is approximately 150 feet south of the gully. The 0-foot baseline stake, a green, short fencepost, is marked by browse tag #7090.



Map Name: Tabby Mountain

Diagrammatic Sketch

Township 2S, Range 8W, Section 28

GPS: NAD 27, UTM 12T 4457860 N, 517197 E

DISCUSSION

Grey Wolf Mountain - Trend Study No. 17-49

The Grey Wolf Mountain trend study is located at the north end of Grey Wolf Mountain at an elevation of approximately 7,080 feet, near the head of Coyote Draw. The slope is less than 5% with an east aspect. The trend study replaced a line-intercept study established in 1981. The land is administered by the Utah Division of Wildlife Resource as part of the Tabby Mountain WMA in an area which is utilized as winter range by both deer and elk. The area was disked on contour and seeded in the fall of 1990 as a habitat and watershed improvement project. Livestock grazing was removed after the treatment. Cattle and horses grazed the area previous to the treatment and use was reported heavy in 1988. Numerous trespassing cattle have been observed in the area during past readings. Pellet group data from 2000 were estimated at 34 deer, 13 elk, and 6 cow days use/acre (84 ddu/ha, 32 edu/ha and 15 cdu/ha). Deer and elk pellet groups appear to be primarily from winter use. In 2005, pellet group data estimates were 58 deer, 47 elk, and 15 cow days use/acre (144 ddu/ha, 116 edu/ha, and 36 cdu/ha).

Soils are alluvially deposited and of considerable depth. The effective rooting depth was estimated at just over 15 inches. There is little rock in the soil profile and soil depth measurements were limited only by soil compaction. Soil texture is a clay loam with a slightly alkaline soil reaction (pH of 7.5). Phosphorus was measured at only 3.6 ppm and values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Protective ground cover has been poor in the past, consisting mostly of old mature sagebrush cover. The relative cover of bare ground has remained around 50%. There is evidence of some overland flow between shrubs and rills, which feed into a large (10' to 12' deep) active gully northeast of the site, are beginning to form. The only factor preventing increased erosion is the cover provided by herbaceous vegetation. The erosion index measurement in 2005 rated the soil erosion as slight, mainly because of small pedestals surrounding shrubs and perennial grasses, gullies covering 2-5% of the site, some minor soil movement, minor litter movement, as well as small rills and flow patterns between perennial species.

The key browse species is Wyoming big sagebrush. There appears to be some hybridization with mountain big sagebrush and basin big sagebrush since some of the sagebrush display characteristics of both these subspecies. For this report, to help alleviate any confusion, all the sagebrush encountered on the study was classified as Wyoming big sagebrush. These shrubs vary considerably in color, size, growth form, and degree of hedging. Typically, the Wyoming big sagebrush occurs more in the flat and the basin big sagebrush type occurs more along the gullies with deeper soils. Wyoming big sagebrush had an estimated density of 1,265 plants/acre in 1982, most of which were mature. By 1988, the density had increased to 6,466 plants/acre due to a dramatic increase in the number of young shrubs (4,733 plants/acre). Since the disking (thinning) in 1990, shrub densities have fluctuated from 2,300 plants/acre in 1995, to 2,800 in 2000, to 1,960 in 2005. The young population has slowly decreased from 45% in 1995, to 29% in 2000, to 9% of the population by 2005. The decadence was very low in 1982 (5%) and 1988 (3%). It has since increased gradually to 10% in 1995, 13% in 2000, and 19% in 2005. Use was light to moderate from 1982 through 1995. Use in 2000 and 2005 was moderate to heavy. Even with the increased heavy use, vigor remained normal on all but 1% of the individuals in 2000 and 8% in 2005.

Small populations of winterfat, fourwing saltbush, and rubber rabbitbrush provide a limited amount of additional forage for wintering big game. Corymbed eriogonum is also fairly abundant. The undesirable increaser, narrowleaf low rabbitbrush, has provided between one-fourth to one-third of the shrub cover with a fairly stable population since 1988.

Before treatment, the herbaceous understory consisted of crested wheatgrass and a few forbs. Crested wheatgrass was reported to be heavily utilized in both 1982 and 1988. As a result of use and competition, vigor was reduced. After the disking treatment, crested wheatgrass declined significantly in nested frequency, but it continues to be the most abundant grass and accounted for 9% cover in 1995, 17% in 2000, and 20% in 2005. Several other grasses were encountered yet all occur in small numbers. Forbs were also more abundant after treatment with 19 perennial species sampled in 1995 with a cover of 8%. Useful species include Lewis flax, yellow sweet clover, low penstemon and scarlet globemallow. Due to drought conditions, cover and frequency of forbs declined from 1995 to 2000 and still had not recovered by 2005.

1982 APPARENT TREND ASSESSMENT

Trend is difficult to evaluate. Based on soil loss, the percentage of bare ground and the trampling effect of livestock, soil trend is probably slightly downward. However, from a management standpoint, this may be an acceptable trade-off if shrub density and composition can be improved. A rather speculative estimate of vegetation trend is stable to slowly improving. The apparent increase in the key species is encouraging, especially if increases of low rabbitbrush can be limited or avoided.

1988 TREND ASSESSMENT

Trend for soil is stable yet in poor condition. A large amount of bare soil remains exposed, 50% of the ground surface. Litter cover is poor and severe gullying continues in Coyote Draw which is adjacent to the site. With reduced grass vigor and litter build-up, there is accelerated soil loss from the flat. Trend for the key browse species is up. Sagebrush density has gone from 1,265 plants/acre to 6,466 plants/acre. The density of mature plants is similar between years, with a moderate density of 1,533 mature plants/acre. The large increase in sagebrush density occurred because of the number of young plants. Sagebrush has increased from 18% to 44% of the browse composition. Overall, use remains moderate and vigor is fair. Annual growth and seed production were low this year. Density of undesirable browse species has increased since 1982. Trend for the herbaceous understory is slightly up with an increase in quadrat frequency of grasses and forbs.

TREND ASSESSMENT

soil - stable (0)

browse - up (+2)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

Since the contoured thinning treatment of sagebrush, percent bare ground has increased from 50% to 54%. Litter cover also declined from 36% to 22%, but the litter is more evenly distributed. Even with these negative changes, sum of nested frequency of grasses and forbs increased providing much better soil protection. No erosion was reported in 1995 and trend for soil is considered stable. The browse trend is stable. Even though total density of Wyoming big sagebrush declined substantially, the number of mature plants remained similar to previous years. The disking treatment thinned the population and eliminated most of the older plants. The remaining stand has better vigor and is less heavily hedged. Percent decadence is still low at 10%. Trend for the herbaceous understory is up slightly. Sum of nested frequency for grasses increased slightly, but more importantly, composition improved with 7 new perennial grass species being sampled. The sum of nested frequency for forbs increased with significant increases in 15 of the 20 perennial species sampled in 1995. The Desirable Components Index rated this site as fair with a score of 34 due to low browse cover, low decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - fair (34) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable with a slight increase in relative percent cover of vegetation and litter as well as a decline in bare ground. The ratio of protective cover (vegetation, litter and cryptogams) to bare soil has remained virtually unchanged. In addition, herbaceous cover has increased slightly since 1995. Trend for browse is stable. Density of the key browse species, Wyoming big sagebrush, is stable. Use is heavier, but vigor is normal. Percent decadence remains moderately low at 13%. Trend for the herbaceous understory is mixed. The sum of nested frequency for perennial grasses has increased slightly, while nested frequency of the dominant grass, crested wheatgrass, has increased significantly. Crested wheatgrass provides 96% of the grass cover and 81% of the herbaceous cover. Due to drought conditions, sum of nested frequency for perennial forbs has declined by 53%. Cover of forbs during the same period has declined from 9% in 1995 to 3% in 2000. Perennial forbs provided 45% of the herbaceous cover in 1995. Currently, perennial forbs account for only 15% of the herbaceous cover. Taking all of these factors into consideration, trend for the herbaceous understory is considered down slightly. The Desirable Components Index rated this site as fair to good with a score of 43 due to low browse cover, low decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - fair to good (43) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained relatively unchanged from 2000 to 2005. The trend for browse is down. Wyoming big sagebrush, the key browse species decreased from 2,800 plants/acre in 2000 to 1,960 in 2005, a 30% decrease. The strip frequency of sagebrush decreased from 65% in 2000 to 55% in 2005, a 15% decrease. The percent cover only decreased one-half percent, although it continues to be considerably below 5%. Recruitment is low with only 9% of the population classified as young and with 8% classified as dying. Decadence has also increased from 13 to 19%. Winterfat increased some, but not nearly enough to compensate for the losses to sagebrush. The herbaceous understory trend is slightly down. The sum of the nested frequencies of perennial grasses decreased by 14%, where perennial grasses contributes on average to 76% of the herbaceous cover. Forbs remained almost unchanged. The cover of grasses increased slightly and the cover of forbs remained virtually unchanged. The Desirable Components Index rated this site as fair to good with a score of 43 due to low browse cover, low decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - fair to good (43) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 17 , Study no: 49

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	ab316	a260	b326	ab311	9.44	17.05	19.77
G	Agropyron dasystachyum	a6	ab21	b31	a6	.28	.35	.09
G	Agropyron intermedium	a-	b30	a5	a-	.12	.03	-
G	Bromus inermis	-	4	2	-	.01	.03	-
G	Carex sp.	a-	b10	a1	a-	.04	.00	-
G	Dactylis glomerata	-	8	5	-	.04	.09	-
G	Elymus junceus	-	-	-	5	-	-	.33
G	Oryzopsis hymenoides	-	6	-	2	.06	-	.03
G	Poa fendleriana	-	-	7	-	-	.15	-
G	Poa secunda	-	2	-	-	.03	-	-
G	Secale cereale (a)	-	7	-	-	.06	-	-
G	Stipa comata	-	-	1	-	-	.03	-
Total for Annual Grasses		0	7	0	0	0.06	0	0
Total for Perennial Grasses		322	341	378	324	10.04	17.76	20.22
Total for Grasses		322	348	378	324	10.10	17.76	20.22
F	Agoseris glauca	a-	b61	a-	a-	1.92	-	-
F	Allium sp.	-	6	-	4	.02	-	.01
F	Arabis sp.	-	-	3	-	-	.00	-
F	Astragalus convallarius	17	23	6	27	.21	.07	.36
F	Astragalus mollissimus	-	5	4	-	.01	.04	-
F	Astragalus tenellus	1	-	-	3	-	-	.03
F	Calochortus nuttallii	a-	b7	a-	b17	.03	-	.04
F	Chaenactis douglasii	-	-	3	-	-	.00	-
F	Chenopodium fremontii (a)	-	7	-	-	.01	-	-
F	Chenopodium leptophyllum(a)	-	b10	a-	a-	.02	-	-
F	Cirsium sp.	-	-	3	-	.15	.00	-
F	Cordylanthus kingii (a)	-	b11	a-	ab5	.08	-	.01
F	Crepis acuminata	-	-	-	2	-	-	.00
F	Cymopterus sp.	-	-	1	3	-	.15	.00
F	Descurainia pinnata (a)	-	5	-	2	.01	-	.01
F	Erigeron eatonii	-	3	-	-	.00	-	-
F	Hedysarum boreale	-	7	5	-	.08	.07	-
F	Lappula occidentalis (a)	-	a-	a-	b16	-	-	.21
F	Lactuca serriola	-	1	-	-	.01	-	-
F	Linum lewisii	-	c69	b19	a-	1.16	.36	-

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	<i>Lygodesmia grandiflora</i>	-	3	-	5	.00	-	.09
F	<i>Machaeranthera canescens</i>	_b 21	_a 4	_a 4	_a 7	.03	.03	.12
F	<i>Machaeranthera grindelioides</i>	4	-	-	2	.00	-	.01
F	<i>Melilotus officinalis</i>	_a -	_b 16	_a 3	_a -	.32	.15	-
F	<i>Penstemon humilis</i>	10	11	8	3	.65	.05	.15
F	<i>Phlox hoodii</i>	_c 101	_b 35	_b 38	_a 5	.43	.96	.19
F	<i>Phlox longifolia</i>	_b 70	_b 76	_a 20	_b 53	.29	.13	.55
F	<i>Sanguisorba minor</i>	_a -	_b 28	_a 2	_a -	.21	.03	-
F	<i>Sphaeralcea coccinea</i>	_b 183	_b 166	_{ab} 152	_a 117	2.40	.98	1.02
F	<i>Tragopogon dubius</i>	4	8	-	-	.18	-	-
F	<i>Trifolium gymnocarpon</i>	_a 8	_{bc} 46	_{ab} 33	_c 68	.19	.17	1.19
Total for Annual Forbs		0	33	0	23	0.12	0	0.22
Total for Perennial Forbs		419	575	304	316	8.34	3.24	3.79
Total for Forbs		419	608	304	339	8.47	3.24	4.02

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

BROWSE TRENDS --

Management unit 17 , Study no: 49

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Artemisia tridentata wyomingensis</i>	50	65	55	2.61	3.95	3.40
B	<i>Atriplex canescens</i>	0	1	0	-	-	-
B	<i>Ceratoides lanata</i>	9	6	9	.03	.18	.18
B	<i>Chrysothamnus depressus</i>	2	2	0	.01	-	-
B	<i>Chrysothamnus nauseosus hololeucus</i>	3	5	1	.03	.03	.00
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	54	61	56	1.96	2.41	2.04
B	<i>Eriogonum corymbosum</i>	71	72	70	1.45	2.00	2.38
B	<i>Gutierrezia sarothrae</i>	1	4	16	-	.03	.28
B	<i>Kochia prostrata</i>	0	0	8	-	-	.03
B	<i>Opuntia sp.</i>	15	14	3	.01	.00	.00
B	<i>Pinus edulis</i>	0	1	1	-	-	-
Total for Browse		205	231	219	6.11	8.63	8.34

CANOPY COVER, LINE INTERCEPT --
Management unit 17 , Study no: 49

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	4.11
Ceratoides lanata	.28
Chrysothamnus nauseosus hololeucus	.05
Chrysothamnus viscidiflorus viscidiflorus	2.78
Eriogonum corymbosum	2.66
Gutierrezia sarothrae	.56
Kochia prostrata	.18

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17 , Study no: 49

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	1.5

BASIC COVER --
Management unit 17 , Study no: 49

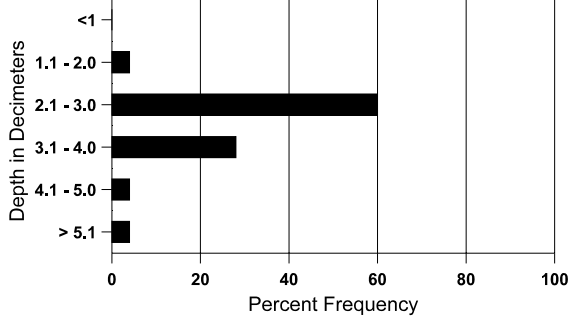
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	0	8.00	23.68	30.28	29.74
Rock	0	0	0	.00	0
Pavement	0	0	0	.11	.04
Litter	0	36.00	21.52	33.00	23.30
Cryptogams	0	6.25	.23	.49	.90
Bare Ground	53.50	49.75	54.37	58.32	56.52

SOIL ANALYSIS DATA --
Herd Unit 17, Study # 49, Study Name: Grey Wolf Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
15.5	60.2 (16.6)	7.5	42.9	26.8	30.3	2.1	3.6	204.8	0.7

Stoniness Index

Grey Wolf Mountain, Study # 17 - 49



PELLET GROUP DATA --

Management unit 17 , Study no: 49

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	2	1	6
Elk	7	15	32
Deer	11	25	14
Cattle	1	2	7

Days use per acre (ha)	
'00	'05
-	-
13 (31)	47 (116)
34 (84)	58 (144)
6 (14)	15 (26)

BROWSE CHARACTERISTICS --

Management unit 17 , Study no: 49

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
82	1265	1133	133	1066	66	-	42	5	5	-	5	23/27
88	6466	5600	4733	1533	200	-	14	11	3	-	10	20/17
95	2300	180	1040	1040	220	780	14	3	10	5	5	15/20
00	2800	40	820	1620	360	420	39	21	13	1	1	15/22
05	1960	80	180	1400	380	740	35	35	19	8	8	16/21
Atriplex canescens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	100	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Ceratoides lanata												
82	332	-	66	266	-	-	40	0	0	-	0	8/8
88	199	-	66	133	-	-	0	67	0	-	0	7/7
95	360	-	20	340	-	-	22	0	0	-	0	10/12
00	220	-	-	220	-	-	18	55	0	-	0	5/9
05	320	-	-	300	20	-	56	44	6	6	6	10/12
Chrysothamnus depressus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	20	20	-	-	0	0	-	-	0	6/8
00	40	-	-	40	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus nauseosus hololeucus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	60	-	40	20	-	-	0	0	-	-	0	17/14
00	280	-	80	200	-	-	0	0	-	-	0	9/14
05	20	-	20	-	-	-	0	0	-	-	0	13/21
Chrysothamnus viscidiflorus viscidiflorus												
82	1933	-	-	1933	-	-	0	0	0	-	0	10/12
88	3533	400	933	1200	1400	-	21	4	40	-	9	7/5
95	3200	20	560	2640	-	-	1	0	0	-	0	11/14
00	2960	20	100	2840	20	-	0	0	1	-	0	7/12
05	2540	20	260	2240	40	20	5	6	2	2	2	10/14
Eriogonum corymbosum												
82	2533	-	-	2533	-	-	37	0	0	-	16	13/15
88	3466	66	400	1866	1200	-	33	13	35	-	0	14/13
95	2960	100	560	2400	-	-	0	0	0	-	0	14/16
00	2760	40	180	2520	60	-	0	0	2	.72	.72	12/16
05	3020	60	680	2200	140	-	15	4	5	3	3	12/16
Gutierrezia sarothrae												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	399	-	-	266	133	-	0	0	33	5	17	8/8
95	20	-	-	20	-	-	0	0	0	-	0	-/-
00	120	-	-	120	-	-	0	0	0	-	0	6/9
05	840	-	60	780	-	-	0	0	0	-	0	6/7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Kochia prostrata												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	480	420	360	120	-	-	13	4	-	-	0	9/18
Opuntia sp.												
82	600	-	-	600	-	-	0	0	0	-	0	3/7
88	732	600	133	266	333	-	0	0	45	-	0	4/10
95	360	-	40	320	-	20	0	0	0	-	0	4/6
00	300	20	-	280	20	-	0	0	7	-	0	3/3
05	80	-	20	60	-	-	0	0	0	-	0	4/8
Pinus edulis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	20	-	-	-	0	0	-	-	0	-/-
05	20	-	20	-	-	-	0	0	-	-	0	-/-

Trend Study 17-50-05

Study site name: Lower Santaquin Draw .

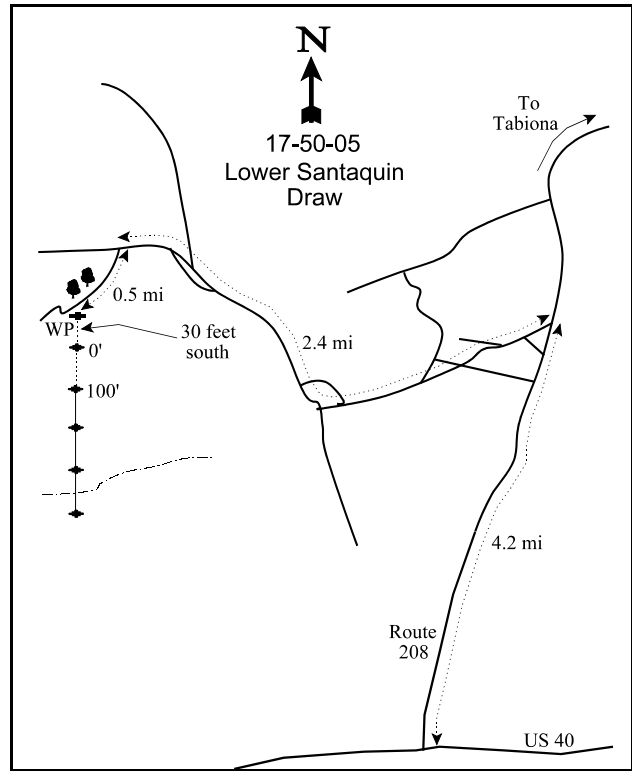
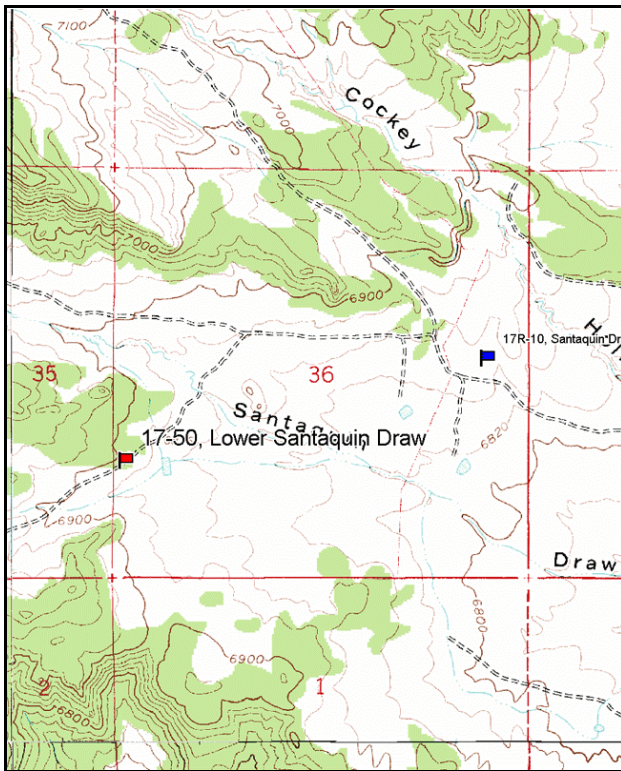
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 83ft), line 2 (38ft), line 3 (54ft), line 4 (79ft).

LOCATION DESCRIPTION

From Highway U.S. 40, take Route 208 towards Tabiona for 4.2 miles and turn west onto a dirt road. Go 2.4 miles on the main road towards Santaquin Draw. Take the road to the left for 0.5 miles to the next intersection to a group of junipers and a witness post. From the witness post the 0-foot stake is 30 feet to the south. The 0-foot stake is marked with browse tag number 7021.



Map Name: Tabiona

Diagrammatic Sketch

Township 2S, Range 8W, Section 35

GPS: NAD 27, UTM 12T 4456389 N, 521680 E

DISCUSSION

Lower Santaquin Draw - Trend Study No. 17-50

The Lower Santaquin Draw trend study monitors a sagebrush-grass site on deer and elk winter range in Lower Santaquin Draw. The terrain has a slight slope of 5-8% on a southeast aspect and the elevation is approximately 6,900 feet. Low ridges covered with pinyon-juniper are within the immediate proximity of the study site. The surrounding woodland provides important escape and thermal cover. The area is obviously critical winter range as many antler sheds, winter-killed deer and pellet groups were observed during past readings. Numerous jackrabbit pellets and cattle pats were also observed during study establishment in 1982. Pellet group data taken in 2000 were estimated at 15 deer, 31 elk, and 8 cow days use/acre (37 ddu/ha, 77 edu/ha and 20 cdu/ha). About half of the deer pellet groups appeared to be from spring use with the other half from winter. About 75% of the elk pellet groups appeared to be from fall/winter use with the rest from spring use. The 2005 pellet group data estimates were 28 deer and 41 elk days use/acre (69 ddu/ha and 101 edu/ha), the seasons of use similar to those of the 2000 readings. This land is managed by the Division of Wildlife as part of the Tabby Mountain WMA.

Soils are alluvially deposited and deep but generally undifferentiated. The soil texture is a loam with few rocks on the surface or within the profile. Effective rooting depth is estimated at just over 10 inches. The soil would be expected to be much deeper, but were limited by soil compaction and a hardpan. Ground cover is fair for this type with percent relative bare ground ranging from 31% to 45% since 1982. Soil is very light textured and easily erodible. Sheet erosion is a factor, but it is greatly reduced by the levelness of the terrain and an adequate amount of vegetation and litter cover. However, stream courses in the area tend to be rather deep, steep-sided gullies, effectively lowering the immediate area's water table. There are active gullies around the site and a single 4-foot gully near the end of the baseline. The erosion index measurement in 2005 rated the soil erosion as slight, mainly because of large frequent pedestals surrounding shrubs and perennial grasses, gullies covering less than 2% of the site, some minor soil movement, minor litter movement, as well as small rills and flow patterns between perennial species.

The key browse species consists of a moderately dense stand of Wyoming big sagebrush. This site, like 17-49, contains sagebrush with characteristics of both mountain and Wyoming big sagebrush. All sagebrush at this location are considered Wyoming big sagebrush. Density remained similar from 1982 to 2000, around 5,000 plants/acre, but this number substantially decreased to 2,720 plants/acre by 2005. Utilization has continually been moderate to heavy, with varying percentages of plants with poor vigor. During the 1982 reading, 25% of the plants were decadent, 44% in 1988, 8% in 1995, 22% in 2000, and 44% in 2005. The individuals classified as dying in the population have increased from 2% in 1982, to 1% in 1988, to 4% in 1995, to 10% in 2000, to 32% in 2005. The number of young plants has also consistently declined since 1988, and it has gradually reached the point in 2005 where the percent of dying individuals have become more numerous than young in the population. The only other palatable browse species is a small but stable population of winterfat. Winterfat density has ranged from 866 plants/acre in 1982 to 1,460 in 2005. Use was moderate to heavy in 1982 and 1988, mostly light in 1995, and moderate to heavy again in 2000 and 2005. Less desirable browse occur in low numbers and consists of narrowleaf low rabbitbrush, broom snakeweed and pricklypear cactus.

The herbaceous understory is moderately abundant but only a few species are common. Grasses provided 13% cover in 1995, 17% in 2000, and 20% in 2005. Six grass species were identified, but crested wheatgrass dominates the composition. Forbs provided 4% cover in 1995, 3% in 2000, and 4% in 2005. Timber poisonvetch, Hood's phlox, and scarlet globemallow provide the majority of the forb cover.

1982 APPARENT TREND ASSESSMENT

Overall, this area appears to be relatively stable. Soil trend may be down slightly due to continuous low-level erosion and soil deposition, although the level terrain helps to minimize the effect. Wyoming big sagebrush may be slowly expanding. Grasses are being heavily impacted by livestock, which is thought to favor the shrub component. Forbs are insignificant forage sources and are generally undesirable species. Undesirable shrubs include pricklypear and narrowleaf low rabbitbrush, neither of which should be allowed to increase much beyond their present level.

1988 TREND ASSESSMENT

Due to a slight decrease in litter cover, there was a slight increase in bare soil cover in 1988. However, the level terrain limits erosion and the trend for soil is still considered stable. The density of the key browse species, Wyoming big sagebrush, remained similar to that of 1982. Vigor has improved since 1982. Most mature plants were moderately hedged rather than heavily hedged. However, a higher percentage (44%) of the sagebrush population was classified as decadent. There is still a substantial population of Wyoming big sagebrush seedlings and young. Average sagebrush cover is 21% on the study site. The trend for grasses and forbs are up due to a significant increase in quadrat frequency. Crested wheatgrass, the most abundant grass, tripled its quadrat frequency since 1982. Scarlet globemallow also greatly increased in quadrat frequency.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Soil trend is up slightly. Percent bare ground declined from 38% to 33% and photos indicate a dramatic increase in herbaceous cover. The nested frequency of grasses and forbs have increased. Trend for sagebrush is slightly improved. Percent decadence has declined from 44% to 8%. It appears that many of the decadent plants surveyed in 1988 are now classified as healthy mature plants. The number of seedlings and young have declined but there are adequate numbers to maintain the population. The secondary browse, winterfat, also shows an improving trend. Heavy use is reduced, vigor is improved and percent decadency has decreased substantially from 15% to 2%. Cover and nested frequency of grasses has slightly improved. Nested frequency of forbs also showed slight increases in nested frequency with 11 perennial species counted. Overall, the herbaceous understory trend is considered stable. The Desirable Components Index rated this site as excellent with a score of 71 due to moderate browse cover, low decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - slightly up (+1)

herbaceous understory - stable (0)

winter range condition (DC Index) - excellent (71) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Relative percent cover of bare ground increased slightly while litter and vegetation cover declined slightly. However, cryptogamic cover increased and the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained similar to 1995 levels. There is some erosion occurring, but it is minimized by the gentle terrain. Trend for the key browse species, Wyoming big

sagebrush, is stable. Use is heavier than in 1995. The proportion of sagebrush in poor vigor has increased slightly and percent decadence has increased from 8% to 22%. This is still relatively low for this type of site. The number of seedlings and the proportion of young plants in the population have remained similar to 1995 levels and there appear to be enough young plants to maintain the population. Winterfat shows heavier use but has a stable population. Trend for the herbaceous understory is considered slightly down. Sum of nested frequency for perennial grasses has declined slightly, and perennial grasses contribute around 80% of the herbaceous cover. Sum of nested frequency for perennial forbs also declined substantially, with a corresponding drop in cover. The Desirable Components Index rated this site as excellent to good with a score of 67 due to moderate browse cover, moderate decadency, and good perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - excellent to good (67) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. This decline in the soil trend is due to a decrease in the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground from 2.6:1 in 2000 to 2.3:1 in 2005. Bare ground cover increased slightly with a decrease in litter cover. The combination of an erosive soil texture, high bare ground cover, and low protective cover may impact soil stability on this study. The erosion index measurement also showed slight signs of recent erosion. The browse trend is down. The population density of the preferred browse species, Wyoming big sagebrush, decreased 45% from 2000 to 2005. Along with this decrease, the cover of sagebrush decreased from 9% to 6%. The decadent individuals increased from 22% of the population in 2000 to 44% in 2005 and those classified as dying increased from 10% to 32%. With 32% of sagebrush population classified as dying in 2005 and only 12% there was 20% of the population dying with out new plants to replace them. Winterfat density increased 25% from 2000 to 2005 with an improved vigor and decrease in percent decadence, but this increase could not compensate for the loss of sagebrush. The trend for herbaceous understory is stable. The nested frequencies of perennial grasses and forbs remained nearly unchanged. The percent cover of perennial species increased slightly, but this is a product of more precipitation the previous year, not an increase in numbers. The Desirable Components Index rated this site as good to excellent with a score of 63 due to moderate browse cover, high decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - down (-2)

herbaceous understory - stable (0)

winter range condition (DC Index) - good to excellent (63) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 17 , Study no: 50

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	_b 307	_c 331	_{bc} 319	_a 263	12.21	16.75	18.44
G	Agropyron dasystachyum	_a -	_{bc} 13	_b 9	_c 30	.02	.05	.47

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Carex sp.	_b 37	_a 9	_a 10	_a 5	.07	.10	.01
G	Oryzopsis hymenoides	_{ab} 15	_a 9	_a 2	_b 32	.22	.04	.30
G	Poa secunda	-	-	-	1	-	-	.03
G	Stipa comata	_a -	_{ab} 13	_a 7	_b 21	.30	.06	.81
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		359	375	347	352	12.84	17.01	20.07
Total for Grasses		359	375	347	352	12.84	17.01	20.07
F	Allium sp.	-	2	-	-	.00	-	-
F	Astragalus convallarius	_a 4	_b 20	_{ab} 18	_b 25	.78	.09	.31
F	Astragalus tenellus	_a -	_b 6	_a -	_{ab} 4	.19	-	.16
F	Calochortus nuttallii	-	3	-	4	.01	-	.01
F	Chenopodium leptophyllum(a)	-	-	-	2	-	-	.00
F	Cordylanthus kingii (a)	-	1	-	-	.01	-	-
F	Descurainia pinnata (a)	-	_a 1	_a -	_b 16	.00	-	.08
F	Draba sp. (a)	-	5	-	-	.01	-	-
F	Lappula occidentalis (a)	-	_a -	_a -	_b 60	-	-	1.76
F	Leucelene ericoides	-	-	8	1	-	.04	.01
F	Lygodesmia grandiflora	-	-	-	1	-	-	.00
F	Machaeranthera canescens	_{ab} 2	_b 10	_a -	_{ab} 7	.02	-	.07
F	Phlox hoodii	_b 79	_b 77	_b 72	_a 35	2.02	1.77	.66
F	Phlox longifolia	20	25	10	17	.06	.02	.21
F	Schoenocrambe linifolia	2	3	-	4	.01	-	.01
F	Senecio multilobatus	1	-	-	-	-	-	-
F	Sphaeralcea coccinea	_b 143	_{ab} 121	_a 109	_a 106	.98	.65	2.44
F	Tragopogon dubius	-	-	1	-	-	.00	-
F	Trifolium gymnocarpon	_a 6	_{ab} 20	_a 11	_b 27	.17	.02	.38
Total for Annual Forbs		0	7	0	78	0.02	0	1.85
Total for Perennial Forbs		257	287	229	231	4.26	2.62	4.28
Total for Forbs		257	294	229	309	4.29	2.62	6.14

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

BROWSE TRENDS --

Management unit 17 , Study no: 50

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Artemisia tridentata wyomingensis</i>	87	80	67	10.30	9.44	5.72
B	<i>Ceratoides lanata</i>	35	34	41	.62	1.03	1.88
B	<i>Chrysothamnus depressus</i>	0	1	0	-	-	-
B	<i>Chrysothamnus nauseosus graveolens</i>	0	12	0	-	.69	-
B	<i>Chrysothamnus nauseosus hololeucus</i>	9	1	5	.33	.00	-
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	5	5	8	.31	.30	.31
B	<i>Gutierrezia sarothrae</i>	3	1	0	.06	-	-
B	<i>Leptodactylon pungens</i>	3	0	1	.01	-	.03
B	<i>Opuntia sp.</i>	28	34	19	.44	.76	.91
B	<i>Pediocactus simpsonii</i>	0	2	1	-	.00	-
B	<i>Purshia tridentata</i>	0	0	0	-	.15	-
Total for Browse		170	170	142	12.09	12.38	8.87

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 50

Species	Percent Cover
	'05
<i>Artemisia tridentata wyomingensis</i>	4.58
<i>Ceratoides lanata</i>	1.20
<i>Chrysothamnus nauseosus graveolens</i>	.15
<i>Chrysothamnus nauseosus hololeucus</i>	.10
<i>Chrysothamnus viscidiflorus stenophyllus</i>	.36
<i>Opuntia sp.</i>	.08

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 17 , Study no: 50

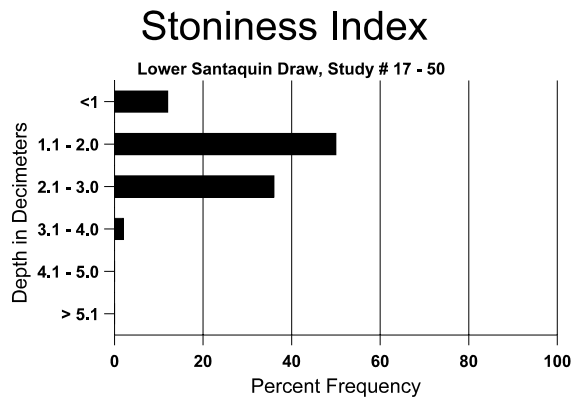
Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	1.7
Ceratoides lanata	3.4

BASIC COVER --
 Management unit 17 , Study no: 50

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	6.50	7.00	32.09	31.07	31.29
Rock	0	0	.15	0	.00
Pavement	0	0	.01	.02	.04
Litter	58.50	53.00	39.47	40.61	25.48
Cryptogams	0	1.75	1.44	4.18	3.39
Bare Ground	35.00	38.25	32.60	44.56	49.93

SOIL ANALYSIS DATA --
 Herd Unit 17, Study # 50, Study Name: Lower Santaquin Draw

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
10.6	61.4 (15.4)	7.6	45.3	36.2	18.6	1.0	2.0	99.2	0.5



PELLET GROUP DATA --
 Management unit 17 , Study no: 50

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	4	15	12
Elk	17	28	45
Deer	29	15	31
Cattle	-	4	2

Days use per acre (ha)	
'00	'05
-	-
4 (10)	41 (101)
139 (342)	28 (69)
8 (20)	-

BROWSE CHARACTERISTICS --
 Management unit 17 , Study no: 50

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
82	5065	1866	1266	2533	1266	-	41	28	25	2	34	20/23
88	4999	733	1333	1466	2200	-	45	13	44	.80	3	19/23
95	5420	180	880	4100	440	500	66	17	8	4	6	18/30
00	5020	100	760	3160	1100	420	53	24	22	10	13	18/26
05	2760	300	320	1220	1220	2100	29	24	44	32	32	18/27
<i>Ceratoides lanata</i>												
82	866	-	-	666	200	-	46	31	23	-	8	10/8
88	1333	66	600	533	200	-	20	25	15	-	10	6/8
95	1040	60	80	940	20	-	8	2	2	-	4	11/13
00	1100	-	40	1000	60	-	44	45	5	4	4	7/8
05	1460	580	280	1120	60	-	41	26	4	1	1	9/13
<i>Chrysothamnus depressus</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	100	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Chrysothamnus nauseosus graveolens</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	-/-
00	240	-	40	160	40	-	8	8	17	8	8	19/20
05	0	-	-	-	-	-	0	0	0	-	0	16/15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus hololeucus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	200	-	20	160	20	-	0	0	10	10	10	20/21
00	40	-	40	-	-	-	0	0	0	-	0	-/-
05	120	-	-	80	40	20	33	17	33	17	33	17/18
Chrysothamnus viscidiflorus stenophyllus												
82	133	-	-	133	-	-	0	0	0	-	0	14/9
88	332	-	133	133	66	-	0	0	20	6	20	24/15
95	300	-	-	300	-	-	0	0	0	-	0	13/17
00	280	20	-	280	-	-	0	0	0	-	0	8/18
05	320	-	80	240	-	-	0	0	0	-	0	9/11
Eriogonum corymbosum												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	7/14
Gutierrezia sarothrae												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	80	-	-	80	-	-	0	0	-	-	0	5/6
00	20	-	-	20	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	6/10
Leptodactylon pungens												
82	2000	-	600	1400	-	-	0	0	-	-	0	1/7
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	60	40	60	-	-	-	0	0	-	-	0	2/3
00	0	60	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	-/-
Opuntia sp.												
82	533	-	-	533	-	-	0	0	0	-	0	3/7
88	866	66	200	333	333	-	8	0	38	-	69	3/8
95	940	20	100	800	40	-	0	0	4	2	2	5/11
00	1180	-	140	940	100	-	0	0	8	8	8	4/9
05	520	20	20	460	40	80	0	0	8	4	4	4/12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Pediocactus simpsonii</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	-/-
00	40	-	20	-	20	-	0	0	50	50	50	0/2
05	20	-	-	20	-	-	0	0	0	-	0	1/2

Trend Study 17-51-05

Study site name: Santaquins Cabin .

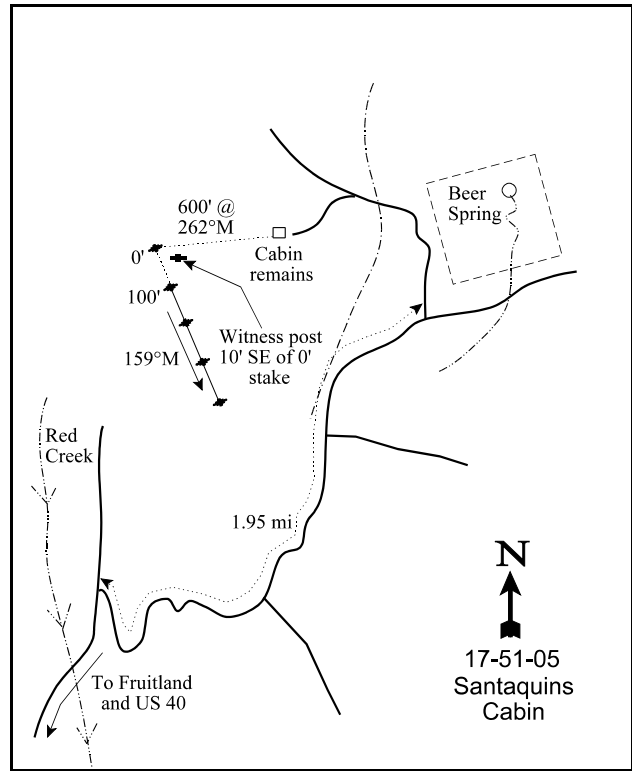
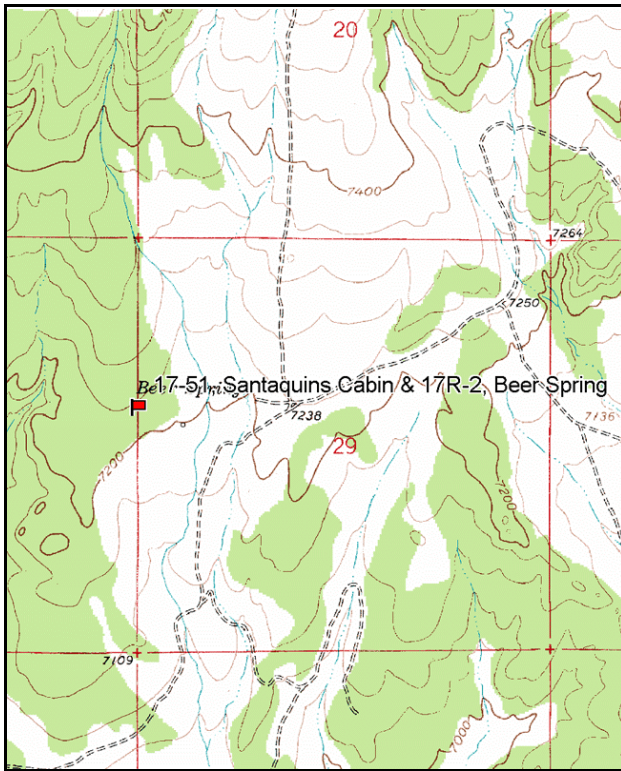
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 159 degrees magnetic.

Frequency belt placement: line 1 (19 & 94ft), line 2 (29ft), line 3 (57ft), line 4 (71ft).

LOCATION DESCRIPTION

From US 40 in Fruitland, travel north up the 45000 S. 1.8 miles to a 3-way fork. Take the middle fork and go 2.5 miles. After crossing Red Creek, turn right onto a dirt road. Go northeast up this road for 1.95 miles, keeping left at two major forks. At Beer Spring, turn left and go along the west side of the fenced spring to a wide, shallow wash. Cross the wash, then bear left onto a faint road. Follow it for about 100 yards to the remains of Santaquins cabin. From the cabin walk west at 262°M for 600 feet, following the old line intercept study, to the 4th stake. From the 4th line-intercept stake, walk 11 paces south to the start of the baseline. The 0-foot baseline stake is marked with red browse tag #7022. There is a witness post southeast of the 0' stake. The frequency baseline runs at a bearing of 159°M.



Map Name: Tabby Mountain

Diagrammatic Sketch

Township 2S ,Range 8W ,Section 30

GPS: NAD 27, UTM 12T 4458485 N, 515235 E

DISCUSSION

Santaquin's Cabin - Trend Study No. 17-51

This trend study is on winter range located near Santaquin's Cabin. The area is owned by the Utah Division of Wildlife Resources as part of the Tabby Mountain WMA. The study is placed on a chained and seeded pinyon-juniper area west of Beer Spring. The last 200 feet of the baseline transect was treated (a disking) again previous to the 2000 reading and a roving site (Beer Spring 17R-2) was established on the new treatment. The elevation is 7,200 feet and the slope is 5% with a slight southeast aspect. This area is used heavily by wintering big game, especially deer. Cattle also use the area. Pellet group data from 2000 were estimated at 139 deer, 4 elk, and 9 cow days use/acre (343 ddu/ha, 10 edu/ha and 22 cdu/ha). The 2005 pellet group data estimates were 60 deer, 52 elk, and 6 cow days use/acre (149 ddu/ha, 127 edu/ha, and 14 cdu/ha).

Soils are fairly deep and fine textured with small amounts of rock on the surface and within the profile. The effective rooting depth is estimated at just over 11 inches due to a compacted horizon, which starts about 8 inches below the surface. This does not appear to be a very restrictive rooting barrier however. Shrub interspaces generally have an effective rooting depth of 8 to 11 inches, while soil near the base of shrubs is normally 13 to 17 inches in depth. The soil texture is a sandy clay loam with a slightly alkaline soil reaction (pH of 7.7). Phosphorus is limited at just 3.3 ppm and values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). There is some localized soil movement on bare areas but for the most part, erosion is minimal due to the abundant chaining litter and vegetation cover. A number of small, south flowing gullies traverse the area. These have stabilized since the chaining treatment. A disking treatment was done near the trend study and the last 150 feet of the baseline was within the disked area. The erosion index measurement in 2005 rated soil erosion condition as stable.

The key browse species on the chaining is Wyoming big sagebrush. There appears to be some sagebrush which exhibit characteristics of basin big sagebrush as well as hybrids of Wyoming big sagebrush and basin big sagebrush. All sagebrush will be classified as Wyoming big sagebrush at this location. Density of sagebrush has declined since 1982. Sagebrush density in 1982 was 5,666 plants/acre, 4,399 in 1988, 3,040 in 1995, 2,320 in 2000, and 1,980 in 2005. Decadence has remained low through 2000 (8%), but increased to 23% by 2005. Utilization has been moderate with 23% of the population classified as heavily hedged in 1988, 16% in 1995 only 4% in 2000, and 32% in 2005. Individuals classified as dying increased from 2% in 1995, to 4% in 2000, to 16% in 2005. The number of young individuals in the population have remained higher than those classified as dying. Several other browse species occur, but in small numbers.

Pinyon and juniper have been increasing since the chaining. In 2000, point-center quarter data was estimated at 18 juniper trees/acre with an average diameter of 2.1 inches. Pinyon pine was estimated at 36 trees/acre with an average diameter of 1.5 inches. In 2005, juniper increased to 34 trees/acre with an average diameter of 3.7 inches. Pinyon pine were estimated at 27 trees/acre with a diameter of 2.3 inches.

The herbaceous understory is diverse with 11 perennial grass species and 32 forb species sampled between 1988 to 2005. Crested wheatgrass, thickspike wheatgrass, intermediate wheatgrass, and a sedge dominate the grass composition. Grasses and grass-likes provided 13% cover in 1995, 17% in 2000, and 16% in 2005. Forbs are diverse but they do not provide very much forage. In 1995, forbs accounted for only 4% cover, 2% in 2000, and 2% in 2005. Common forbs include: loose flower milkvetch, alfalfa, Hood's phlox, and scarlet globemallow.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable. The shrub component, especially Wyoming big sagebrush, appears to be on the increase. However, browse diversity could be better. This seems to be another of those seedings where direct seeding of desirable shrubs has largely failed. Interseeding may be a viable option. Grasses and forbs are providing needed watershed protection as well as livestock forage. The highly palatable alfalfa appears to be on the way out. Vegetation trend appears stable to improving.

1988 TREND ASSESSMENT

Veggtative cover hits were rare in 1988. Basal vegetation cover decreased from 9% to 2%. Since litter cover was constant, the percentage of bare soil exposed increased. Trend for soil is considered slightly down. The permanent photo-plots associated with the study on DWR land at Santaquin's Cabin will help to document the continued succession of this chaining. From the photos, there is an obvious increase in the size and prominence of woody species although cover is still very limited in the area. For some reason, the frequency baseline was established in an area with less sagebrush than is typical over the area as a whole. Along the baseline, sagebrush cover is 1%. On the density plots, sagebrush cover averages 17%. In 1982, a large number of seedling and young big sagebrush were counted. Total sagebrush density was 5,666 plants/acre. During the 1988 reading, no seedlings were found, but there were still a substantial number of young plants. However, the total sagebrush population was only 4,399 plants/acre with a decrease in the number of mature plants counted. Correlating with the data, photograph comparisons illustrate the increased size and degree of hedging on the sagebrush. Seven percent of the mature sagebrush were classified as heavily hedged in 1982. In 1988, 21% were in form class 3. The populations of increaser species; broom snakeweed, pricklypear, juniper and pinyon have only slightly increased. Browse trend is considered slightly down. Quadrat frequency of grasses increased slightly since 1982, while frequency of forbs declined. Overall, trend is stable for the herbaceous understory.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly down (-1)

herbaceous understory - stable (0)

1995 TREND ASSESSMENT

Soil conditions have improved since 1988. Cover of bare ground declined from 42% to 28%, while litter cover continues to decline as chaining litter decomposes. Trend is slightly up for soil. The key browse species, Wyoming big sagebrush, has declined in overall density due to a reduction in the number of young plants in the population caused by drought conditions over the past several years. The number of shrubs displaying heavy use declined slightly, vigor improved and the number of decadent plants declined slightly from 9% to 7% of the population. Trend is considered stable at this time. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency of grasses which makes up 74% of the herbaceous cover. Frequency of forbs remained similar to 1988. The Desirable Components Index rated this site as excellent with a score of 70 due to moderate browse cover, moderate decadency, and good perennial grass cover.

TREND ASSESSMENT

soil - up slightly (+1)

browse - stable (0)

herbaceous understory - up slightly (+1)

winter range condition (DC Index) - excellent (70) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Relative cover of bare ground declined slightly while litter cover increased slightly. Vegetation cover remained similar to 1995 estimates and the ratio of protective cover (vegetation, litter, cryptogams) to bare ground remained fairly stable. Trend for the key browse species, Wyoming big sagebrush, is down. Density of mature plants has declined, but this is due to the disking treatment which effected 2 of the 5 density strips. Use is mostly light to moderate, vigor good on most plants and percent decadence remains low. Young plants currently account for 19% of the population while there are a fair number of seedlings. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses and forbs have declined with a significant decline in the nested frequency of crested wheatgrass. The Desirable Components Index rated this site as excellent with a score of 69 due to moderate browse cover, low decadency, and good perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - excellent (69) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 2.7:1 in 2000 to 2.3:1 in 2005. This is a product of a large increase in the relative cover of bare ground as well as a decrease in the relative cover of litter. The browse trend is slightly down. The density of the key browse species Wyoming big sagebrush decreased by 15% from 2,230 plants/acre in 2000 to 1,980 in 2005. This decrease in density was coupled with a substantial increase in the percentage of decadent individuals (from 8% in 2000 to 23% in 2005). As well, the number of plants classified as dying increased from 4% in 2000 to 16% in 2005. Young plants constituted 26% of the population, which is more than the number of plants classified as dying. The utilization on the sagebrush also increased from 36% of the population with moderate to high use to 52% with moderate to high use. The herbaceous understory trend is slightly down. The sum of the nested frequency of perennial grasses and perennial forbs decreased 12% and the percent cover of perennial grasses decreased slightly. This is likely a residual product of the drought which extended from 2000 to 2003 in this area. As well, cheatgrass was sampled for the first time in 2005. It only had a 4% quadrat frequency, but its increased presence could change the ecology of the site. The Desirable Components Index rated this site as excellent with a score of 68 due to moderate browse cover, moderate decadency, and good perennial grass cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly down (-1)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - excellent (68) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 17 , Study no: 51

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	172	165	136	156	3.85	7.93	8.34
G	Agropyron dasystachyum	_b 152	_{ab} 113	_b 134	_a 90	3.99	4.32	3.36
G	Agropyron intermedium	_a -	_d 86	_c 44	_b 14	1.69	.93	.22
G	Bromus inermis	_c 75	_b 43	_{ab} 24	_a 3	.78	.83	.04
G	Bromus tectorum (a)	-	-	-	11	-	-	.08
G	Carex sp.	_a -	_c 60	_c 57	_b 25	1.27	2.12	.40
G	Elymus junceus	_a -	_a 6	_a 3	_b 18	.06	.15	1.43
G	Festuca ovina	_b 32	_a 3	_a -	_a 5	.03	-	.04
G	Oryzopsis hymenoides	_{ab} 46	_b 67	_a 21	_{ab} 52	.86	.38	1.27
G	Poa secunda	_a -	_a 4	_a 1	_b 15	.03	.00	.27
G	Sitanion hystrix	11	16	10	9	.13	.25	.08
G	Stipa comata	_a -	_b 22	_b 23	_b 30	.22	.43	.65
Total for Annual Grasses		0	0	0	11	0	0	0.08
Total for Perennial Grasses		488	585	453	417	12.94	17.36	16.14
Total for Grasses		488	585	453	428	12.94	17.36	16.23
F	Agoseris glauca	-	-	3	-	-	.00	-
F	Antennaria rosea	-	-	1	-	-	.00	-
F	Astragalus convallarius	-	6	4	9	.06	.04	.07
F	Astragalus tenellus	_c 91	_b 23	_{ab} 13	_a -	.28	.20	.03
F	Calochortus nuttallii	_a -	_b 8	_a -	_{ab} 5	.03	-	.04
F	Castilleja sp.	-	-	-	-	-	-	.03
F	Chenopodium fremontii (a)	-	_b 13	_a -	_c 25	.05	-	.22
F	Chenopodium leptophyllum(a)	-	3	-	5	.00	-	.02
F	Cirsium sp.	1	2	1	3	.01	.03	.01
F	Cordylanthus kingii (a)	-	_b 25	_a -	_a 5	.28	-	.01
F	Cryptantha sp.	-	-	3	3	-	.03	.01
F	Cymopterus sp.	-	4	-	2	.01	-	.01
F	Descurainia pinnata (a)	-	2	-	2	.01	-	.00
F	Erigeron sp.	3	7	8	1	.04	.06	.00
F	Hedysarum boreale	-	-	4	-	-	.09	-
F	Lappula occidentalis (a)	-	_b 18	_a -	_b 25	.08	-	.31
F	Machaeranthera canescens	_b 21	_{ab} 7	_a 3	_{ab} 10	.06	.04	.07
F	Machaeranthera grindelioides	_b 8	_a -	_{ab} 1	_a -	.00	.00	-
F	Medicago sativa	_c 58	_b 28	_{ab} 25	_a 7	1.70	.56	.30
F	Penstemon humilis	_a -	_{bc} 8	_c 15	_{ab} 2	.07	.20	.06

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Penstemon sp.	-	4	-	-	.00	-	-
F	Phlox hoodii	_{ab} 8	_b 14	_b 19	_a -	.61	.43	-
F	Phlox longifolia	-	1	-	-	.00	-	-
F	Polygonum douglasii (a)	-	_b 10	_a -	_{ab} 8	.03	-	.02
F	Schoenrambe linifolia	3	3	-	-	.00	-	-
F	Senecio multilobatus	3	-	-	4	-	-	.03
F	Sisymbrium altissimum (a)	-	2	-	6	.00	-	.04
F	Sphaeralcea coccinea	_a 24	_b 73	_b 61	_b 64	.85	.37	1.20
F	Taraxacum officinale	-	4	-	-	.01	-	-
F	Tragopogon dubius	1	-	-	-	-	-	-
F	Trifolium gymnocarpon	_a -	_b 12	_a -	_{ab} 11	.22	-	.19
F	Unknown forb-perennial	4	-	-	-	-	-	-
Total for Annual Forbs		0	73	0	76	0.47	0	0.63
Total for Perennial Forbs		225	204	161	121	4.00	2.08	2.08
Total for Forbs		225	277	161	197	4.48	2.08	2.71

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

BROWSE TRENDS --

Management unit 17 , Study no: 51

T y p e	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	74	56	47	9.66	8.36	8.59
B	Atriplex canescens	0	1	1	-	-	.38
B	Chrysothamnus depressus	3	6	1	.16	.21	.15
B	Chrysothamnus nauseosus graveolens	0	4	0	-	.15	-
B	Chrysothamnus nauseosus hololeucus	35	11	11	1.16	.06	.41
B	Chrysothamnus parryi	0	19	22	-	1.02	1.28
B	Chrysothamnus viscidiflorus viscidiflorus	4	2	4	-	-	.03
B	Eriogonum corymbosum	3	2	3	.15	.15	-
B	Gutierrezia sarothrae	13	15	1	.24	.24	-
B	Juniperus osteosperma	0	4	4	-	.03	.18
B	Leptodactylon pungens	4	3	3	.15	.15	.00
B	Opuntia sp.	6	8	5	.00	.18	.15
B	Pediocactus simpsonii	1	0	1	.00	-	.03
B	Pinus edulis	0	3	3	-	-	.03
Total for Browse		143	134	106	11.54	10.57	11.24

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 51

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	8.36
Atriplex canescens	.18
Chrysothamnus nauseosus hololeucus	.43
Chrysothamnus parryi	.95
Eriogonum corymbosum	.25
Juniperus osteosperma	.31
Opuntia sp.	.03
Pinus edulis	.31

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17 , Study no: 51

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	3.2

POINT-QUARTER TREE DATA --
Management unit 17 , Study no: 51

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	18	34
Pinus edulis	36	27

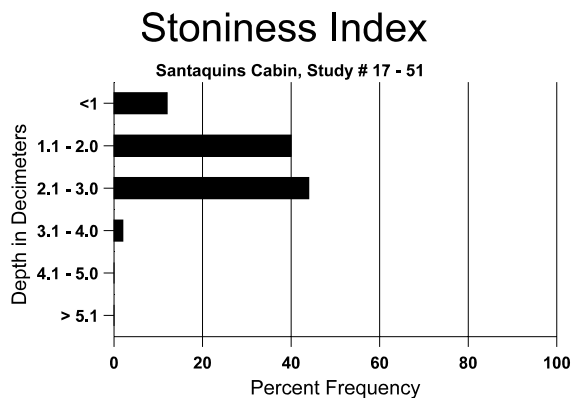
Average diameter (in)	
'00	'05
2.1	3.7
1.5	2.3

BASIC COVER --
Management unit 17 , Study no: 51

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	8.50	2.25	29.18	35.20	28.07
Rock	0	.25	.04	.02	0
Pavement	0	0	.14	.80	.12
Litter	56.00	55.75	44.87	59.80	33.79
Cryptogams	0	0	1.22	1.00	1.16
Bare Ground	35.50	41.75	27.60	32.01	49.23

SOIL ANALYSIS DATA --
Herd Unit 17, Study # 51, Study Name: Santaquins Cabin

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
11.6	55.6 (12.8)	7.37	49.6	27.1	23.3	3.0	3.3	134.4	0.8



PELLET GROUP DATA --
Management unit 17 , Study no: 51

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	18	24	27
Elk	6	2	28
Deer	47	55	37
Cattle	-	4	1

Days use per acre (ha)	
'00	'05
-	-
4 (10)	52 (127)
139 (343)	60 (149)
9 (22)	6 (14)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 51

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
82	5666	5533	2866	2800	-	-	13	4	0	-	0	20/20
88	4399	-	2133	1866	400	-	55	23	9	-	11	22/23
95	3040	20	520	2300	220	320	42	16	7	2	2	33/38
00	2320	120	440	1700	180	240	32	4	8	4	4	18/24
05	1980	3280	520	1000	460	400	20	32	23	16	20	25/30
<i>Atriplex canescens</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	0	0	-	-	0	32/32
05	20	-	-	20	-	-	0	100	-	-	0	31/34
<i>Ceratoides lanata</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	18/22
<i>Chrysothamnus depressus</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	300	-	-	300	-	-	0	0	0	-	0	6/15
00	260	-	-	240	20	-	38	15	8	-	0	1/5
05	20	-	-	20	-	-	0	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus graveolens												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	-/-
00	80	-	-	40	40	-	0	0	50	25	25	23/23
05	0	-	-	-	-	-	0	0	0	-	0	17/24
Chrysothamnus nauseosus hololeucus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	200	-	200	-	-	-	0	33	0	-	33	-/-
95	2380	-	220	2160	-	-	0	0	0	-	0	14/14
00	260	-	80	180	-	-	8	0	0	-	15	17/18
05	240	-	80	120	40	-	8	25	17	17	17	18/20
Chrysothamnus parryi												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	1880	-	40	1840	-	-	43	1	-	-	0	5/8
05	1060	220	140	920	-	20	0	6	-	-	0	7/10
Chrysothamnus viscidiflorus viscidiflorus												
82	66	-	-	66	-	-	0	0	0	-	0	6/10
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	80	-	20	60	-	-	0	0	0	-	0	11/15
00	40	-	-	20	20	-	0	0	50	50	50	-/-
05	160	20	-	160	-	-	0	0	0	-	0	10/13
Eriogonum corymbosum												
82	66	-	-	66	-	-	0	0	-	-	0	15/16
88	66	-	-	66	-	-	0	0	-	-	0	15/13
95	80	-	20	60	-	-	0	0	-	-	0	16/30
00	60	-	-	60	-	-	0	0	-	-	0	16/20
05	60	-	20	40	-	20	33	33	-	-	0	13/18
Gutierrezia sarothrae												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	200	-	-	200	-	-	0	0	-	-	0	6/9
95	680	-	40	640	-	-	0	0	-	-	0	9/11
00	860	-	20	840	-	20	0	0	-	-	0	4/6
05	120	20	-	120	-	-	0	0	-	-	0	7/12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	66	-	66	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	80	-	60	20	-	-	0	0	-	-	0	-/-
05	100	-	60	40	-	-	0	0	-	-	0	-/-
Leptodactylon pungens												
82	533	-	-	533	-	-	0	0	-	-	0	2/7
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	160	-	-	160	-	-	0	0	-	-	0	6/7
00	240	-	-	240	-	-	0	0	-	-	0	3/6
05	100	20	20	80	-	-	0	0	-	-	0	2/8
Opuntia sp.												
82	933	-	-	933	-	-	0	0	0	-	0	3/13
88	1533	-	133	1400	-	-	0	0	0	-	0	3/4
95	120	-	-	120	-	-	0	0	0	-	0	6/14
00	220	-	60	140	20	-	0	0	9	-	0	4/12
05	140	-	20	120	-	20	0	0	0	-	0	4/12
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	-	20	-	-	0	0	-	-	0	1/2
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	1/2
Pinus edulis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	66	-	66	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	60	-	60	-	-	-	0	0	-	-	0	-/-
05	60	-	40	20	-	-	0	0	-	-	0	-/-
Tetradymia canescens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	14/12
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 17-52-05

Study site name: Cutoff.

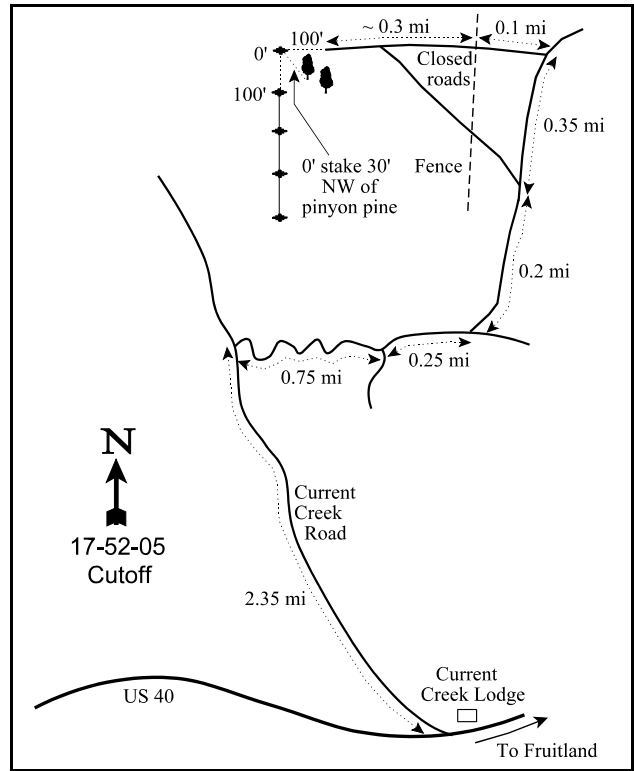
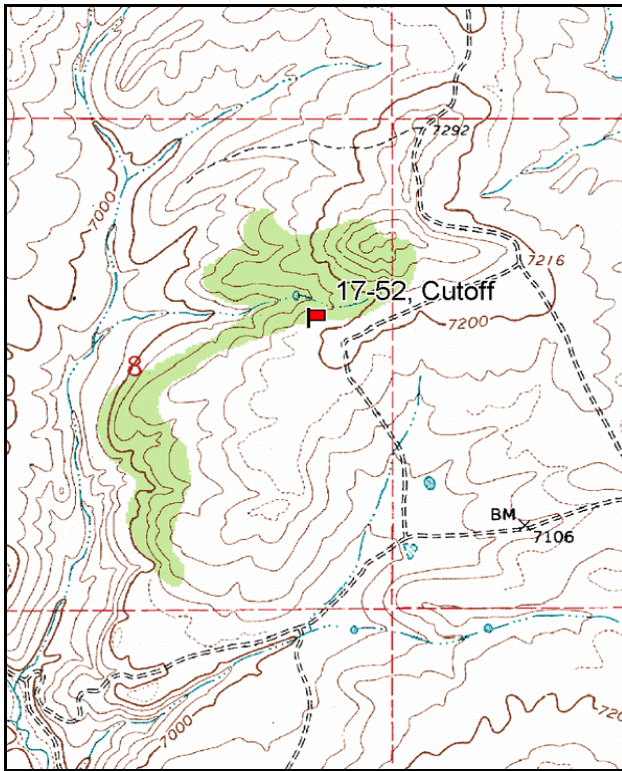
Vegetation type: Mountain Big Sagebrush.

Compass bearing: frequency baseline 179 degrees magnetic.

Frequency belt placement: line 1 (6 & 90ft), line 2 (26ft), line 3 (57ft), line 4 (69ft).

LOCATION DESCRIPTION

From the intersection of Currant Creek Road and Highway U.S. 40, drive north on the Currant Creek Road for 2.35 miles. Turn right and go east 0.75 miles to an intersection. Turn left and drive north for 0.25 miles to a "T". At the "T", turn left and go 0.2 miles to a fork. Stay right for another 0.35 miles to another fork. Turn left and drive to the fence. Cross the fence and walk to the end of the road (about a third of a mile) to the west. The 0-foot baseline is 100 feet west of the end of the road. The 0-foot stake is about 30 feet north west of a mature pinyon pine.



Map Name: Deep Creek Canyon

Diagrammatic Sketch

Township 3S, Range 9W, Section 8

GPS: NAD 27, UTM 12T 4453656 N, 506989 E

DISCUSSION

Cutoff - Trend Study No. 17-52

The Cutoff trend study is on private land, about 1/3 mile west of Division of Wildlife land, on winter range. The area is immediately north of Currant Creek Lodge. The range type is sagebrush-grass with a mixture of some mountain brush. Slope varies from 10% to 20% with a west aspect. Elevation is approximately 7,200 feet. Pellet group frequency data indicates the area is used heavily by deer. Pellet group data in 2000 were estimated at 96 deer and 8 elk days use/acre (237 ddu/ha and 20 edu/ha). The 2005 pellet group data estimates were 86 deer, 16 elk, and 11 cow days use/acre (212 ddu/ha, 40 edu/ha, and 27 cdu/ha). During both readings, a few deer pellet groups appeared to be from spring, but most were from winter use. Elk pellets were from winter. There were also some signs of cattle grazing; all cattle pats sampled appeared to be from the previous summer.

The soils are fairly deep but variable. The average effective rooting depth is estimated at nearly 14 inches with deep soil measurements of nearly 20 inches occurring near shrubs. Soil depths within the shrub interspaces is only 6 to 7 inches. Some areas also contain a calcium carbonate hardpan. The soil texture is a sandy loam with a neutral soil reaction (pH of 7.2). Phosphorus was measured at 5.9 ppm and values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). There is little rock on the surface or within the profile, but there are some exposed boulders near the beginning and end of the baseline. There is some erosion, notably on the steeper slopes near the beginning and end of the baseline. There is evidence of past erosion in the form of soil pedestaling and gully formation. However, there appears to be sufficient protective ground cover to prevent serious erosion. On nearby steeper slopes, erosion is more serious and widespread than on the study site. The erosion index measurement in 2005 rated the soil erosion as moderate, mainly because of small but frequent pedestaling of shrubs and perennial grasses, small gullies covering between 10% and 50% of the site, some minor soil movement, moderate litter movement, many small rills, and minor flow patterns between perennial species.

The key browse species is mountain big sagebrush which provided 11% cover in 1995, 7% in 2000, and 8% in 2005. There are also a variety of other browse species present which include: serviceberry, true mountain mahogany, mountain low rabbitbrush, and bitterbrush. Density for mountain big sagebrush was estimated at 1,866 plants/acre in 1982, 2,199 plants/acre in 1988, 3,000 plants/acre in 1995, 2,980 plants/acre in 2000, and 2,420 plants/acre in 2005. Before 1995, use was light to moderate, but has been moderate to heavy from 1995 to 2005. The percentage of the decadent individuals in the population has been relatively high. It was estimated at 21% in 1982, 70% in 1988, 39% in 1995, 45% in 2000, and 51% in 2005. The percentage of dying individuals in the population is on the decline. In 1995, 21% of the population was dying, 12% in 2000, and 9% in 2005. The young individuals were only 16% of the population in 1995, 5% in 2000, and 4% in 2005. This percentage of young individuals has been around one-half that of the individuals classified as dying, therefore there has been a continual decrease in population. Other preferred browse, serviceberry and true mountain mahogany, occur in small numbers but provide additional forage. Serviceberry shows mostly light to moderate hedging, but some mature individuals have displayed heavy use. Mahogany has shown mostly moderate use, but showed heavy utilization in 2000 and 2005.

Grasses and forbs combined provided 21% cover in 1995, 25% in 2000, and 23% in 2005. Perennial grasses are diverse and thickspike wheatgrass, needle-and-thread, bluebunch wheatgrass, Indian ricegrass, Sandberg's bluegrass, and mutton bluegrass being are the most abundant. Forbs are abundant, but few useful species are present. Timber poisonvetch, king birdbeak, and Hood's phlox provided 8% cover in 1995 and 9% in 2005. In 2000, pussytoes, timber poisonvetch, and Hood's phlox provided 9% cover.

1982 APPARENT TREND ASSESSMENT

Soil trend appears to be stable to declining. Soil movement, while not rapid, appears to be a long-term problem. Vegetation trend also appears to be in a state of decline, which could be reversed in a relatively short time. The most obvious problems involve browse composition and age structure and vigor of the key species. Prior to 1981, the area had been grazed by livestock during the summer and fall. A spring grazing program designed to enhance the browse component might prove beneficial if the increaser shrubs currently present can be held in check or even reduced.

1988 TREND ASSESSMENT

There was an increase in percent bare ground from 39% to 46%. Litter cover also declined but basal vegetation cover increased slightly and frequency of herbaceous vegetation increased. There is continued gully erosion evident on the site, but other soil trend indicators appear stable. Trend for soil is considered stable but in poor condition. A variety of browse species are available, but mountain big sagebrush is the key and the most abundant species. Density of sagebrush has increased slightly but so have the less desirable rabbitbrush species. For the sagebrush, the most important change is in the age class composition. The mostly mature sagebrush population found in 1982 is now 70% decadent, not unusual for 1988. There are few young plants. The sagebrush is lightly to moderately hedged. Sagebrush cover averages 12%. The more palatable, but less common, shrubs such as true mountain mahogany, serviceberry and bitterbrush are also only lightly to moderately hedged. Although poorly sampled due to low numbers, more individuals of these species were counted in 1988 and all are vigorous. Young shrubs are common. Trend for browse is slightly down. In the understory, frequency of grasses and forbs has increased. Trend for grasses and forbs is slightly up.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

The soil trend is slightly up. The amount of exposed bare soil is down from 46% to 34%. Litter cover continued to decline slightly, but cover of cryptogamic crusts increased to over 5%. There are currently no active gullies on the site, but signs of past soil movement such as pedestaling are evident. Trend for browse is mixed for the key species, mountain big sagebrush. The number of mature plants is similar to that found in 1982 (1,400 to 1,340 plants/acre) and the number of decadent plants declined from 70% to 39%. On the negative side, heavy use increased. No heavy use was reported on sagebrush in 1982 or 1988. During the 1995 reading, 56% of the mature and decadent shrubs displayed heavy hedging. Those plants classified with poor vigor equaled 21%. In addition, 54% of the decadent plants (640 plants/acre) were classified as dying. Dead plants numbered 920 plants/acre, indicating a die off in the past few years. Few seedlings were found, yet young plants are moderately abundant. It appears that the population may decline in the future, but the resulting population will be younger and show better health as long as use is not too extreme. Trend for browse is considered stable at this time. Trend for the herbaceous understory is slightly up with an increase in the sum of nested frequency of perennial grasses and forbs. Nested frequency of thickspike wheatgrass increased significantly while frequency of Indian ricegrass declined significantly. Overall, nested frequency of perennial grasses increased by 18%. Nested frequency for perennial forbs increased by 11%. The Desirable Components Index rated this site as fair with a score of 61 due to moderate browse cover, high decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - fair (61) Moderate Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Relative percent cover of bare ground and litter are unchanged, while vegetation cover has increased and cryptogamic cover has declined. Overall, the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground has remained fairly stable since 1995. Trend for the key browse species, mountain big sagebrush, is stable at this time. Use is similar to 1995 levels. Percent decadence is still relatively high at 45%, but a smaller proportion were classified as dying (54% in 1995 and 27% in 2000). Reproduction is marginal with few seedlings encountered and young plants providing for only 5% of the population. If recruitment does not improve, the population will likely decline. A return to normal precipitation patterns will do much to improve sagebrush health and reproduction. Trend for the herbaceous understory is slightly down. Sum of nested frequency of perennial grasses and forbs have declined by 10% and 14%, respectively. Nested frequency of thickspike wheatgrass declined significantly while only about one-third of the grasses remained fairly stable. Nested frequency of perennial forbs declined slightly while nested frequency of annual forbs declined dramatically due to the dry conditions of 2000 (287 to 11). The Desirable Components Index rated this site as good to fair with a score of 67 due to moderate browse cover, high decadency, and excellent perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - good to fair (67) Moderate Potential scale

2005 TREND ASSESSMENT

The soil trend is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground changed little from 2000 to 2005. The relative cover of bare ground increased slightly and relative cover of litter decreased slightly, but not enough to change the trend. The browse trend is slightly down. The population of the key browse species, mountain big sagebrush, decreased 19% from 2000 to 2005. The majority of the loss was in the mature age class. This general population decrease was coupled with an increase in decadence from 45% of the population in 2000 to 51% in 2005. Despite a decrease in the percentage of dying individuals, the percentage of individuals with poor vigor increased from 14% in 2000 to 17% in 2005. The percentage of young individuals in the population also decreased slightly and produced less than half the number of individuals dying. True mountain mahogany and Utah serviceberry populations are small. The trend for herbaceous understory is slightly up. The nested frequency of perennial grasses increased by 21% and perennial forbs changed little from 2000 to 2005. The cover of both perennial grasses and perennial forbs decreased some. Cheatgrass increased some in both nested frequency and quadrat frequency. The Desirable Components Index rated this site as fair to poor with a score of 52 due to moderate browse cover, high decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - fair to poor (52) Moderate Potential scale

HERBACEOUS TRENDS --

Management unit 17 , Study no: 52

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	_b 181	_c 203	_b 163	_a 85	2.23	2.68	2.03
G	Agropyron spicatum	_a -	_b 32	_b 46	_c 148	1.14	1.20	1.75
G	Bromus tectorum (a)	-	3	3	11	.00	.00	.19
G	Carex sp.	_a 3	_b 46	_b 44	_b 34	.27	.29	.13
G	Elymus salina	_a 39	_b 67	_a 21	_a 12	.99	.82	.07
G	Oryzopsis hymenoides	_b 145	_a 79	_a 67	_a 50	1.20	1.80	1.12
G	Poa fendleriana	_c 148	_c 118	_a 8	_b 66	1.35	.21	1.34
G	Poa secunda	_a -	_a 7	_c 199	_b 171	.01	6.15	2.21
G	Sitanion hystrix	-	1	-	-	.00	-	-
G	Stipa comata	_a -	_c 74	_b 14	_d 111	2.25	.42	2.20
Total for Annual Grasses		0	3	3	11	0.00	0.00	0.19
Total for Perennial Grasses		516	627	562	677	9.48	13.59	10.89
Total for Grasses		516	630	565	688	9.48	13.60	11.08
F	Agoseris glauca	_a -	_a 3	_a -	_b 8	.01	-	.02
F	Allium sp.	_a -	_c 104	_a -	_b 61	.45	-	.24
F	Antennaria rosea	_b 68	_b 48	_b 60	_a 12	.52	2.10	.33
F	Androsace septentrionalis (a)	-	_b 35	_a -	_a -	.14	-	-
F	Arabis sp.	_a 6	_a 5	_a 9	_b 24	.02	.22	.10
F	Artemisia dracunculus	-	-	2	-	-	.00	-
F	Astragalus convallarius	_a 83	_b 139	_b 122	_b 131	3.79	3.19	2.83
F	Astragalus sp.	4	3	8	2	.62	.44	.01
F	Castilleja chromosa	_a 4	_a 4	_b 23	_a 3	.07	.27	.00
F	Calochortus nuttallii	_a -	_{ab} 3	_{ab} 2	_b 8	.01	.00	.02
F	Chaenactis douglasii	_b 25	_{ab} 9	_{ab} 7	_a 1	.02	.02	.00
F	Chenopodium fremontii (a)	-	6	-	-	.01	-	-
F	Chenopodium leptophyllum(a)	-	_b 11	_a -	_{ab} 6	.03	-	.01
F	Cirsium sp.	2	-	2	-	-	.00	-
F	Cordylanthus kingii (a)	-	_b 81	_a 3	_c 119	2.25	.00	2.91
F	Collinsia parviflora (a)	-	_b 62	_a -	_c 99	.22	-	.57
F	Crepis acuminata	-	9	2	-	.19	.00	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Cryptantha sp.	3	-	-	-	-	-	.00
F	Cymopterus sp.	a ⁻	b ²⁴	a ⁴	b ¹⁴	.07	.00	.05
F	Delphinium nuttallianum	-	-	-	1	-	-	.00
F	Descurainia pinnata (a)	-	a ¹⁰	a ⁻	b ²⁵	.07	-	.09
F	Eriogonum cernuum (a)	-	3	-	1	.01	-	.00
F	Erigeron eatonii	a ⁻	a ⁻	a ⁻	b ¹⁵	-	-	.42
F	Erigeron pumilus	ab ³⁶	a ²⁷	c ⁸⁵	bc ⁵⁶	.07	.51	.51
F	Gayophytum ramosissimum(a)	-	7	-	11	.06	-	.02
F	Hedysarum boreale	a ⁻	b ³⁰	a ⁴	a ⁻	.61	.01	-
F	Lappula occidentalis (a)	-	b ¹⁹	a ⁻	b ²⁴	.05	-	.06
F	Lithospermum ruderales	1	3	2	2	.03	.03	.06
F	Machaeranthera canescens	b ¹⁵¹	a ¹⁹	a ¹²	a ¹⁵	.08	.08	.20
F	Penstemon sp.	-	2	1	-	.00	.01	-
F	Phlox hoodii	b ¹⁴²	a ¹⁰⁸	ab ¹³¹	a ¹⁰⁸	1.58	3.62	2.79
F	Phlox longifolia	a ⁻	b ³⁰	b ¹⁵	b ²⁹	.12	.03	.21
F	Polygonum douglasii (a)	-	b ⁵³	a ⁸	b ⁶¹	.13	.04	.14
F	Ranunculus testiculatus (a)	-	-	-	4	-	-	.01
F	Schoenocrambe linifolia	-	5	3	1	.01	.00	.03
F	Senecio multilobatus	-	-	6	5	-	.03	.03
F	Sphaeralcea coccinea	b ⁵⁵	ab ³¹	ab ³²	a ³¹	.45	.23	.15
F	Trifolium gymnocarpon	a ⁵	c ⁵⁰	ab ²⁹	b ³⁰	.24	.13	.22
Total for Annual Forbs		0	287	11	350	3.00	0.04	3.84
Total for Perennial Forbs		585	656	561	557	9.00	10.99	8.29
Total for Forbs		585	943	572	907	12.00	11.04	12.13

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

BROWSE TRENDS --

Management unit 17 , Study no: 52

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	16	19	20	.82	2.40	.91
B	Artemisia tridentata vaseyana	78	70	69	10.52	7.12	7.80
B	Ceratoides lanata	0	4	3	-	-	-
B	Cercocarpus montanus	7	8	8	.56	.68	.72
B	Chrysothamnus depressus	28	29	32	1.13	.61	1.75
B	Chrysothamnus viscidiflorus lanceolatus	37	31	35	.31	.78	.87
B	Eriogonum corymbosum	18	18	17	.30	.27	.45
B	Juniperus osteosperma	0	0	1	-	-	-
B	Opuntia fragilis	15	8	15	.14	.19	.09
B	Pediocactus simpsonii	0	5	8	-	-	.03
B	Tetradymia canescens	6	4	4	.33	.76	.30
Total for Browse		205	196	212	14.14	12.83	12.95

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 52

Species	Percent Cover
	'05
Amelanchier utahensis	3.34
Artemisia tridentata vaseyana	11.25
Ceratoides lanata	.03
Cercocarpus montanus	1.91
Chrysothamnus depressus	1.81
Chrysothamnus viscidiflorus lanceolatus	3.28
Eriogonum corymbosum	.86
Opuntia fragilis	.11
Pediocactus simpsonii	.06
Tetradymia canescens	.11

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17 , Study no: 52

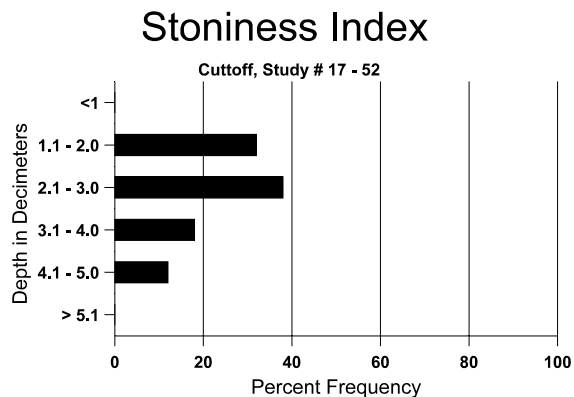
Species	Average leader growth (in)
	'05
Amelanchier utahensis	3.2
Artemisia tridentata vaseyana	1.4
Cercocarpus montanus	3.8

BASIC COVER --
Management unit 17 , Study no: 52

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	11.50	13.00	32.34	37.61	37.54
Rock	.75	1.25	.20	.89	.53
Pavement	.75	.25	.26	.62	1.40
Litter	45.00	38.50	35.52	40.88	30.97
Cryptogams	2.75	1.00	5.24	1.69	1.84
Bare Ground	39.25	46.00	34.07	38.95	41.66

SOIL ANALYSIS DATA --
Herd Unit 17, Study # 52, Study Name: Cutoff

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.8	61.6 (14.6)	7.2	61.4	19.0	19.6	1.8	5.9	131.2	0.7



PELLET GROUP DATA --
Management unit 17 , Study no: 52

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	25	38	75
Elk	3	14	14
Deer	44	33	50
Cattle	-	-	3

Days use per acre (ha)	
'00	'05
-	-
8 (20)	16 (40)
96 (236)	86 (212)
3 (7)	11 (27)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 52

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	133	-	-	133	-	-	100	0	0	-	0	16/22
88	200	400	200	-	-	-	0	0	0	-	0	-/-
95	320	-	60	260	-	-	38	0	0	-	0	22/26
00	520	140	280	220	20	-	4	15	4	4	4	28/31
05	540	-	320	160	60	80	44	15	11	-	0	33/38
Artemisia tridentata vaseyana												
82	1866	-	66	1400	400	-	46	0	21	-	0	18/26
88	2199	-	133	533	1533	-	39	0	70	7	24	18/23
95	3000	20	480	1340	1180	920	28	47	39	21	21	20/34
00	2980	20	160	1480	1340	620	28	53	45	12	14	20/33
05	2420	820	100	1080	1240	1000	21	55	51	9	17	22/35
Ceratoides lanata												
82	66	-	-	66	-	-	0	0	0	-	0	14/9
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	6/8
00	120	-	-	100	20	-	83	0	17	17	17	7/6
05	80	-	-	80	-	-	75	25	0	-	0	13/12
Cercocarpus montanus												
82	200	-	-	200	-	-	100	0	0	-	0	20/19
88	400	66	400	-	-	-	100	0	0	-	0	-/-
95	260	-	20	240	-	-	38	0	0	-	0	22/31
00	260	-	20	220	20	-	23	77	8	8	8	32/32
05	240	-	-	220	20	-	0	100	8	8	8	41/45

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	666	-	66	600	-	-	0	0	0	-	0	3/6
95	2520	-	60	2460	-	-	0	0	0	-	0	6/11
00	2480	-	-	2460	20	40	32	19	1	.80	.80	5/10
05	1700	20	-	1560	140	60	24	67	8	6	9	7/14
Chrysothamnus nauseosus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	7/15
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus lanceolatus												
82	1533	-	-	1533	-	-	0	0	0	-	0	12/15
88	3132	-	333	2466	333	-	0	0	11	1	4	8/8
95	1480	-	120	1360	-	-	0	0	0	-	0	11/14
00	1640	-	20	1620	-	60	5	0	0	-	1	9/13
05	1480	-	-	1420	60	20	18	5	4	-	1	11/18
Eriogonum corymbosum												
82	733	-	-	733	-	-	0	0	0	-	0	17/15
88	732	-	333	133	266	-	0	0	36	-	0	13/11
95	800	-	160	640	-	-	0	0	0	-	0	13/18
00	720	40	100	380	240	-	11	0	33	3	3	11/15
05	820	100	140	640	40	-	20	29	5	-	0	16/21
Juniperus osteosperma												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	20	-	-	-	0	0	-	-	0	-/-
Opuntia fragilis												
82	200	-	-	200	-	-	0	0	0	-	0	3/5
88	999	533	333	466	200	-	0	0	20	-	0	1/2
95	340	-	60	260	20	-	0	0	6	6	6	4/11
00	420	-	-	400	20	60	5	0	5	5	5	2/6
05	440	-	20	360	60	-	0	0	14	5	5	3/8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	140	-	-	140	-	-	0	0	-	-	0	1/2
05	240	-	-	240	-	-	0	0	-	-	0	2/3
Purshia tridentata												
82	66	-	-	66	-	-	100	0	-	-	0	14/30
88	133	-	-	133	-	-	50	0	-	-	0	19/39
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Quercus gambelii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	51/16
Symphoricarpos oreophilus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	10/32
05	0	-	-	-	-	-	0	0	-	-	0	13/30
Tetradymia canescens												
82	200	-	-	200	-	-	0	0	0	-	0	8/15
88	66	-	-	66	-	-	0	0	0	-	0	6/6
95	140	-	-	140	-	-	14	0	0	-	0	11/17
00	80	-	-	80	-	-	25	0	0	-	0	11/17
05	80	-	-	60	20	-	75	0	25	-	0	11/20

Trend Study 17-53-05

Study site name: Two Bar Ranch .

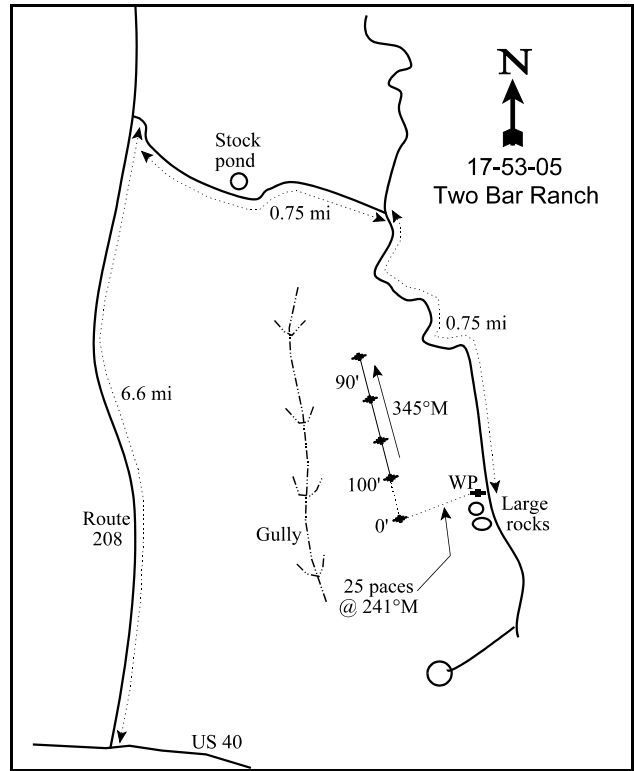
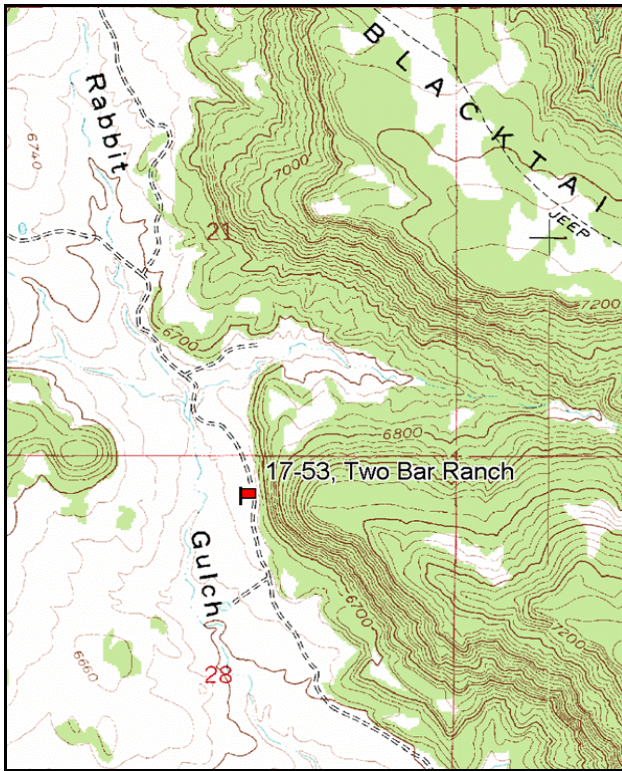
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 345 degrees magnetic.

Frequency belt placement: line 1 (9 & 85ft), line 2 (26ft), line 3 (45ft), line 4 (60ft).

LOCATION DESCRIPTION

From U.S. 40 five miles east of Fruitland, take Rt. 208 north towards Tabiona for 6.6 miles. Just after a small road cut, there is a road on the right. Turn right towards Rabbit Gulch and go 0.75 miles to an intersection. Turn right (south) and go another 0.75 miles down a gully-ridden road to two large rocks on the west side of the road. From the highest point of the first rock, the 0-foot baseline stake is 25 paces away bearing 241°M. The baseline runs to the north.



Map Name: Tabiona

Diagrammatic Sketch

Township 2S, Range 7W, Section 28

GPS: NAD 27, UTM 12T 4459012 N, 527287 E

DISCUSSION

Two Bar Ranch - Trend Study No. 17-53

The Two Bar Ranch study is located on the upper part of Rabbit Gulch near the base of Blacktail Ridge. The study is within a large sagebrush flat with a gentle 5% slope and an aspect to the west. The elevation is approximately 6,600 feet. This is the lowest elevation for a trend study on the unit. Thermal and escape cover for big game is limited within the sagebrush flat, but good cover is available in the pinyon-juniper woodland along the ridge east of the site. This entire area is considered critical deer winter range. There is evidence of substantial deer use during past readings. Pellet group quadrat frequency data from 1995 indicated moderate numbers of deer and elk use this area. In 2000, pellet group data were estimated at 38 deer and 35 elk days use/acre (94 ddu/ha and 86 edu/ha). Pellet group data in 2005 estimates were 23 deer, 17 elk, and 1 cow days use/acre (56 ddu/ha, 43 edu/ha, and 2 cdu/ha).

Soils are alluvially deposited, moderately deep, and somewhat sandy in texture. The effective rooting depth is estimated at just over 15 inches with deeper measurements limited only by soil compaction. There is little rock on the soil surface or within the profile. Soil texture is a sandy clay loam with a slightly alkaline soil reaction (pH of 7.7). Phosphorus was measured at 1.5 ppm and values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Exposed bare ground was extensive and erosion was occurring at an accelerated rate in 1982, as evidenced by many small rills and gullies. Vegetation was sparse and generally inadequate to prevent soil movement. Conditions have improved slightly since 1982, but they are still only poor to fair and erosion is still a problem. The erosion index measurement in 2005 rated the soil erosion as high to moderate, mainly because of small frequent pedestals surrounding shrubs and perennial grasses, gullies covering over 50% of the site (two large gullies on the site), large amounts of soil movement, minor litter movement, many small rills, and moderate flow patterns between perennial species.

The key browse species is Wyoming big sagebrush, with shadscale present but historically of secondary importance. Density of sagebrush has fluctuated considerably since 1982 from 2,533 sagebrush plants/acre to 9,865 plants/acre in 1988 (a change mainly in young and decadent plant numbers), 5,080 plants/acre in 1995, 5,080 plants/acre in 2000, and 2,280 plants/acre in 2005. The population has had a strong population of mature individuals around 2,000 to 3,000 plants/acre, until 2005. The percent decadence was low (below 15%) until 2000 when it increased to 33% and then to 62% in 2005. The plants classified as dying also increased from 7% in 1995 to 14% in 2000, then to 55% by 2005. The percentage of young individuals was as high as 66% in 1988, then decreased to 26% in 1995, then 11% in 2000, and then 3% in 2005. This decrease in young and drastic increase in percent dying has led to the substantial decrease in population.

Shadscale were historically moderately abundant and provided 22% of the browse cover with a density of 4,020 plants/acre in 2000 and less in previous years. In 2005, the shadscale increased in percent cover to produce more cover and density than sagebrush (2,640 plants/acre of shadscale compared to 2,280 plants/acre of sagebrush). Although shadscale declined in population as sagebrush did, shadscale declined slightly less. Shadscale also increased in percent decadence and percent dying. In 1995, decadent shadscale plants only made up 1% of the population, but increased to 12% in 2000, and 10% in 2005. Percent dying increased from 1% of the population in 1995 to 2% in 2000, to 6% in 2005. The percentage of shadscale with poor vigor mirrored the pattern of percent dying with the only exception was that 9% of the population showed poor vigor in 2005. Use has been mostly light.

The herbaceous understory is deficient. Four perennial grass species, thickspike wheatgrass, Indian ricegrass, squirreltail, and needle-and-thread make up the bulk of the herbaceous cover. Thickspike wheatgrass decreased significantly in nested frequency in 2005. Perennial forbs are scarce with hoary aster, longleaf phlox, and scarlet globemallow combining to produce most of the meager forb cover. Cover of forb was just over 1% in 1995 and just over one-half of 1% in 2000, but increased to nearly 7% in 2005. This increase was due to a large increase in scarlet globemallow and annual stickseed.

1982 APPARENT TREND ASSESSMENT

Currently, this area is rather poor quality winter range. Significant improvements are possible but will be difficult to achieve. Soil trend appears to be declining and must be reversed if any vegetation change is to occur. The area appears stable but at a low level of plant species diversity. A principle management goal should be to improve species diversity among all classes of vegetation.

1988 TREND ASSESSMENT

There appears to have been a decrease in vegetation basal cover and litter cover. Although there was an increase in cryptogamic cover from 3 to 12%, there was an overall decrease in total protective ground cover in 1988 resulting in a large amount of bare soil (53%). Small gullies have expanded since the 1982 study, with accelerated soil loss continuing. Soil trend is slightly down. Although the total number of sagebrush has increased by two and one-half times on the density plots, the density of mature plants and mean sagebrush occurrence are unchanged. There is a moderately dense stand of mature sagebrush (2,066 plants/acre) and consistent cover of 8%. More decadent plants, but also many more young plants, were found in 1988. The degree of hedging has increased since 1982. Hedging on 48% of the available sagebrush is moderate, whereas most (87%) were rated as lightly hedged in 1982. Trend appears up due to the large numbers of seedlings and young plants and a stable mature population. Trend for the herbaceous understory is stable but in poor condition. Quadrat frequency of grasses increased slightly while frequency of forbs declined.

TREND ASSESSMENT

soil - slightly down (-1)

browse - up (+2)

herbaceous understory - stable (0)

1995 TREND ASSESSMENT

Soil conditions have improved but are still poor. Percent bare ground declined from 53% in 1988 to 34%. Litter cover remained similar and cryptogamic cover increased to 16%. In addition, sum of nested frequency for grasses increased providing improved soil protection. Trend for soil is slightly up but still only in fair condition. The browse trend is stable. Past data suggest wide fluctuations in Wyoming big sagebrush density. However, percent decadency has remained similar to 1988 estimates (13% vs 14%) and there are adequate numbers of seedlings and young plants to maintain the population. The proportion of plants displaying heavy use has increased from 3% to 35%. This could cause an increase in decadence in the future as heavy use increases or if use is consistently high for several years. Trend for the herbaceous understory is up for grasses and forbs, but still slightly deficient. The Desirable Components Index rated this site as good with a score of 61 due to moderate browse cover, low decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - slightly up (+1)

browse - stable (0)

herbaceous understory - up (+2)

winter range condition (DC Index) - good (61) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable. The slightly downward changes are not enough to warrant a change in trend. Relative percent cover of bare ground has increased slightly, while litter cover has declined slightly. In addition, the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground has decreased slightly. There is still erosion occurring in the area with several active gullies around the site. Trend for the key browse species, Wyoming big sagebrush, appears stable. Density is identical to 1995 estimates and use is also similar. Drought is obviously effecting the health of the sagebrush. The proportion of sagebrush displaying poor vigor has increased from 7% in 1995 to 16% in 2000. Decadence has also increased from 15% to 33%. In addition, 43% (720 plants/acre) of the decadent shrubs appear to be dying. Seedling and young recruitment is good and appears sufficient to maintain the population at this time. A return to normal precipitation patterns will do much to improve sagebrush health. Trend for the herbaceous understory is stable for grasses and down slightly for forbs. Forbs are still very limited and currently produce less than 1% cover. Since grasses provide the majority of the herbaceous cover (about 95%), the overall herbaceous trend is stable. The Desirable Components Index rated this site as good with a score of 60 due to moderate browse cover, high decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - good (60) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground changed little from 2000 to 2005, although the site shows many signs of moderate active erosion. The trend for browse is down. The two key browse species on the site, Wyoming big sagebrush and shadscale, both declined in population from 2000 to 2005. The sagebrush population decreased 55% with major losses in numbers of young and mature individuals. Percent decadence nearly doubled from 33% in 2000 to 62% in 2005. The individuals classified as dying increased from 14% of the population in 2000 to 55% in 2005, with a decrease in the percentage of young individuals from 11% to 3%. The shadscale population decreased 34% from 4,020 plants/acre in 2000 to 2,640 plants/acre in 2005. The percent decadence decreased very slightly and the percent dying increased slightly. The herbaceous understory trend is down. The nested frequency of perennial grasses decreased by 23%, while perennial forbs increased over 100%. The percent cover of perennial grasses increased from 10% to 12% and perennial forbs increased from less than 1% to 3%. However, on average perennial forbs only contributed to only about 14% of the herbaceous cover. The perennial forb increase was due to the significant increase in globemallow, which has little forage value in winter, and therefore does not stabilize the trend. The Desirable Components Index rated this site as good with a score of 56 due to moderate browse cover, high decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - good (56) Lower Potential scale

HERBACEOUS TRENDS --
 Management unit 17 , Study no: 53

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	_b 132	_c 173	_{bc} 156	_a 62	2.55	3.42	1.81
G	Bromus tectorum (a)	-	1	-	-	.00	-	-
G	Carex sp.	_c 73	_{ab} 38	_a 15	_{bc} 43	.23	.18	.46
G	Oryzopsis hymenoides	40	65	31	39	1.10	.87	1.62
G	Sitanion hystrix	29	29	49	23	1.33	1.10	1.16
G	Sporobolus cryptandrus	-	2	-	-	.00	-	-
G	Stipa comata	_a 29	_a 51	_b 103	_b 106	1.82	4.39	6.96
Total for Annual Grasses		0	1	0	0	0.00	0	0
Total for Perennial Grasses		303	358	354	273	7.06	9.97	12.02
Total for Grasses		303	359	354	273	7.07	9.97	12.02
F	Arabis sp.	-	7	3	5	.04	.00	.01
F	Astragalus convallarius	-	-	-	4	-	-	.01
F	Chenopodium fremontii (a)	-	3	-	6	.01	-	.01
F	Chenopodium leptophyllum(a)	-	_b 6	_a -	_b 18	.02	-	.05
F	Collinsia parviflora (a)	-	-	-	1	-	-	.00
F	Descurainia pinnata (a)	-	_a 1	_a 1	_b 49	.00	.00	.60
F	Draba sp. (a)	-	3	-	-	.00	-	-
F	Eriogonum cernuum (a)	-	2	-	8	.01	-	.02
F	Lappula occidentalis (a)	-	_b 16	_a -	_c 112	.03	-	2.67
F	Lepidium sp. (a)	-	_b 24	_a -	_a 5	.12	-	.04
F	Lychnis drummondii	1	-	-	-	-	-	-
F	Machaeranthera canescens	_a 6	_b 32	_a 1	_a 4	.22	.03	.06
F	Phlox longifolia	_a 3	_c 81	_a 7	_b 43	.21	.06	.28
F	Plantago patagonica (a)	-	_{ab} 9	_a -	_b 18	.07	-	.06
F	Schoenocrambe linifolia	_a 2	_b 10	_a 1	_a 3	.03	.03	.00
F	Sphaeralcea coccinea	_a 52	_a 65	_a 62	_b 103	.45	.50	2.71
F	Townsendia incana	-	1	-	2	.03	-	.03
Total for Annual Forbs		0	64	1	217	0.28	0.00	3.46
Total for Perennial Forbs		64	196	74	164	0.99	0.62	3.12
Total for Forbs		64	260	75	381	1.28	0.63	6.59

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

BROWSE TRENDS --

Management unit 17 , Study no: 53

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	93	82	57	11.23	13.25	4.33
B	Atriplex confertifolia	63	70	62	2.59	4.47	6.48
B	Ceratoides lanata	0	2	1	-	-	.00
B	Chrysothamnus depressus	0	0	0	-	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	1	1	2	-	-	.00
B	Opuntia sp.	36	39	37	1.10	.97	1.02
B	Pediocactus simpsonii	0	0	1	-	-	.00
B	Pinus edulis	0	4	3	.15	.38	.38
B	Sarcobatus vermiculatus	16	14	17	1.28	1.25	3.28
B	Tetradymia spinosa	0	0	1	.00	-	-
Total for Browse		209	212	181	16.36	20.32	15.55

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 53

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	4.13
Atriplex confertifolia	7.80
Ceratoides lanata	.13
Juniperus osteosperma	.50
Opuntia sp.	.93
Sarcobatus vermiculatus	4.09

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 17 , Study no: 53

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.9

BASIC COVER --

Management unit 17 , Study no: 53

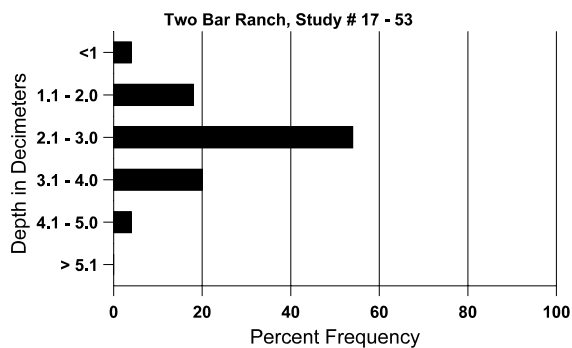
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	5.50	2.00	26.45	30.25	28.32
Rock	0	1.00	.06	.15	.01
Pavement	0	.50	.12	.09	.07
Litter	45.25	31.50	29.09	27.65	34.43
Cryptogams	2.50	12.25	15.82	15.10	11.37
Bare Ground	46.75	52.75	33.79	45.52	43.01

SOIL ANALYSIS DATA --

Herd Unit 17, Study # 53, Study Name: Two Bar Ranch

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
15.4	62.8 (16.1)	7.7	52.6	24.8	22.6	1.2	1.5	92.8	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 17 , Study no: 53

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	2	3	18
Elk	17	11	18
Deer	28	9	28
Cattle	-	-	-

Days use per acre (ha)	
'00	'05
-	-
35 (86)	17 (43)
38 (93)	23 (57)
-	1 (2)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 53

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	11/23
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia tridentata wyomingensis												
82	2533	2000	333	2000	200	-	13	0	8	-	0	25/29
88	9865	1866	6466	2066	1333	-	39	3	14	-	.67	22/21
95	5080	340	1300	3020	760	1320	48	35	15	7	7	21/30
00	5080	180	560	2840	1680	1240	40	28	33	14	16	17/25
05	2280	20	60	800	1420	3280	25	52	62	55	56	17/23
Atriplex confertifolia												
82	2599	1133	1266	1333	-	-	18	0	0	-	0	12/20
88	3399	333	1000	1866	533	-	12	2	16	-	0	10/10
95	3080	-	620	2420	40	-	7	3	1	1	1	12/19
00	4020	60	500	3040	480	-	8	12	12	2	2	8/15
05	2640	680	240	2140	260	160	2	0	10	6	9	14/22
Ceratoides lanata												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	6/7
00	40	-	20	-	20	-	0	0	50	50	50	-/-
05	20	-	-	20	-	-	100	0	0	-	0	13/14
Chrysothamnus viscidiflorus viscidiflorus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	20	-	-	20	-	-	0	0	-	-	0	10/4
00	20	-	-	20	-	-	0	0	-	-	0	9/18
05	40	140	20	20	-	-	0	0	-	-	0	14/23

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	2066	-	133	1933	-	-	0	0	0	-	0	4/3
95	1260	-	20	1080	160	80	0	0	13	6	8	5/15
00	1440	-	80	1300	60	60	0	0	4	4	8	4/9
05	1380	-	60	1220	100	160	0	0	7	1	1	5/15
Pediocactus simpsonii												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	0/1
Pinus edulis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	66	-	66	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	80	-	60	20	-	-	0	0	-	-	0	-/-
05	60	-	40	20	-	-	0	33	-	-	0	-/-
Sarcobatus vermiculatus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	1399	-	733	533	133	-	0	0	10	-	0	39/27
95	700	20	380	320	-	-	0	0	0	-	0	47/38
00	500	-	40	460	-	-	0	0	0	-	0	29/37
05	560	-	160	340	60	20	0	0	11	-	0	28/43
Tetradymia canescens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	7/11

Trend Study 17-55-05

Study site name: Lower Horse Ridge.

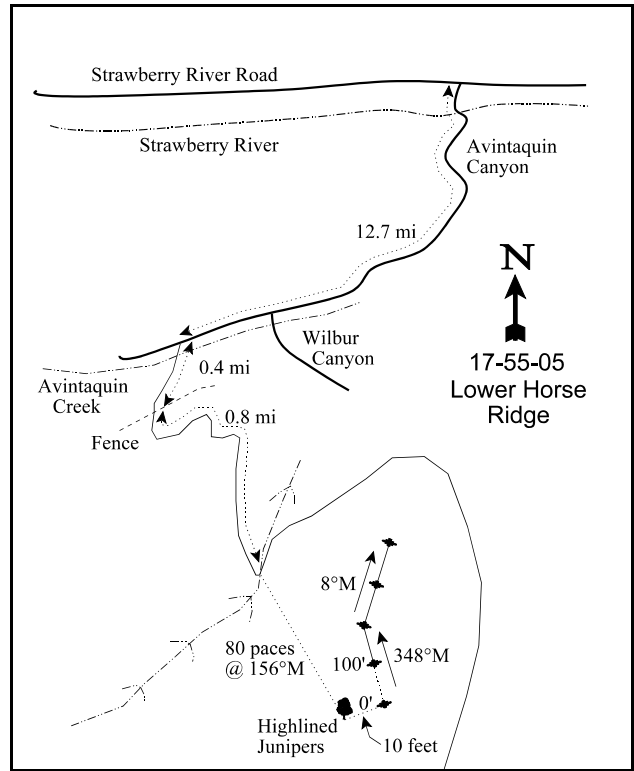
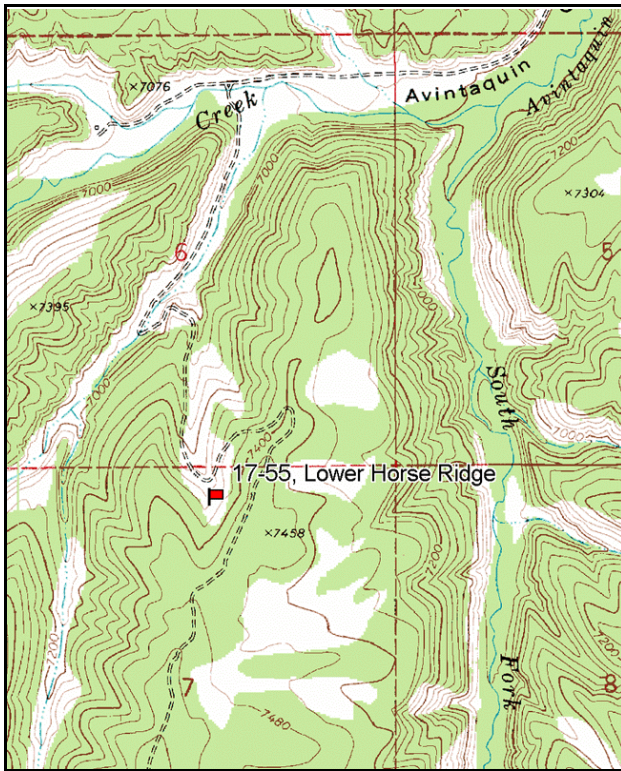
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 348 degrees magnetic.

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

LOCATION DESCRIPTION

From the Strawberry River Road, proceed south up Avintaquin Canyon 12.7 miles. Turn left here onto a road hidden in the trees and cross Avintaquin Creek. Go up Horse Ridge Canyon 0.4 miles to a fence. Continue up the ridge 0.8 miles to a sharp left bend in the road. From the bend and the gully bottom, walk 80 paces bearing 156°M towards a couple of highlined junipers. The 0-foot baseline stake is 10 feet away from one of the highlined junipers. The study stakes are green steel fenceposts 12 to 18 inches in height.



Map Name: Gray Head Peak

Diagrammatic Sketch

Township 6S, Range 8W, Section 7

GPS: NAD 27, UTM 12S 4425321 N, 514950 E

DISCUSSION

Lower Horse Ridge - Trend Study No. 17-55

The Lower Horse Ridge trend study is located on big game winter range near the north end of Horse Ridge at about 7,360 feet in elevation. The land is owned and managed by the Division of Wildlife Resources in the Avintaquin Wildlife Management Area. The range type is a mixed mountain brush on a west-southwest exposure with a 30% to 40% slope. Judging from the number of pellet groups observed, both past and present, along with the high level of browse utilization, this site is likely a winter concentration area for deer. Pellet group data in 2000 were estimated at 23 deer and 3 elk days use/acre (57 ddu/ha and 7 edu/ha). Pellet group data in 2005 were estimated at 34 deer and 11 elk days use/acre (83 ddu/ha and 26 edu/ha).

Soil is moderately deep with an effective rooting depth estimated at over 16 inches. The soil texture is a loam with considerable surface of limestone. Rock and pavement are concentrated on the surface between bunch grass and shrub interspaces. Rock and gravel are also distributed throughout the soil profile. Percent organic matter is fairly high at 4.9%. Phosphorus was measured at 2.8 ppm and values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Soil pedestalling and terracing are evident on the slopes, although there is little bare ground exposed and erosion is minimal. The erosion index measurement in 2005 was stable.

Several browse species occupy the site but the key species consist of true mountain mahogany and mountain big sagebrush. These two species provided 7% cover in 1995, 11% in 2000, and 12% in 2005. Mahogany has been consistently heavily utilized since 1982, yet the population appears stable with good recruitment of young (17-46%) and low decadence. The population density slowly increased to 1,640 plants/acre in 2000, and remained at 1,600 plants/acre in 2005. Vigor was poor on 30% of the population in 1982, although vigor had returned to normal by 2000. In 2005, decadence increased from 1% in 2000 to 13%. Utilization in 2005 was high with 84% of the population exhibiting heavy use.

Mountain big sagebrush provides additional preferred forage on this winter range. With the exception of the 1980s readings, sagebrush density has remained fairly stable at 1,040 plant/acre in 1995, 1,120 in 2000, and 980 in 2005. Since 1995, decadence has increased from 8% in 1995, to 25% in 2000, to 45% in 2005. The individuals classified as dying have followed a similar pattern with an increase from 2% of the population in 1995, to 11% in 2000, to 29% in 2005. With the increase in decadent and dying individuals, the young have decreased from 46% of the population in 1995, to 20% in 2000, to 8% in 2005. Previous to 2005 (and with the exception of 1982), utilization had been light. In 2005, utilization had increased to light to moderate. Plants with poor vigor, which include dying individuals, increased from 2% of the population in 1995, to 16% in 2000, to 31% in 2005.

Several other browse species occur including: serviceberry, dwarf rabbitbrush, mountain low rabbitbrush, white rubber rabbitbrush, snowberry, gray horsebrush, and broom snakeweed. A few Utah Rocky Mountain juniper and pinyon pine are scattered throughout the area. Point-center quarter data estimates from 2000 were 55 Utah juniper, 7 Rocky Mountain juniper, and 20 pinyon trees/acre. The average diameter of Utah juniper and pinyon was about 5 inches, while Rocky mountain juniper was 6 inches. Point-center quarter data estimates from 2005 were 41 pinyon trees/acre and 90 juniper trees/acre (Utah juniper and Rocky Mountain Juniper were not differentiated). The average diameter of pinyon was 4.6 inches and that of juniper was 6.0 inches.

The herbaceous understory is dominated by grasses which combined to produce 14% cover in 1995, 16% in 2000, and 11% in 2005. Bluebunch wheatgrass and Salina wildrye, provided 13% cover in 1995, 14% in 2000, and 9% in 2005. Forbs are diverse and moderately abundant with 21 perennial species encountered in 1995, 19 in 2000, and 24 in 2005. Combined, all forbs produced only 5% cover in 1995, 3% in 2000, and 5%

in 2005. Common species include: bastard toadflax, Indian paintbrush, and Pingue hymenoxys. The sum of nested frequency of perennial grasses and forbs decreased in 2000 due to drought, but increased slightly in 2005 because of increased precipitation.

1982 APPARENT TREND ASSESSMENT

Soil condition was considered poor. Short of mechanical treatment and seeding, there is probably little that can be done to quickly arrest the poor condition. Vegetation trend also appears to be declining. The key species, with the possible exception of mountain big sagebrush, are almost certainly in trouble. Another area of potential concern is the abundance of undesirable increasers and the apparent juniper and pinyon encroachment.

1988 TREND ASSESSMENT

Trend for soil is slightly up due to increased litter cover and a decline in percent bare ground. Eroding soil has been replaced by increased rock and pavement cover. Trend for browse is up. The 1982 report suggested that one of the key browse species, true mountain mahogany, was in a state of decline. The 1988 data indicate otherwise. It shows an increased density of both seedlings and young. Utilization is still moderate to heavy, but the average height of the mature plants increased from 20 to 30 inches and vigor has improved. Few mahogany have grown beyond browsing reach. Mountain big sagebrush has also increased in density and displays a more moderately hedged growth form. Trend for the herbaceous understory is up. Grass cover was good in 1982 and remains so in 1988 with an increase in overall quadrat frequency. The number of forb species encountered on the frequency baseline increased from 13 to 22 species and quadrat frequency increased 34%. Bastard toadflax remains the most abundant species.

TREND ASSESSMENT

soil - slightly up (+1)

browse - up (+2)

herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Trend for soil is considered stable. Percent bare ground declined slightly, although percent litter cover also decreased and frequency of grasses and forbs declined. The browse trend is stable for the key species, true mountain mahogany. There are no decadent plants and vigor is good. Heavy use increased from 47% in 1988 to 65% by 1995. Mahogany is very tolerant of heavy use. Recruitment of seedlings and young declined slightly but there are still sufficient numbers to maintain the population. Many mature plants are producing seed. Average height remains similar to 1988 estimates. Mountain big sagebrush also displays a stable trend with a decline in percent decadency from 14% to 8%. Use is light to moderate and vigor is generally good. One negative aspect to the sagebrush trend is the continued decline in height and crown of mature plants. Trend for the herbaceous understory is slightly down. Because grasses make up 75% of the herbaceous understory cover, overall trend is considered stable. Nested frequency of bluebunch wheatgrass and Salina wildrye increased significantly, while nested frequency of all other grasses declined. Sum of nested frequency for forbs declined by 26%. The Desirable Components Index rated this site as good with a score of 73 due to moderate browse cover, low decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - good (73) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Percent cover of bare ground has declined slightly while litter and vegetation cover increased slightly. The ratio of protective cover (vegetation, litter and cryptogams) to bare ground has remained almost unchanged. There is little erosion occurring on the site. Trend for the key browse species, true mountain mahogany, is also stable. Use is moderate to heavy, vigor is normal and decadence is only 1%. Young plants are common and account for 17% of the population. Mountain big sagebrush is of secondary importance. It also appears stable with a similar density compared to 1995. Use is light to moderate. Sagebrush does seem to be showing signs of stress due to drought however. Currently, 16% of the plants sampled were classified with poor vigor and percent decadence has increased from 8% to 25%. Trend for the herbaceous understory is down due to drought. Sum of nested frequency of perennial grasses and forbs has declined 31%. Three of the 4 most abundant perennial grasses have declined significantly in nested frequency since 1995. Many of the perennial forbs have also declined significantly in nested frequency. The Desirable Components Index rated this site as good with a score of 76 due to moderate browse cover, moderate decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - good (76) Mid-level Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground changed little from 2000 to 2005. The trend for browse is stable. The key browse species mountain mahogany remained quite stable. Utilization increased from 35% heavy use in 2000 to 84% heavy use in 2005. Percent decadence increased from 1% in 2000 to 13% in 2005 and percent dying increased from no dying plants in 2000 to 5% in 2005. The percentage of young individuals to replace the dying increased from 17% to 21%, which is more than enough to compensate the 5% that are dying. Percent browse cover for mahogany increased from around 8% in 2000 to nearly 10% in 2005. The population of mountain big sagebrush, the other key browse species, decreased slightly in density. The decadence increased from 25% in 2000 to 45% in 2005 and the individuals classified as dying increased from 11% of the population to 29%. The young individuals decreased from 20% to 8%, not nearly enough to compensate for the increase in dying individuals. Utilization increased from 21% of the population exhibiting moderate use to 49%. The mountain big sagebrush is a smaller population than the mahogany and is utilized far less than the mountain mahogany, therefore has less impact on the overall browse trend. The trend for herbaceous understory is stable. The sum of nested frequency of perennial grasses remained unchanged, but perennial forbs increased nearly 24% from 2000 to 2005. The quadrat frequency of perennial species increased. Percent cover of perennial grasses decreased slightly, however percent cover can fluctuate greatly depending on precipitation levels and seasons. The Desirable Components Index rated this site as good with a score of 71 due to moderate browse cover, moderate decadency, and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - good (71) Mid-level Potential scale

HERBACEOUS TRENDS --

Management unit 17 , Study no: 55

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron spicatum	_a 219	_c 230	_{bc} 190	_b 173	7.10	11.46	6.67
G	Carex sp.	62	37	40	53	1.20	1.43	1.45
G	Elymus salina	_a 46	_c 140	_b 83	_{ab} 63	5.44	2.54	2.05
G	Oryzopsis hymenoides	_b 81	_b 49	_a 18	_b 48	.58	.29	1.15
G	Poa fendleriana	-	3	3	-	.03	.15	-
G	Poa secunda	_b 68	_a 2	_a -	_a -	.03	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		476	461	334	337	14.40	15.88	11.35
Total for Grasses		476	461	334	337	14.40	15.88	11.35
F	Achillea millefolium	3	-	-	-	-	-	-
F	Androsace septentrionalis (a)	-	_a 2	_a -	_b 15	.00	-	.22
F	Arabis sp.	-	6	2	5	.06	.00	.01
F	Aster chilensis	_b 86	_a 26	_a 13	_a 13	.31	.05	.07
F	Astragalus convallarius	_a 2	_b 15	_a -	_a 2	.17	.00	.01
F	Astragalus purshii	1	3	-	2	.01	-	.00
F	Astragalus tenellus	4	-	-	-	-	-	-
F	Castilleja chromosa	_b 33	_{ab} 33	_b 44	_a 10	.51	.44	.08
F	Chenopodium leptophyllum(a)	-	5	-	1	.02	-	.00
F	Comandra pallida	_b 196	_a 137	_a 126	_a 132	1.49	1.00	2.45
F	Crepis acuminata	4	-	1	9	-	.00	.04
F	Cryptantha sp.	_a 9	_{ab} 26	_a 4	_b 32	.08	.06	.17
F	Cynoglossum officinale	-	-	-	2	-	-	.00
F	Delphinium nuttallianum	1	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	_b 10	_a -	_{ab} 1	.08	-	.00
F	Eriogonum alatum	_a 6	_a 1	_{ab} 13	_b 20	.03	.10	.58
F	Erigeron sp.	-	1	4	-	.00	.01	-
F	Haplopappus acaulis	_b 51	_a 16	_a 31	_{ab} 39	.32	.92	.70
F	Ipomopsis aggregata	4	-	-	1	-	-	.00
F	Lesquerella sp.	-	-	-	3	-	-	.15
F	Linum lewisii	_a 4	_b 24	_a 4	_{ab} 14	.12	.01	.15

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Lithospermum sp.	c ₂₆	b ₁₈	ab ₇	a ₋	.26	.21	-
F	Machaeranthera canescens	b ₃₇	a ₆	a ₋	a ₁	.07	-	.00
F	Machaeranthera grindelioides	a ₁₄	b ₅₀	a ₁₇	a ₁₉	.71	.14	.34
F	Penstemon caespitosus	15	4	4	7	.02	.01	.02
F	Pedicularis centranthera	-	-	-	-	-	-	.03
F	Penstemon humilis	b ₂₅	b ₁₈	a ₂	ab ₉	.07	.03	.04
F	Phlox austromontana	c ₆₂	bc ₄₃	a ₇	ab ₂₂	.35	.09	.23
F	Phlox longifolia	-	5	4	5	.01	.01	.01
F	Potentilla gracilis	-	2	1	6	.00	.00	.04
F	Schoenocrambe linifolia	-	-	-	1	-	-	.00
F	Senecio multilobatus	b ₁₈	ab ₇	ab ₄	a ₃	.04	.01	.03
F	Taraxacum officinale	-	5	-	-	.03	-	-
F	Viguiera multiflora	3	-	-	-	-	-	-
Total for Annual Forbs		0	17	0	17	0.10	0	0.23
Total for Perennial Forbs		604	446	288	357	4.71	3.14	5.22
Total for Forbs		604	463	288	374	4.82	3.14	5.46

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

BROWSE TRENDS --

Management unit 17 , Study no: 55

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	0	8	8	-	.48	.39
B	Artemisia frigida	1	0	0	-	-	-
B	Artemisia tridentata vaseyana	34	34	31	1.06	2.26	2.27
B	Cercocarpus montanus	47	53	46	5.57	8.43	9.76
B	Chrysothamnus depressus	21	11	13	.36	.54	.10
B	Chrysothamnus nauseosus hololeucus	1	3	3	-	-	.00
B	Chrysothamnus viscidiflorus lanceolatus	39	38	44	.84	1.58	.78
B	Eriogonum corymbosum	38	18	26	1.76	.53	.81
B	Gutierrezia sarothrae	56	18	63	1.14	.11	.84
B	Juniperus osteosperma	0	3	4	.30	.30	.66
B	Juniperus scopulorum	0	2	3	-	1.85	1.66
B	Pinus edulis	0	4	2	2.09	2.30	2.43
B	Rosa woodsii	0	4	2	-	.15	.03
B	Symphoricarpos oreophilus	3	8	8	.03	.44	.56
B	Tetradymia canescens	10	10	11	.09	.24	.18
Total for Browse		250	214	264	13.26	19.25	20.49

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 55

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	-	.53
Artemisia tridentata vaseyana	-	1.86
Cercocarpus montanus	-	12.13
Chrysothamnus depressus	-	.08
Chrysothamnus viscidiflorus lanceolatus	-	1.23
Eriogonum corymbosum	-	1.13
Gutierrezia sarothrae	-	.31
Juniperus osteosperma	1.60	.75
Juniperus scopulorum	-	2.13
Pinus edulis	2.00	3.16
Symphoricarpos oreophilus	-	.90
Tetradymia canescens	-	.43

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17 , Study no: 55

Species	Average leader growth (in)
	'05
Cercocarpus montanus	1.9

POINT-QUARTER TREE DATA --
Management unit 17 , Study no: 55

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	62	90
Pinus edulis	20	41

Average diameter (in)	
'00	'05
5.0	6.0
4.7	4.6

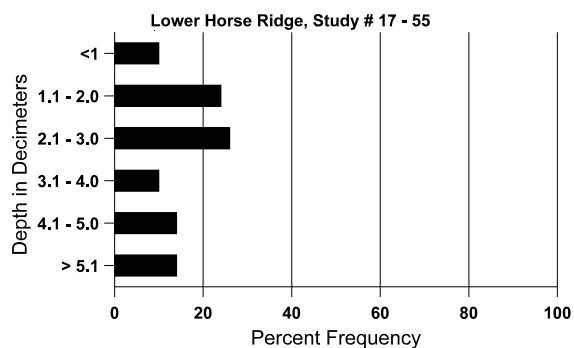
BASIC COVER --
Management unit 17 , Study no: 55

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	7.00	6.00	34.53	37.02	33.81
Rock	3.75	7.75	11.69	6.51	6.90
Pavement	19.50	21.25	4.91	18.27	16.18
Litter	41.50	43.50	32.45	36.79	29.86
Cryptogams	0	0	.39	.01	.15
Bare Ground	28.25	21.50	18.20	16.13	25.62

SOIL ANALYSIS DATA --
Herd Unit 17, Study # 55, Study Name: Lower Horse Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
16.3	58.8 (16.6)	7.3	27.3	46.2	26.6	4.9	2.8	336.0	1.8

Stoniness Index



PELLET GROUP DATA --
 Management unit 17 , Study no: 55

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	6	5	33
Elk	2	1	6
Deer	26	11	31
Cattle	-	-	1

Days use per acre (ha)	
'00	'05
-	-
3 (7)	11 (26)
23 (58)	34 (83)
-	-

BROWSE CHARACTERISTICS --
 Management unit 17 , Study no: 55

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	480	-	200	280	-	-	50	42	-	-	0	18/26
05	420	-	240	180	-	40	19	14	-	-	0	20/26
Artemisia frigida												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	40	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia tridentata vaseyana												
82	532	800	66	200	266	-	38	63	50	-	50	22/25
88	1932	-	1400	266	266	-	14	0	14	-	3	14/17
95	1040	20	480	480	80	400	13	6	8	2	2	11/16
00	1120	20	220	620	280	360	21	5	25	11	16	16/22
05	980	20	80	460	440	400	49	14	45	29	31	17/21
Cercocarpus montanus												
82	666	-	-	666	-	-	0	100	0	-	30	20/17
88	1132	200	466	666	-	-	53	47	0	-	12	30/23
95	1360	120	220	1140	-	-	28	65	0	-	0	30/33
00	1640	20	280	1340	20	60	27	35	1	-	0	43/37
05	1600	760	340	1060	200	20	10	84	13	5	5	42/40

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	465	-	133	266	66	-	29	0	14	-	14	4/6
95	900	20	80	780	40	-	0	0	4	4	4	6/8
00	440	-	-	420	20	-	5	5	5	-	0	4/7
05	660	-	-	580	80	-	24	30	12	9	9	3/8
Chrysothamnus nauseosus hololeucus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	40	-	40	-	-	-	0	0	-	-	0	24/21
00	60	-	20	40	-	-	0	0	-	-	0	7/10
05	140	-	80	60	-	-	57	0	-	-	0	6/11
Chrysothamnus viscidiflorus lanceolatus												
82	2865	-	266	2066	533	-	14	2	19	-	16	10/11
88	5933	-	400	5000	533	-	13	1	9	-	7	9/9
95	2520	-	100	2420	-	-	0	0	0	-	0	11/13
00	2160	20	140	1820	200	-	0	0	9	-	0	10/11
05	2300	-	220	1940	140	20	3	0	6	3	3	10/11
Eriogonum corymbosum												
82	399	-	-	266	133	-	0	0	33	5	33	16/11
88	932	66	333	333	266	-	7	0	29	-	14	11/11
95	1140	-	300	820	20	-	12	0	2	-	0	12/16
00	460	-	20	340	100	-	22	22	22	4	4	14/18
05	740	160	40	560	140	20	5	3	19	11	11	11/15
Gutierrezia sarothrae												
82	2599	-	133	2466	-	-	0	0	0	-	0	8/10
88	6132	-	666	5133	333	-	0	0	5	-	0	6/4
95	3600	20	360	3240	-	20	0	0	0	-	0	9/9
00	940	-	220	720	-	-	0	0	0	-	0	4/4
05	3760	60	480	3220	60	-	2	0	2	-	0	6/6
Juniperus osteosperma												
82	66	-	66	-	-	-	0	0	-	-	0	-/-
88	66	66	66	-	-	-	100	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	60	-	60	-	-	-	0	0	-	-	0	-/-
05	80	-	20	60	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus scopulorum												
82	66	-	-	66	-	-	0	0	-	-	0	67/45
88	66	-	-	66	-	-	100	0	-	-	0	122/35
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	40	-	-	40	-	-	0	0	-	-	0	-/-
05	80	-	20	60	-	-	0	0	-	-	0	-/-
Pinus edulis												
82	66	-	-	66	-	-	0	0	-	-	0	63/44
88	66	-	-	66	-	-	0	0	-	-	0	79/55
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	80	-	40	40	-	-	0	0	-	-	0	-/-
05	60	-	-	60	-	-	0	0	-	-	0	-/-
Ribes sp.												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	20	-	-	-	-	0	0	-	-	0	24/24
Rosa woodsii												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	-/-
00	180	-	20	160	-	-	0	0	0	-	0	19/29
05	100	-	-	60	40	40	0	0	40	20	20	19/13
Symphoricarpos oreophilus												
82	199	-	133	66	-	-	0	33	0	-	0	7/9
88	399	-	266	133	-	-	67	0	0	-	0	11/10
95	60	-	-	60	-	-	0	0	0	-	0	12/17
00	320	-	-	320	-	-	0	0	0	-	6	16/16
05	400	-	160	220	20	-	0	0	5	5	5	14/37
Tetradymia canescens												
82	66	-	-	-	66	-	0	100	100	-	0	-/-
88	332	-	266	66	-	-	20	0	0	-	0	6/10
95	200	-	40	160	-	-	10	0	0	-	0	9/11
00	300	-	80	140	80	-	0	13	27	7	7	10/9
05	280	-	40	160	80	-	7	21	29	14	14	9/11

Trend Study 17-56-05

Study site name: Sam's Canyon .

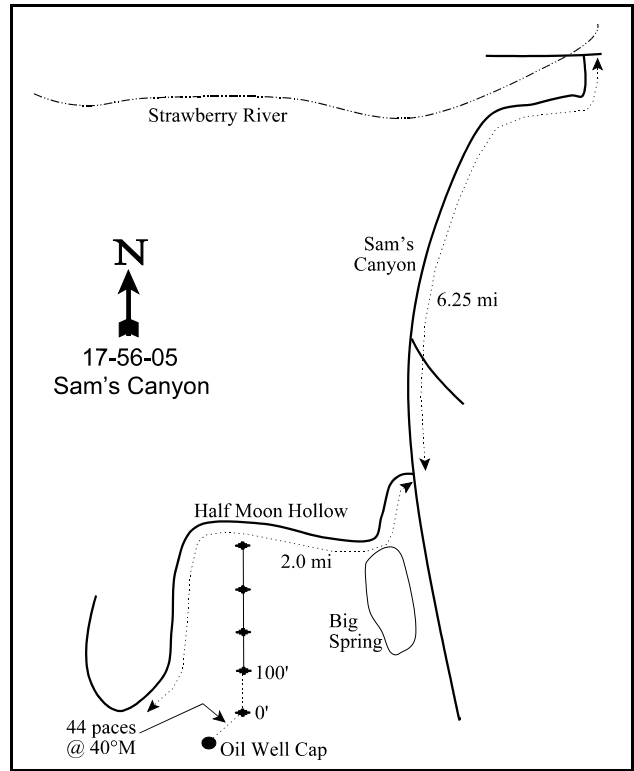
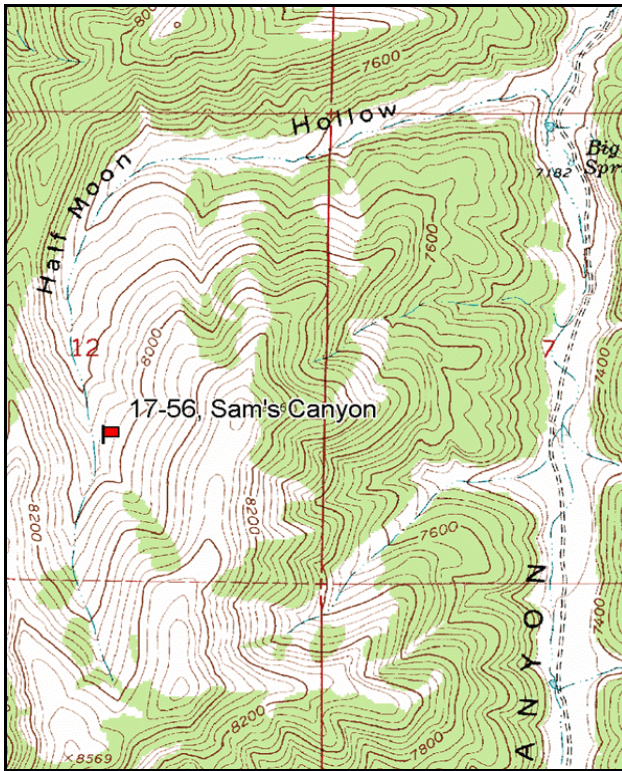
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 0 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the Strawberry River Road and U.S. 40 near Starvation Reservoir, go west up the Strawberry River for 8.5 miles. Before the bridge, turn left. From the Strawberry River Road, go 6.25 miles up Sam's Canyon. Turn right into Half Moon Hollow (about 0.2 miles before Big Spring). Follow the old, rabbitbrush-covered road (which may be impassable to vehicles due to washouts and tall brush) about 2 miles up the canyon to when the road turns sharply right and goes up a dugway. The old drilling platform there is hardly noticeable, just a brush-covered flat spot in the bottom of the canyon. The well cap is 15" tall. From the capped well, the 0-foot baseline stake (marked with browse tag #7080) is 44 paces bearing 40°. The baseline runs north across the slope. The first density plot is located a few paces north of the 100-foot baseline stake.



Map Name: Sam's Canyon

Diagrammatic Sketch

Township 5S Range 8W , Section 12

GPS: NAD 27, UTM 12T 4434014 N, 522920 E

DISCUSSION

Sam's Canyon - Trend Study No. 17-56

The Sam's Canyon study is located at the head of Half Moon Hollow, a tributary of Sam's Canyon. The study is within Ute Indian Reservation lands. The range type is intermediate between black sagebrush and mixed mountain brush. The elevation is relatively high at 7,900 feet, but is on an exposed western slope of about 35%, so winter snow usually does not accumulate. This site was not read in 2000 because the access road was washed out. In 1995, deer pellet frequency was higher than in 2005. Elk frequencies were very low in 1995, but appeared to be higher in 2005. Pellet group data from 2005 were estimated at 48 elk, 27 deer, and 7 cow days use/acre (119 edu, 68 ddu/ha, and 16 cdu/ha). Cow use was from last season.

Soils are limestone derived and very rocky on the surface. Subsurface soil tends to be unconsolidated with a high clay content. Soils are shallow and average 13 inches, although they were measured at 21 inches in some places. Very little organic matter is present. Most of the finer surface soil particles have long since been eroded away. Erosion-exposed pavement and rock cover a considerable amount of the ground surface.

Several species of browse offer forage for wildlife but true mountain mahogany would be considered the key browse species. Mahogany is in good condition with respect to age structure and vigor. The average mature shrub measures only 2.5 feet in height and is all available. Utilization has been extremely heavy in the past, with the exception of 1995 when the majority of individuals were moderately browsed. Vigor is good and no decadent plants were encountered previous to 2005. Reproductive potential and the proportion of young plants in the population stabilized around 15% young and 3% dying, despite the seemingly large decline in young numbers from 1988 to 1995. The large number of young plants and reduced number of mature plants sampled in 1988 appears to be a classification problem and not a major shift in age structure.

Secondary browse species include: serviceberry, black sagebrush, and a small number of mountain big sagebrush. Mature serviceberry average about 3 feet in height and all of it is considered available to wildlife. These shrubs have been heavily utilized in the past, but now exhibit mostly light hedging. Vigor was good (3% or less with poor vigor) and percent decadency was low at 8%. A moderately dense stand of black sagebrush occupies the site, but both Black sagebrush and mountain big sagebrush have decreased with previous drought conditions. Black sagebrush cover averaged 11% in 1995 and decreased to 4% in 2005. Density has been decreasing since 1988. Its density estimated at 4,220 plants/acre in 1995 then decreased to 2,680 in 2005. Decadence was high in 1988 and 2005 at 41%, but was low in 1995 at 12%. The plants classified as dying increased from 5% in 1995 to 32% in 2005. Mountain big sagebrush density decreased from 599 plants/acre in 1988 to 180 in 1995. Since 1995, mountain big sagebrush has increased to 320 plants/acre. In 2005, decadence was high at 63% with 38% of the population classified as dying. Use was moderate to heavy in 2005.

The herbaceous understory averaged 16% cover in 1995 and decreased to 10% in 2005. Perennial grasses sum of nested frequency decreased by 16% in 2005. Bluebunch wheatgrass dominates the grass composition and produced 5% cover in 2005. A sedge and Salina wildrye are also common. Forb production is sparse, even though diversity is moderately high with 23 perennial species encountered in 1995 and 25 in 2005. Most species are low-growing forms with low to medium forage value. The most common species include cryptantha and sulfur eriogonum.

1982 APPARENT TREND ASSESSMENT

Soil trend appears to be in a state of decline. Erosion and soil loss prevent any significant litter buildup and make seedling establishment difficult over much of the area. However, vegetation trend appears more stable. The browse component, although heavily utilized, vigor is fair, and seems to be maintaining itself.

Herbaceous diversity and density are moderately good considering the ongoing erosion. This condition should not be expected to improve without direct management intervention.

1988 TREND ASSESSMENT

Few changes are evident on this high elevation winter range. Ground cover percentages are unchanged and overall soil erosion does not appear as severe as described in 1982. Photograph comparisons indicate an obvious increase in the size and vigor of the key browse species. Data from the density plots show very little increase in true mountain mahogany, although young plants comprise 82% of the population. Black sagebrush has shown the greatest increase and was rated as being moderately hedged as opposed to heavily hedged in 1982. Other browse species provide moderate amounts of forage with their status remaining unchanged. Unpalatable increaser shrubs have not expanded significantly. Trend for browse is considered stable. Grass abundance has increased largely due to an increase in Salina wildrye from a quadrat frequency of 1% to 36%. Quadrat frequency of bluebunch also increased from 55% to 82%. Sixteen species of forbs were found, yet their density remains relatively low.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

1995 TREND ASSESSMENT

Trend for soil is stable. Even though percent bare ground has increased slightly, there appears to be no movement of soil and bare ground is still below 10%. Trend for browse is stable with reduced heavy use, good vigor and low decadency rates of the preferred browse species (true mountain mahogany, serviceberry and black sagebrush). Unpalatable increasers do not appear to have expanding populations. Trend for the herbaceous understory appears slightly up with substantial increase in sum of nested frequency for perennial grasses and forbs. The Desirable Components Index rated this site as good with a score of 83 due to excellent browse cover and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - good (83) High Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground improved. The relative cover of both litter and bare ground changed little. The trend for browse is slightly down. The key browse species include true mountain mahogany and black sagebrush. The mountain mahogany population is stable with an increase in utilization from moderate to heavy. The percentage of decadent and of dying individuals are both low. The density of black sagebrush decreased 36% from 1995 to 2005. The decadent individuals increased from 12% in 1995 to 41% in 2005. Dying increased from 5% to 32% of the population and those with poor vigor increased from 8% to 34%. The utilization decreased from 67% moderate use in 1995 to 22% in 2005. Although this large dieoff of black sagebrush will influence the overall browse component, it is evident from the utilization numbers that mahogany is compensating for the losses of black sagebrush browse, as are the other less common preferred browse species. The trend for herbaceous understory is down. The sum of the nested frequencies for perennial grasses and perennial forbs decreased by more than 20%. The overall cover for perennial grasses and perennial forbs also decreased

substantially. The Desirable Components Index rated this site as good to fair with a score of 72 due to excellent browse cover and good perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - down (-2)

winter range condition (DC Index) - good to fair (72) High Potential scale

HERBACEOUS TRENDS --

Management unit 17 , Study no: 56

T y p e	Species	Nested Frequency			Average Cover %	
		'88	'95	'05	'95	'05
G	Agropyron spicatum	201	205	197	6.77	4.80
G	Carex sp.	64	104	63	2.45	.92
G	Elymus salina	_b 74	_a 54	_a 40	1.54	1.04
G	Festuca ovina	1	-	-	-	-
G	Koeleria cristata	-	4	7	.06	.06
G	Oryzopsis hymenoides	16	30	29	.57	.92
G	Poa fendleriana	18	11	9	.10	.05
G	Poa secunda	_b 38	_a 6	_a 3	.01	.03
Total for Annual Grasses		0	0	0	0	0
Total for Perennial Grasses		412	414	348	11.52	7.85
Total for Grasses		412	414	348	11.52	7.85
F	Antennaria rosea	2	-	5	-	.01
F	Androsace septentrionalis (a)	-	5	7	.01	.01
F	Arenaria sp.	_a -	_b 13	_b 16	.06	.04
F	Arabis perennans	_a 5	_b 23	_a 11	.07	.02
F	Astragalus argophyllus	_{ab} 6	_b 15	_a 2	.09	.00
F	Aster chilensis	-	-	8	-	.06
F	Astragalus convallarius	_a 2	_{ab} 5	_b 10	.01	.06
F	Astragalus tenellus	5	4	3	.01	.00
F	Balsamorhiza sagittata	1	-	-	-	-
F	Caulanthus crassicaulis	-	2	-	.00	-
F	Castilleja flava	_a 7	_b 54	_a 2	.71	.03
F	Calochortus nuttallii	_a -	_b 9	_a -	.04	.00
F	Chaenactis douglasii	-	3	-	.00	-
F	Chenopodium leptophyllum(a)	-	2	6	.00	.01
F	Crepis acuminata	_a -	_b 18	_b 12	.14	.06
F	Cryptantha sp.	_a 19	_b 66	_b 37	.94	.51

Type	Species	Nested Frequency			Average Cover %	
		'88	'95	'05	'95	'05
F	Cymopterus sp.	-	-	3	-	.00
F	Descurainia pinnata (a)	-	4	5	.01	.04
F	Eriogonum alatum	13	23	15	.30	.15
F	Erigeron flagellaris	-	2	2	.03	.03
F	Eriogonum umbellatum	56	68	54	1.33	.55
F	Hymenoxys acaulis	_{ab} 2	_b 10	_a -	.24	-
F	Lappula occidentalis (a)	-	3	3	.00	.00
F	Lesquerella sp.	3	-	7	-	.04
F	Lithospermum multiflorum	7	9	9	.18	.27
F	Machaeranthera grindelioides	_b 24	_{ab} 14	_a 4	.34	.06
F	Orobancha sp.	-	2	-	.00	-
F	Penstemon humilis	_b 92	_a 33	_a 29	.10	.32
F	Petradoria pumila	-	5	-	.01	-
F	Phlox austromontana	-	-	2	-	.03
F	Schoenrambe linifolia	-	4	3	.01	.03
F	Senecio multilobatus	-	2	-	.03	-
F	Unknown forb-perennial	1	-	-	-	-
Total for Annual Forbs		0	14	21	0.02	0.07
Total for Perennial Forbs		245	384	234	4.71	2.33
Total for Forbs		245	398	255	4.74	2.41

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

BROWSE TRENDS --

Management unit 17 , Study no: 56

Type	Species	Strip Frequency		Average Cover %	
		'95	'05	'95	'05
B	Amelanchier utahensis	31	27	5.11	5.82
B	Artemisia nova	76	47	10.60	3.90
B	Artemisia tridentata vaseyana	7	12	1.09	.04
B	Cercocarpus montanus	76	80	9.68	14.12
B	Chrysothamnus depressus	44	31	.98	1.32
B	Chrysothamnus viscidiflorus viscidiflorus	47	50	2.04	1.87
B	Eriogonum corymbosum	20	11	.31	.41
B	Gutierrezia sarothrae	24	11	.24	.06
B	Pinus edulis	0	1	.18	.15
B	Pseudotsuga menziesii	0	1	-	-
B	Symphoricarpos oreophilus	54	55	3.04	6.15
B	Tetradymia canescens	12	2	.03	.03
Total for Browse		391	328	33.34	33.90

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 56

Species	Percent Cover
	'05
Amelanchier utahensis	7.19
Artemisia nova	3.23
Artemisia tridentata vaseyana	1.79
Cercocarpus montanus	17.43
Chrysothamnus depressus	1.01
Chrysothamnus viscidiflorus viscidiflorus	1.61
Eriogonum corymbosum	.28
Pinus edulis	.28
Pseudotsuga menziesii	.30
Symphoricarpos oreophilus	5.03

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17 , Study no: 56

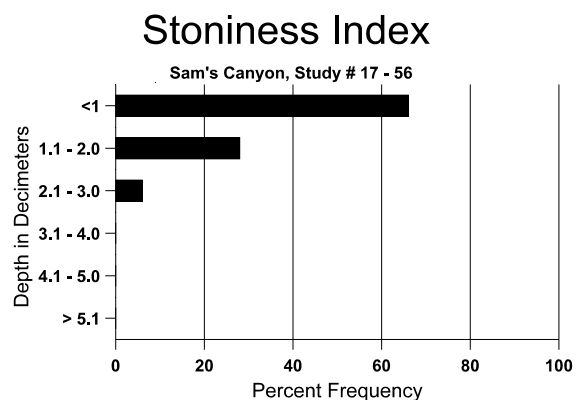
Species	Average leader growth (in)
	'05
Amelanchier utahensis	5.0
Cercocarpus montanus	5.4

BASIC COVER --
Management unit 17 , Study no: 56

Cover Type	Average Cover %			
	'82	'88	'95	'05
Vegetation	0	6.50	45.45	37.96
Rock	0	1.00	10.33	3.13
Pavement	0	46.00	10.54	24.85
Litter	0	40.25	39.87	41.11
Cryptogams	0	0	.03	.10
Bare Ground	6.50	6.25	9.88	7.67

SOIL ANALYSIS DATA --
Herd Unit 17, Study # 56, Study Name: Sam's Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.1	46.2 (14.7)	7.7	38.1	35.4	26.6	4.5	6.9	163.2	0.7



PELLET GROUP DATA --
 Management unit 17 , Study no: 56

Type	Quadrat Frequency		Days use per acre (ha)
	'95	'05	
Rabbit	6	5	-
Elk	4	24	48 (119)
Deer	25	12	27 (68)
Cattle	-	3	7 (16)

BROWSE CHARACTERISTICS --
 Management unit 17 , Study no: 56

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	799	533	66	733	-	-	17	83	0	-	8	34/29
88	932	-	666	266	-	-	36	43	0	-	0	40/35
95	820	-	180	620	20	20	22	0	2	-	0	38/50
05	760	-	260	440	60	-	29	37	8	3	3	37/46
Artemisia nova												
82	3199	200	800	1733	666	-	23	65	21	1	21	9/15
88	5799	133	1066	2333	2400	-	48	1	41	.34	1	10/15
95	4220	80	440	3260	520	160	67	2	12	5	8	12/21
05	2680	440	460	1120	1100	1060	22	4	41	32	34	11/15
Artemisia tridentata vaseyana												
82	599	-	200	266	133	-	78	22	22	-	11	19/19
88	599	-	333	200	66	-	11	11	11	-	0	11/17
95	180	-	60	60	60	20	33	0	33	11	11	17/27
05	320	60	80	40	200	100	31	31	63	38	44	18/21
Cercocarpus montanus												
82	3466	466	1400	2000	66	-	19	69	2	-	2	23/23
88	4065	66	3333	666	66	-	21	62	2	-	0	33/29
95	2920	20	380	2540	-	-	55	16	0	-	0	27/31
05	3120	20	520	2340	260	40	9	84	8	3	3	31/35
Chrysothamnus depressus												
82	599	-	66	533	-	-	67	22	0	-	0	6/8
88	533	-	400	133	-	-	0	0	0	-	0	3/6
95	3080	-	260	2780	40	-	0	0	1	1	1	6/9
05	1900	20	40	1660	200	-	81	7	11	2	2	5/7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
82	3598	-	66	3466	66	-	0	4	2	.55	4	11/9
88	3666	-	1266	2200	200	-	0	0	5	-	18	12/12
95	2520	-	120	2380	20	-	0	0	1	-	0	34/54
05	2520	160	320	2180	20	-	0	0	1	-	0	10/11
<i>Eriogonum corymbosum</i>												
82	266	-	-	200	66	-	50	0	25	-	25	12/12
88	266	-	200	66	-	-	25	0	0	-	25	10/8
95	540	-	20	520	-	-	0	4	0	-	0	10/14
05	220	-	-	100	120	20	0	9	55	9	9	13/17
<i>Gutierrezia sarothrae</i>												
82	333	-	-	333	-	-	0	0	-	-	0	9/8
88	600	-	-	600	-	-	0	0	-	-	0	6/3
95	840	-	80	760	-	-	0	0	-	-	0	8/8
05	300	20	40	260	-	-	0	0	-	-	0	6/6
<i>Leptodactylon pungens</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	5/6
<i>Pinus edulis</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	20	-	-	-	0	0	-	-	0	-/-
<i>Pseudotsuga menziesii</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	-/-
05	20	-	-	-	20	-	0	100	100	100	100	-/-
<i>Symphoricarpos oreophilus</i>												
82	3265	-	1266	1933	66	-	6	0	2	-	0	11/17
88	4332	400	3533	666	133	-	11	2	3	-	14	12/16
95	2500	40	620	1880	-	-	2	0	0	-	0	11/16
05	2420	40	300	1980	140	-	5	0	6	.82	.82	13/23

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Tetradymia canescens												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	460	-	20	440	-	-	4	0	0	-	0	9/10
05	40	-	-	20	20	-	100	0	50	-	0	8/11

Trend Study 17-57-05

Study site name: Skitzzy Canyon .

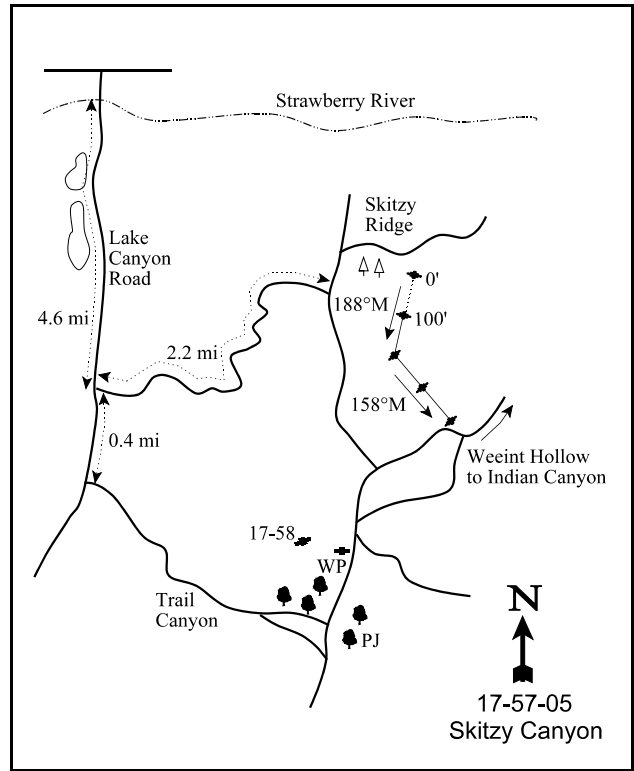
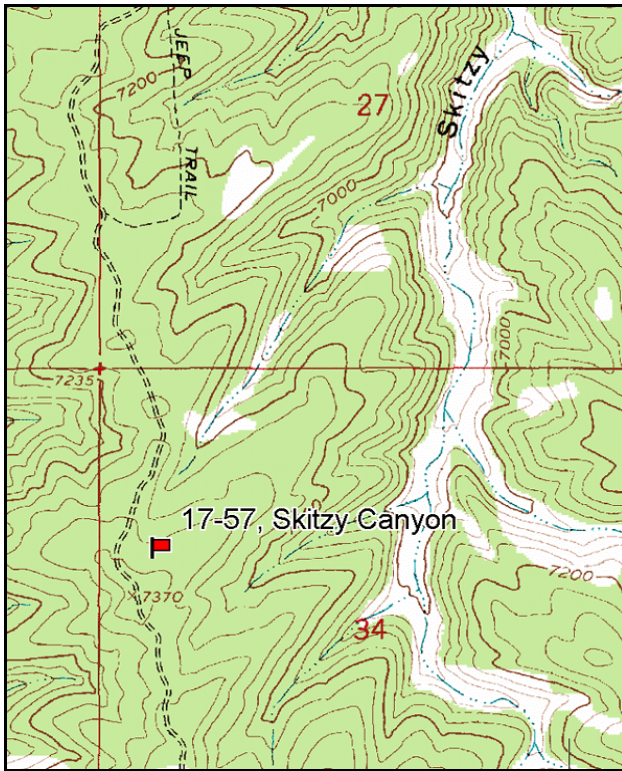
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 188 degrees magnetic.

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

LOCATION DESCRIPTION

From the Strawberry River, take the Lake Canyon Road (3239 West) south for 4.6 miles to a road which goes up the canyon to the east. Turn left and drive approximately 2.2 miles up to a “T” intersection at the top of the ridge. [Skitzzy Ridge can also be reached via Trail Canyon the next (south) side canyon of Lake Canyon, or from Indian Canyon along the Weeint Hollow road.] At the top, look east into the chaining for two large conifers (Douglas firs). The 0-foot baseline stake is located to the east of the two trees. The baseline is marked by green, steel fenceposts approximately 12-18 inches in height.



Map Name: Buck Knoll

Diagrammatic Sketch

Township 4S, Range 6W, Section 34

GPS: NAD 27, UTM 12T 4437811 N, 537847 E

DISCUSSION

Skitzzy Canyon - Trend Study No. 17-57

This trend study is located on a pinyon-juniper chaining in Skitzzy Canyon. The area is considered deer and elk winter range. The site has an elevation of 7,300 feet and is located on a ridge top with a 5% slope. The land slopes gently to the north-northeast, draining into Skitzzy Canyon. Management for this area is by the Utah Division of Wildlife Resources. Prior to the chaining and seeding in 1977-78, the site was dominated by Utah Juniper and Colorado pinyon. The area is used heavily by elk, deer, and livestock. Pellet group data from 2000 estimated 90 elk, 7 deer, and 9 cow days use/acre (222 edu/ha, 17 ddu/ha, and 22 cdu/ha). Deer pellet groups were recent while all cow pats were from the previous year. About half of the elk pellet groups encountered were from spring. In 2005, pellet group data estimated 195 elk, 80 deer, and 2 cow days use/acre (481 edu/ha, 198 ddu/ha, and 5 cdu/ha). Around 10% of the pellet groups were recent and the remainder were from fall and winter.

Soils are relatively shallow and rocky, but stabilized as a result of excellent herbaceous vegetation cover. Effective rooting depth is estimated at just over 10 inches with much of the rock encountered in the top 4 inches of the soil profile. Soil texture is a sandy loam with a slightly alkaline soil reaction (pH of 7.8). Percent organic matter is very high at 8.4%. Phosphorus levels at 62 ppm are very high and do not limit plant growth (Tiedemann and Lopez 2004). Erosion and soil loss prior to treatment was heavy, which resulted in patchy areas of pavement and bare ground. Much of this has since filled in with herbaceous vegetation and the rate of erosion is being controlled. The erosion index measurement in 2005 was stable.

Browse is a minor component of this chaining. No shrubs were encountered during the 1982 reading. Since 1988, black sagebrush has been the dominant shrub and population appeared to peak in 2000 at 820 plants/acre. By 2005, the population had decreased to 660 plants/acre. Use had been light until 2005 when it increased to moderate-heavy. Mountain big sagebrush is very sparse and densities have never surpassed 100 plants/acre. Use of this more preferred sagebrush was moderate to heavy. Other preferred browse species occur, but did not fall within the shrub density strips. These include true mountain mahogany and antelope bitterbrush.

Some pinyon and juniper trees were released after the chaining and have been increasing in density. In 2000, 21 pinyon and 23 juniper trees/acre were estimated. Average trunk diameter of pinyon was 2.8 inches and juniper was 2.6 inches. In 2005, tree densities had increased to 35 pinyon and 32 juniper trees/acre. Average trunk diameter increased to 3.5 inches for pinyon and 4.2 inches for juniper.

Grasses are dominant and have provided between 18% and 21% cover during all sampling years. The grass composition is very diverse with 14 species encountered in 1995, 12 in 2000, and 15 in 2005. Crested wheatgrass is the most numerous species. It averaged 11% cover in 1995, 13% in 2000, and 16% in 2005. Smooth brome and Russian wildrye are also fairly common. Forbs comprise a small percentage of the vegetation. The only common forb is looseflower milkvetch which provided 4% cover in 1995, 2% in 2000, and 1% in 2005. Seeded alfalfa was sampled in 1995 and 2000, but not in 2005, which indicates that it persisted on the treatment for over 20 years.

1982 APPARENT TREND ASSESSMENT

This area was chained in 1977-78. Since the chaining, the soil trend definitely appears to be improving. The development of vegetation cover and litter buildup has acted to reduce erosion and soil loss. The site supports a good herbaceous component but the current composition is not the most favorable for deer winter range. In time, shrub density will eventually increase through natural colonization of native species. However, if high value shrubs are desired more quickly, interseeding or transplanting would be required.

1988 TREND ASSESSMENT

Soil trend is considered stable with only a slight decline in basal vegetation cover and litter cover, combined with an increase in percent bare ground (7% to 12%). These slight changes do not warrant a change in trend. Erosion is not a problem due to the gentle terrain and good distribution of vegetation and litter cover. Since the chaining treatment in 1977, there has been surprisingly little change in the browse component on this area. As in the 1982 study, there were only a few individual browse plants encountered. Many young shrubs were observed throughout the area, but were not common enough to be sampled. The general view photographs show a slight increase in the prominence of woody species, but grasses still dominate the site. Trend for browse is considered slightly up but density is still very low. Trend for the herbaceous understory is slightly up. Quadrat frequency of grasses increased while frequency of forbs remained similar to 1982 values.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

Some ground cover characteristics have improved slightly since 1988, but not enough to warrant a change in trend. Litter cover declined from 68% to 54%, but percent bare ground also declined from 12% to 7%. Browse is still limited, yet it has continually increased in density. Black sagebrush has increased to 540 plants/acre, 52% of which are young plants. Trend is considered slightly up. Trend for herbaceous understory is stable. Sum nested frequency of grasses and forbs have remained similar to those of 1988. The Desirable Components Index rated this site as fair with a score of 41 due to excellent perennial grass cover and excellent forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair (41) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1995. There is no significant erosion occurring due to the excellent herbaceous understory and litter cover. Trend for browse is slightly up and continuing to slowly increase. Density is still poor. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses declined slightly, but the dominant grass species (crested wheatgrass, smooth brome and Russian wildrye) have remained stable. Sum of nested frequency of perennial forbs also declined slightly, but forbs currently provide only 11% of the herbaceous cover. The Desirable Components Index rated this site as fair with a score of 39 due to excellent perennial grass cover and fair forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair (39) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased. Relative bare ground cover increased from 6 to 17%. The trend for browse is also down. Black sagebrush, the key browse species decreased 20% in density, which was initially low. This decrease in density was accompanied by an increase in utilization from light to moderate-heavy use. Some young and seedlings were sampled, but not many. Mountain big sagebrush, the other preferred browse species sampled decreased 75% in density, leaving only a few individuals. No young individuals were sampled in 2005. The herbaceous trend is down. The sum of the nested frequencies of perennial grasses and perennial forbs decreased 25%. Significant decreases were seen in intermediate wheatgrass and smooth brome. Cheatgrass was also sampled for the first time, which indicates its possible expansion. The Desirable Components Index rated this site as fair with a score of 38 due to excellent perennial grass cover and fair forb cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - Fair (38) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 17 , Study no: 57

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	_a 159	_b 259	_b 261	_b 257	11.42	13.32	15.62
G	Agropyron intermedium	_{ab} 48	_{ab} 56	_b 61	_a 28	.61	1.12	2.25
G	Agropyron trachycaulum	7	16	4	11	.64	.00	.49
G	Bouteloua gracilis	1	-	-	4	-	-	.01
G	Bromus inermis	_b 60	_b 74	_b 72	_a 11	1.89	2.04	.23
G	Bromus tectorum (a)	-	-	-	2	-	-	.00
G	Carex sp.	_b 40	_a 20	_a 8	_a 2	.13	.06	.03
G	Dactylis glomerata	-	1	-	-	.00	-	-
G	Elymus cinereus	4	17	9	8	.62	.74	.39
G	Elymus junceus	23	19	38	25	1.10	1.44	1.47
G	Elymus salina	-	-	6	-	-	1.23	-
G	Festuca ovina	_a -	_a 1	_b 20	_{ab} 8	.03	.21	.10
G	Oryzopsis hymenoides	-	4	-	4	.18	-	.02
G	Poa fendleriana	_a -	_{ab} 3	_{ab} 2	_b 9	.03	.03	.13
G	Poa secunda	_a -	_c 32	_{ab} 4	_{bc} 17	.25	.04	.10
G	Sitanion hystrix	_c 101	_b 12	_a -	_{ab} 4	.04	-	.06
G	Stipa lettermani	_c 122	_b 47	_{ab} 34	_a 8	.58	.45	.07
Total for Annual Grasses		0	0	0	2	0	0	0.00
Total for Perennial Grasses		565	561	519	396	17.56	20.72	21.01

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
Total for Grasses		565	561	519	398	17.56	20.72	21.01
F	Androsace septentrionalis (a)	-	_b 40	_a 2	_a -	.12	.00	-
F	Arabis sp.	_{ab} 3	_{bc} 12	_c 19	_a -	.03	.04	-
F	Astragalus convallarius	_b 12	_{ab} 4	_a -	_{ab} 3	.04	-	.01
F	Astragalus miser	_a -	_b 15	_b 17	_b 18	.57	.48	.80
F	Astragalus tenellus	_b 45	_a 17	_a 16	_a 7	3.78	2.28	1.16
F	Chaenactis douglasii	-	5	3	2	.01	.00	.01
F	Descurainia pinnata (a)	_a -	_{ab} 8	_a -	_b 8	.02	-	.02
F	Eriogonum alatum	_b 15	_{ab} 12	_{ab} 3	_a 3	.14	.03	.03
F	Erigeron eatonii	3	2	-	-	.00	-	-
F	Eriogonum umbellatum	-	-	4	2	-	.00	.00
F	Gayophytum ramosissimum(a)	-	3	-	-	.01	-	-
F	Grindelia squarrosa	-	3	-	-	.00	-	-
F	Hedysarum boreale	-	1	-	3	.15	-	.53
F	Ipomopsis aggregata	1	6	-	-	.01	-	-
F	Lappula occidentalis (a)	-	-	-	5	-	-	.01
F	Linum lewisii	-	3	-	-	.00	-	-
F	Medicago sativa	-	7	3	-	.56	.21	-
F	Penstemon caespitosus	1	-	-	-	-	-	-
F	Penstemon pachyphyllus	-	5	-	3	.01	-	.03
F	Sisymbrium altissimum (a)	-	_a 3	_a -	_b 13	.00	-	.35
Total for Annual Forbs		0	54	2	26	0.15	0.00	0.39
Total for Perennial Forbs		80	92	65	41	5.34	3.07	2.58
Total for Forbs		80	146	67	67	5.50	3.07	2.97

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

BROWSE TRENDS --

Management unit 17 , Study no: 57

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	0	0	1	-	-	-
B	Artemisia nova	12	15	14	.64	1.18	1.03
B	Artemisia tridentata vaseyana	5	4	1	.21	.84	.00
B	Chrysothamnus nauseosus	1	0	1	-	-	.00
B	Chrysothamnus viscidiflorus lanceolatus	0	1	0	-	-	-
B	Juniperus osteosperma	0	2	2	.03	.78	1.23
B	Pinus edulis	0	3	3	.03	.81	.66
Total for Browse		18	25	22	0.91	3.61	2.94

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 57

Species	Percent Cover	
	'00	'05
Artemisia nova	-	1.33
Artemisia tridentata vaseyana	-	.08
Juniperus osteosperma	-	.85
Pinus edulis	.60	1.16

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 17 , Study no: 57

Species	Average leader growth (in)
	'05
Artemisia nova	1.7
Artemisia tridentata vaseyana	3.0
Cercocarpus montanus	2.1
Cowania mexicana	2.0

POINT-QUARTER TREE DATA --

Management unit 17 , Study no: 57

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	23	32
Pinus edulis	21	35

Average diameter (in)	
'00	'05
2.6	4.2
2.8	3.6

BASIC COVER --

Management unit 17 , Study no: 57

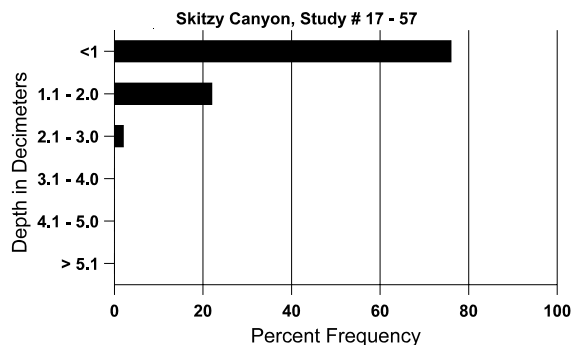
Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	7.50	4.75	26.94	29.00	26.73
Rock	3.25	4.50	12.60	5.57	6.23
Pavement	18.25	10.50	6.38	13.64	9.48
Litter	63.50	68.00	54.15	54.83	46.57
Cryptogams	.75	0	.05	.78	.01
Bare Ground	6.75	12.25	6.84	7.07	18.72

SOIL ANALYSIS DATA --

Herd Unit 17, Study # 57, Study Name: Skitzzy Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
10.5	59.4 (14.3)	7.8	61.3	20.2	18.6	8.4	62.0	252.8	1.6

Stoniness Index



PELLET GROUP DATA --

Management unit 17 , Study no: 57

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	7	6	27
Horse	3	1	-
Elk	42	57	68
Deer	6	5	14
Cattle	1	2	-
Antelope	-	1	-

Days use per acre (ha)	
'00	'05
-	-
-	-
90 (223)	195 (481)
7 (17)	80 (198)
9 (23)	2 (5)
-	-

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 57

		Age class distribution (plants per acre)					Utilization						
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)	
Amelanchier utahensis													
82	0	-	-	-	-	-	0	0	-	-	0	-/-	
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	0	-	-	-	-	-	0	0	-	-	0	-/-	
05	20	-	20	-	-	-	0	100	-	-	0	12/12	
Artemisia nova													
82	0	-	-	-	-	-	0	0	0	-	0	-/-	
88	133	-	-	133	-	-	0	0	0	-	0	8/11	
95	540	300	280	260	-	20	48	0	0	-	0	17/32	
00	820	40	100	480	240	20	12	0	29	-	0	14/27	
05	660	200	60	420	180	20	33	42	27	3	3	16/29	
Artemisia tridentata vaseyana													
82	0	-	-	-	-	-	0	0	0	-	0	-/-	
88	66	-	-	66	-	-	0	0	0	-	0	15/10	
95	100	-	40	60	-	-	20	0	0	-	0	27/42	
00	80	-	20	40	20	-	25	25	25	-	0	23/38	
05	20	-	-	20	-	-	0	100	0	-	0	29/52	
Atriplex canescens													
82	0	-	-	-	-	-	0	0	-	-	0	-/-	
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	0	-	-	-	-	-	0	0	-	-	0	-/-	
05	0	-	-	-	-	-	0	0	-	-	0	31/46	
Ceratoides lanata													
82	0	-	-	-	-	-	0	0	-	-	0	-/-	
88	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	0	-	-	-	-	-	0	0	-	-	0	-/-	
05	0	-	-	-	-	-	0	0	-	-	0	16/35	

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	22/39
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	37/29
Chrysothamnus nauseosus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	20	-	-	20	-	-	0	0	0	-	0	31/33
00	0	-	-	-	-	-	0	0	0	-	0	34/45
05	20	40	-	-	20	-	0	0	100	-	0	32/44
Chrysothamnus viscidiflorus lanceolatus												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	28/41
00	20	-	-	-	20	-	0	0	100	-	0	36/58
05	0	-	-	-	-	-	0	0	0	-	0	15/35
Cowania mexicana stansburiana												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	23/37
Juniperus osteosperma												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	40	-	-	-	-	0	0	-	-	0	-/-
00	40	-	40	-	-	-	0	0	-	-	0	-/-
05	40	-	20	20	-	-	0	0	-	-	0	-/-
Opuntia sp.												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	5/15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
82	66	-	-	66	-	-	0	0	-	-	0	41/24
88	66	66	66	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	60	-	40	20	-	-	0	0	-	-	0	-/-
05	60	-	40	20	-	-	0	0	-	-	0	-/-
Purshia tridentata												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	17/30
00	0	-	-	-	-	-	0	0	-	-	0	39/36
05	0	-	-	-	-	-	0	0	-	-	0	43/38
Sambucus sp.												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	35/45

Trend Study 17-58-05

Study site name: Buck Knoll.

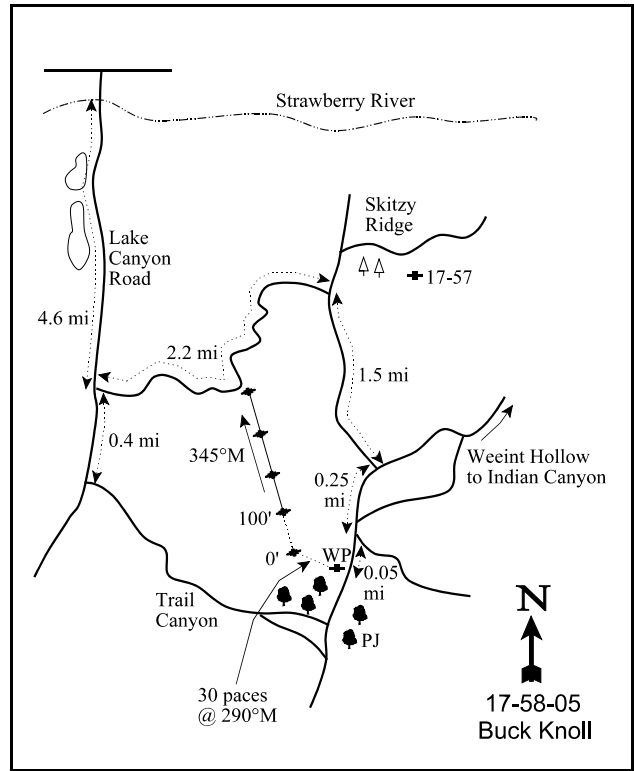
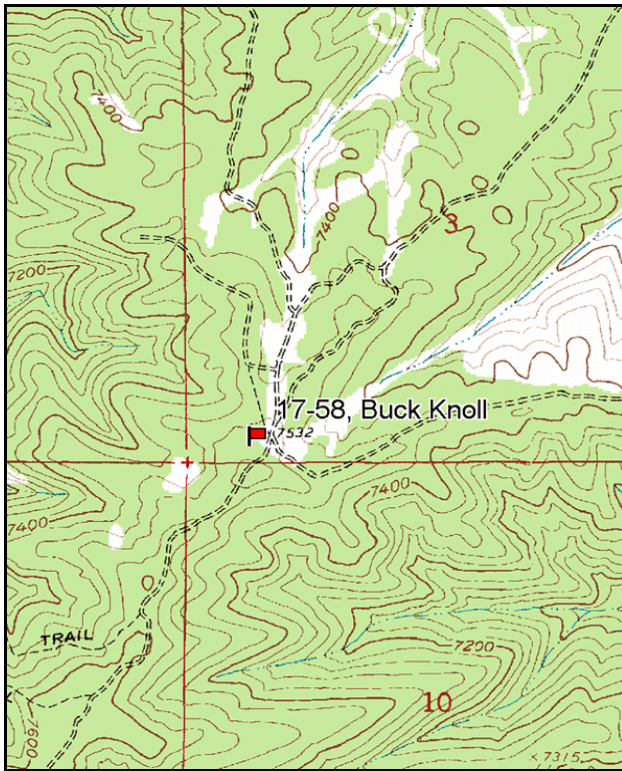
Vegetation type: Chained, Seeded P-J.

Compass bearing: frequency baseline 345 degrees magnetic.

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

LOCATION DESCRIPTION

From the Strawberry River, take the Lake Canyon Road (3239 West) south for 4.6 miles to a road which goes up the side canyon to the east. Turn left and go up the side canyon and switchbacks for 2.2 miles to an intersection at the top of the ridge (location of study 17-57). Turn right and drive south 1.5 miles to an intersection. Turn right and go 0.25 miles to a fork. Bear right and proceed up the hill 0.05 miles to the witness post, a short green fencepost on the right side of the road. From the witness post, the 0-foot baseline stake is 30 paces west ($290^{\circ}M$) down the hill.



Map Name: Buck Knoll

Diagrammatic Sketch

Township 5S, Range 6W, Section 3

GPS: NAD 27, UTM 12T 4435267 N, 538193 E

DISCUSSION

Buck Knoll - Trend Study No. 17-58

The Buck Knoll range trend study is located in the Skitzzy WMA on a Utah Division of Wildlife Resources chaining and seeding. It is approximately one and one-half miles southwest of study #17-57 at an elevation of 7,500 feet. It is close (within 100 yards) to the untreated juniper-pinyon woodland edge and is on a gentle (10% to 20%) west-facing slope. The area currently supports a mixed browse community with a good herbaceous understory. Pellet group data from 2000 were estimated at 26 elk, 6 deer, and 3 cow days use/acre (64 edu/ha, 15 ddu/ha, and 7 cdu/ha). In 2005, pellet group data estimates were 64 elk, 19 deer, and 5 cow days use/acre (157edu/ha, 46 ddu/ha, and 13 cdu/ha). Most pellet groups appeared to be from winter use during both readings.

The soil is relatively shallow with an effective rooting depth estimated at nearly 13 inches. The soil texture is a clay loam with a slightly alkaline soil reaction (pH of 7.4). Rock and pavement are common on the surface and in the soil profile. Many of the rocks in the profile contain calcium carbonate deposits. Phosphorus was measured at 5.1 ppm and values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). There is some localized soil movement but erosion is not severe. Regardless, the soil condition is still vastly better than in the nearby untreated juniper-pinyon woodland. The erosion index measurement in 2005 rated the degree of soil erosion as stable.

The browse is more abundant on this study area than at Skitzzy Canyon (17-57), but it is still well below optimum for a deer winter range. The key species consist of a small stand of true mountain mahogany which has been estimated around 600 plants/acre since 1988. In 2005, the population experienced an increase to 800 plants/acre. Mahogany cover has gradually increased from 3% in 1995 to 5% cover in 2005. These shrubs are about 4 to 6½ feet in height and exhibit light to heavy utilization, depending on the year. It is evident from the pellet group and utilization data that big game wintering on the site differs from year to year. Vigor was good in 2005, but some plants had yellowing leaves in 2000 due to the very dry conditions. Secondary browse species provide additional forage, they include: black sagebrush, mountain big sagebrush, rubber rabbitbrush, antelope bitterbrush, and elderberry.

The herbaceous understory is dominated by a variety of grasses and has averaged 18% cover since 1995. The grass composition is similar to the Skitzzy Canyon (17-57), but crested wheatgrass is not nearly as dominant. Crested wheatgrass only provided 4-5% cover from 1995 to 2005. Intermediate wheatgrass, Salina wildrye, Russian wildrye, and Indian ricegrass are also common. Forbs are diverse but not numerous. Twenty-eight species were encountered in 1995, combined they produced less than 3% cover. Twenty-two forbs were sampled in 2000 and 2005, which produced less than 1% total cover both years. The more common species are native species like hoary aster, mat penstemon, and common twinpod.

1982 APPARENT TREND ASSESSMENT

Soil condition is fair and improving as a result of increased herbaceous cover and litter accumulation since the chaining. The area is dominated by grasses, but contains a small number of desirable shrubs as well as an undesirable invader, broom snakeweed. Both can be expected to increase, although probably at different rates. Broom snakeweed could likely become more abundant in the immediate future.

1988 TREND ASSESSMENT

As was the case with study 17-57, this chained site shows little sign of change since 1982. Ground cover characteristics remain basically unchanged. Browse species are more prominent on this site than at Skitzzy Canyon. Other than a slight increase in grass and forb frequency and shrub density, the data from the two

sampling periods is very similar. Observations based on photo point comparisons suggest an increase in the size of big sagebrush and less grass production in 1988. The expected rapid increase in broom snakeweed has not occurred because of the competitive herbaceous understory. The population of true mountain mahogany is mostly comprised of young plants (78%), but density has not significantly increased in the last six years. Use of the palatable browse species (mahogany, bitterbrush and mountain big sagebrush) is light.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

Ground cover characteristics are similar to those in 1988. Protective ground cover is good and erosion is not a problem. Browse trend is stable but density is still well below what would be needed for a good deer winter range. The herbaceous understory displays a stable trend with sum of nested frequency being slightly down for grasses but up for forbs. Grass composition has changed. Nested frequency of crested wheatgrass, intermediate wheatgrass, smooth brome and mutton bluegrass declined significantly while nested frequency of Russian wildrye, Indian ricegrass, bottlebrush squirreltail and needle-and-thread increased. The Desirable Components Index rated this site as fair with a score of 60 due to excellent perennial grass cover and excellent shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair (60) Moderate Potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable. The slight changes do not warrant any changes in trend. Relative percent cover of bare ground has increased slightly while litter cover declined. In addition, the ratio of protective cover (vegetation, litter and cryptogams) to bare ground declined slightly. Sum of nested frequency for perennial grasses and forbs also decreased due to the dry conditions. There is some localized soil movement, but erosion is not a problem on the site at this time. Trend for browse is stable for the key species, true mountain mahogany. Density has remained similar to 1995, use is light to moderate and vigor normal. One positive aspect is that young recruitment has improved and numerous seedlings were sampled in 2000 (1,080 seedlings/acre). On the negative side, density of the green-stem rubber rabbitbrush, broom snakeweed and pinyon and juniper trees have increased. These less desirable shrubs and trees currently provide 45% of the browse cover. Trend for the herbaceous understory is down for grasses and forbs. Sum of nested frequency for perennial grasses has declined for crested wheatgrass, Indian ricegrass, bottlebrush squirreltail and needle-and-thread. The individual nested frequencies of Indian ricegrass, bottlebrush squirreltail, and needle-and-thread all decreased significantly. The only grass to increase significantly was Salina wildrye. Nested frequency of perennial forbs declined by 54% and cover dropped from 3% to less than 1%. The Desirable Components Index rated this site as good with a score of 69 due to excellent perennial grass cover, excellent percentage of young individuals, and excellent shrub decadence.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - good (69) Moderate Potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 3.2:1 in 2000 to 2.7:1 in 2005, a 16% decrease. The relative cover of bare ground increased slightly and the relative cover of litter and vegetation both decreased slightly. The browse trend is up. Although densities are low, the preferred browse species true mountain mahogany, black sagebrush, and mountain big sagebrush all increased. The most important increase was that of mahogany, the key browse species, which increased 23%. Despite heavy use, mahogany shrubs were larger in height than they had been since the site was established in 1982. In the case of all three preferred browse species, decadence was low and vigor was good. The trend for herbaceous understory is stable. The sum of nested frequency for perennial grasses remained virtually unchanged while perennial forbs decreased. Perennial grasses are the more important herbaceous understory component on this winter range, therefore have a greater weight on the trend. Both perennial grass and forb percent cover increased slightly. The Desirable Components Index rated this site as fair to good with a score of 64 due to excellent perennial grass cover, a fair percentage of young individuals, and very low shrub decadence.

TREND ASSESSMENT

soil - slightly down (-1)

browse - up (+2)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair to good (64) Moderate Potential scale

HERBACEOUS TRENDS --

Management unit 17 , Study no: 58

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	c ₂₁₇	b ₁₁₁	ab ₉₄	a ₇₁	5.14	3.99	4.88
G	Agropyron dasystachyum	8	11	16	5	.42	.25	.03
G	Agropyron intermedium	b ₄₈	a ₇	ab ₂₉	b ₃₉	.16	1.46	2.92
G	Bromus inermis	b ₂₃	a ₃	a ₄	a ₋	.03	.01	-
G	Carex sp.	ab ₁₈	b ₂₄	a ₆	ab ₈	.38	.21	.21
G	Elymus cinereus	11	8	1	5	.41	.38	.53
G	Elymus junceus	31	40	34	37	2.00	1.95	3.42
G	Elymus salina	a ₄₇	a ₃₈	b ₈₉	a ₃₅	1.82	4.09	1.83
G	Oryzopsis hymenoides	a ₃₉	b ₈₉	a ₄₀	a ₄₉	3.67	1.95	1.36
G	Poa fendleriana	b ₃₃	a ₉	a ₁₃	a ₁₁	.07	.39	.13
G	Poa pratensis	a ₋	b ₁₄	ab ₇	a ₋	.17	1.70	-
G	Poa secunda	a ₋	b ₂₄	b ₁₂	b ₂₈	.25	.07	.80

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Sitanion hystrix	ab43	c83	a28	bc61	.61	.45	.99
G	Sporobolus cryptandrus	-	3	-	-	.00	-	-
G	Stipa comata	a8	b44	a14	b51	1.64	.65	2.33
G	Unknown grass - perennial	2	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		528	508	387	400	16.79	17.58	19.48
Total for Grasses		528	508	387	400	16.79	17.58	19.48
F	Agoseris glauca	-	-	-	-	.15	-	-
F	Antennaria rosea	-	-	7	2	-	.02	.01
F	Androsace septentrionalis (a)	-	b23	a2	a1	.10	.00	.00
F	Arabis drummondi	6	13	1	-	.02	.00	-
F	Arenaria fendleri	-	1	5	-	.00	.03	-
F	Astragalus argophyllus	13	8	2	3	.07	.00	.00
F	Astragalus miser	c35	bc17	a-	ab5	.24	-	.06
F	Balsamorhiza sagittata	1	-	-	-	-	-	-
F	Caulanthus crassicaulis	-	2	-	6	.00	-	.01
F	Calochortus nuttallii	-	2	-	-	.00	-	-
F	Chaenactis douglasii	a-	b18	a3	ab5	.04	.00	.05
F	Chenopodium fremontii (a)	-	b16	a-	b12	.06	-	.08
F	Chenopodium leptophyllum(a)	-	b10	a-	a-	.05	-	-
F	Chamaechaenactis scaposa	6	-	-	-	-	-	-
F	Cryptantha sp.	ab8	b19	a-	a-	.25	-	.00
F	Descurainia pinnata (a)	-	b29	a-	a5	.22	-	.02
F	Eriogonum alatum	a-	b17	ab7	ab10	.22	.02	.09
F	Erigeron eatonii	a-	a-	b10	a-	-	.07	-
F	Gilia sp. (a)	-	1	1	-	.00	.00	-
F	Hedysarum boreale	-	1	6	1	.03	.04	.15
F	Hymenoxys acaulis	b33	ab15	a1	a9	.08	.00	.05
F	Ipomopsis aggregata	a-	b12	ab1	ab1	.02	.00	.03
F	Lappula occidentalis (a)	-	b73	a3	b60	.52	.01	.43
F	Lesquerella sp.	b18	ab12	a3	a3	.04	.01	.00
F	Linum lewisii	b16	b14	b11	a-	.08	.10	-
F	Machaeranthera grindelioides	17	18	15	10	.32	.11	.24
F	Penstemon caespitosus	ab13	b31	a10	a3	.06	.10	.01
F	Physaria acutifolia	a-	ab10	b15	ab8	.04	.04	.16
F	Phlox sp.	b11	a-	a-	a-	-	-	-

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Schoenocrambe linifolia	-	4	-	-	.01	-	-
F	Senecio canus	11	4	3	2	.03	.01	.03
F	Sphaeralcea coccinea	-	1	4	-	.00	.15	-
F	Taraxacum officinale	a ⁻	b ¹³	ab ³	ab ²	.02	.01	.03
F	Townsendia incana	4	-	3	5	-	.03	.03
F	Tragopogon dubius	a ⁻	b ⁹	a ⁻	a ⁻	.02	-	-
F	Trifolium sp.	4	-	-	3	-	-	.00
Total for Annual Forbs		0	152	6	78	0.96	0.01	0.53
Total for Perennial Forbs		196	241	110	78	1.82	0.79	0.98
Total for Forbs		196	393	116	156	2.79	0.81	1.52

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

BROWSE TRENDS --

Management unit 17 , Study no: 58

T y p e	Species	Average Cover %		
		'95	'00	'05
B	Amelanchier utahensis	-	-	-
B	Artemisia nova	-	-	.04
B	Artemisia tridentata vaseyana	.18	.76	.79
B	Cercocarpus montanus	3.10	4.49	4.90
B	Chrysothamnus nauseosus graveolens	2.04	1.63	1.86
B	Chrysothamnus nauseosus hololeucus	.56	1.12	-
B	Chrysothamnus viscidiflorus lanceolatus	-	.18	-
B	Eriogonum corymbosum	.15	.38	.38
B	Gutierrezia sarothrae	.53	.63	.42
B	Juniperus osteosperma	.56	.53	.78
B	Leptodactylon pungens	-	.03	-
B	Pinus edulis	1.16	3.05	.81
B	Purshia tridentata	-	.15	-
Total for Browse		8.31	12.97	9.98

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17 , Study no: 58

Species	Average leader growth (in)
	'05
Artemisia nova	1.6
Artemisia tridentata vaseyana	2.8
Cercocarpus montanus	3.6
Cowania mexicana	2.1

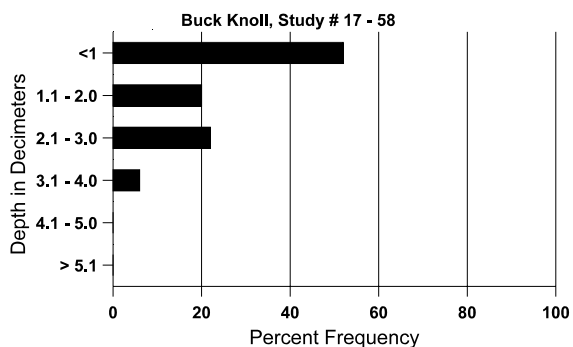
BASIC COVER --
Management unit 17 , Study no: 58

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	8.25	8.50	25.78	33.96	28.21
Rock	2.25	2.50	7.89	2.73	1.60
Pavement	18.00	18.25	8.38	11.82	11.38
Litter	57.50	59.00	55.12	54.79	45.62
Cryptogams	0	.25	.24	.22	.03
Bare Ground	14.00	11.50	10.93	14.94	26.13

SOIL ANALYSIS DATA --
Herd Unit 17, Study # 58, Study Name: Buck Knoll

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
12.9	57.6 (15.7)	7.4	24.9	47.8	28.3	5.3	5.1	92.8	0.9

Stoniness Index



PELLET GROUP DATA --
Management unit 17 , Study no: 58

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	5	16	13
Horse	5	1	-
Elk	12	18	27
Deer	7	9	9
Cattle	-	-	1

Days use per acre (ha)	
'00	'05
-	-
-	-
26 (65)	64 (157)
6 (15)	19 (46)
3 (7)	5 (13)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 58

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia nova</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	40	-	20	20	-	-	50	0	0	-	0	11/20
00	0	-	-	-	-	-	0	0	0	-	0	7/11
05	320	20	160	140	20	-	31	19	6	-	0	12/21
<i>Artemisia tridentata vaseyana</i>												
82	66	-	-	66	-	-	100	0	-	-	0	12/6
88	66	-	-	66	-	-	0	0	-	-	0	31/24
95	40	-	-	40	-	-	0	0	-	-	0	30/46
00	100	-	60	40	-	-	0	0	-	-	0	33/46
05	160	120	40	120	-	-	38	38	-	-	0	30/44
<i>Atriplex canescens</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	11/29
<i>Cercocarpus montanus</i>												
82	465	66	333	66	66	-	29	71	14	-	14	25/33
88	599	-	466	133	-	-	0	0	0	-	0	44/53
95	580	-	80	500	-	20	62	17	0	-	0	47/49
00	620	1080	140	480	-	-	35	0	0	-	0	45/47
05	800	40	120	680	-	-	25	65	0	-	0	55/50

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Chrysothamnus nauseosus graveolens</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	780	-	20	760	-	-	31	0	0	-	0	31/42
00	1200	20	360	580	260	-	0	0	22	10	10	23/29
05	760	20	80	600	80	20	0	0	11	5	5	29/36
<i>Chrysothamnus nauseosus hololeucus</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	20	-	-	20	-	-	0	0	0	-	0	28/26
00	940	-	300	620	20	-	0	0	2	-	0	4/5
05	0	-	-	-	-	-	0	0	0	-	0	32/29
<i>Chrysothamnus viscidiflorus lanceolatus</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	133	-	-	133	-	-	0	0	-	-	0	6/4
95	120	-	20	100	-	-	0	0	-	-	0	10/15
00	180	-	-	180	-	-	11	0	-	-	0	12/22
05	0	-	-	-	-	-	0	0	-	-	0	17/22
<i>Cowania mexicana stansburiana</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	13/17
<i>Ephedra viridis</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	21/40
05	0	-	-	-	-	-	0	0	-	-	0	14/22
<i>Eriogonum corymbosum</i>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	60	-	40	20	-	-	0	0	-	-	0	16/21
00	40	-	-	40	-	-	100	0	-	-	0	15/20
05	60	-	-	60	-	-	0	0	-	-	0	18/27

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
82	600	-	-	600	-	-	0	0	0	-	0	11/19
88	2333	-	-	2000	333	-	0	0	14	-	0	7/4
95	1820	280	780	1020	20	-	0	0	1	1	1	8/8
00	2760	20	200	2560	-	-	0	0	0	-	0	5/4
05	2060	160	560	1500	-	-	0	0	0	-	0	6/7
Juniperus osteosperma												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	120	-	100	20	-	-	0	0	-	-	0	-/-
05	60	-	40	20	-	20	0	0	-	-	0	-/-
Leptodactylon pungens												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	100	0	-	-	0	5/7
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
82	66	-	66	-	-	-	0	0	-	-	100	-/-
88	66	-	66	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	120	40	60	60	-	20	0	0	-	-	0	-/-
05	120	-	120	-	-	60	0	0	-	-	0	-/-
Purshia tridentata												
82	66	-	66	-	-	-	0	0	-	-	0	-/-
88	66	-	-	66	-	-	100	0	-	-	0	8/6
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	-	20	-	-	100	0	-	-	0	42/23
05	20	-	-	20	-	-	0	100	-	-	0	25/22
Sambucus cerulea												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	61/64
00	0	-	-	-	-	-	0	0	-	-	0	46/53
05	0	-	-	-	-	-	0	0	-	-	0	58/67

Trend Study 17-59-05

Study site name: Emma Park .

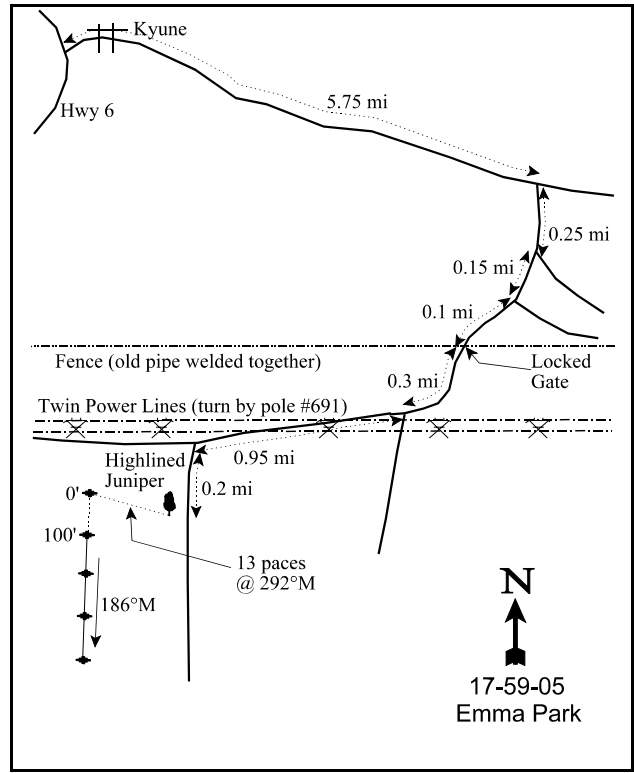
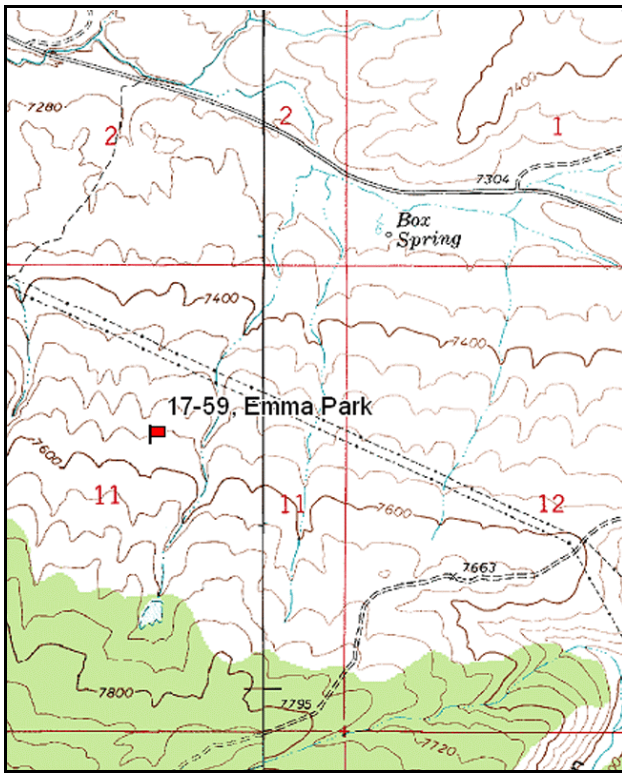
Vegetation type: Mountain Big Sagebrush .

Compass bearing: frequency baseline 186 degrees magnetic.

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

LOCATION DESCRIPTION

Traveling south on Highway 6 take a left on the road that leads to Kyune and travel 5.75 miles. Turn right and go 0.25 miles. Veer right for 0.15 miles to a fork. Continue right for 0.1 miles to a locked gate. Go through the gate for 0.3 miles. Veer right and go 0.95 miles following the power lines. Turn left for 0.2 miles to a high lined juniper. The 0 foot stake is 13 paces away @ 292°M.



Map Name: Kyune

Diagrammatic Sketch

Township 12S, Range 9E, Section 11

GPS: NAD 27, UTM 12S 4405280 N, 510327 E

DISCUSSION

Emma Park - Trend Study No. 17-59

The Emma Park study was established in 1994 and was selected because of the perceived increase of winter use by elk in the area. It is located on one of the many moderately north sloping ridges in the area that drain into Horse Creek, which in turn drains southwest into the Price River. The elevation is about 7,600 feet on an 8% slope and a northwest aspect. It is located within the sagebrush-grass type. Species diversity is very high with about 56 species found on the inventoried transects. Cattle use the area during the summer as part of the Price Canyon East allotment which is used by 108 cattle from May 16 to November 15. Deer appear to be using this area as transitional and summer range. Deer were seen on site during the 2000 reading. Quadrat frequencies of elk (25%) and deer (19%) pellet groups were fairly high in 1994. Perhaps due to the mild winter of 1999-2000, quadrat frequency of elk and deer pellet groups dropped to 6% and 8% during the 2000 reading. Pellet quadrat frequencies in 2005 were 13% elk and 6% deer, higher than 2000, but lower than 1994. Pellet group data read in 2000 were estimated at 13 elk, 15 deer, and 20 cow days use/acre (32 edu/ha, 37 ddu/ha, and 50 cdu/ha). Pellet group data in 2005 were estimated at 24 elk, 11 deer, and 19 cow days use/acre (60 edu/ha, 28 ddu/ha, and 47 cdu/ha).

Soil is moderately deep with an effective rooting depth estimated at just over 14 inches. The soil has a clay loam texture and a neutral soil reaction (pH of 7.0). Small rocks are common on the surface and within the profile in some areas, but the soil is deeper and relatively rock free in other areas. Rocky areas support far fewer and smaller shrubs, while the deeper soil along the end of the baseline supports very large and robust sagebrush. There is little current evidence of erosion, but historically the area exhibits signs of heavy soil loss. The erosion index measurement in 2005 rated the soil erosion as slight, mainly because of moderate frequent pedestaling of the shrubs and perennial grasses, some minor soil movement, moderate litter movement, minor surface rock movement, and minor flow patterns between perennial species.

Mountain big sagebrush is the key browse species. Mountain big sagebrush density was 4,640 plants/acre in 1994, 4,600 in 2000, and 3,820 in 2005. It has provided cover values of 22% in 1994, 19% in 2000, and 13% in 2005. In areas with deeper soil, some of the sagebrush appears to be basin big sagebrush. These plants are very tall and robust with a height of 5 feet and a crown of nearly 4 feet. Most of the sagebrush sampled are considered to be mountain big sagebrush, although there appears to be some hybridizing between the two subspecies. Use of the sagebrush has been mostly light and have had good vigor. The plants with poor vigor increased from 4% of the population in 2000 to 25% in 2005, nearly all of which were classified as dying. Decadence had also been low and reproduction good, but decadence increased from 11% in 2000 to 41% in 2005. The young plants decreased from 17% of the population in 2000 to only 2% in 2005.

Other desirable shrubs include some moderate to heavy browsed serviceberry and a few scattered heavily hedged bitterbrush. Stickyleaf low rabbitbrush and Oregon grape are abundant understory shrubs. They are not utilized and appear to have stable mature populations.

The herbaceous understory is moderately abundant and diverse. It contributed 15% of the cover in 1994, 21% in 2000, and 23% in 2005. Forbs alone contributed 8% cover in 1995, 11% in 2000, and 12% in 2005. The herbaceous species could provide good transition range forage in the fall and spring. Salina wildrye, thickspike wheatgrass, Letterman needlegrass, Kentucky bluegrass, and mutton bluegrass are all fairly abundant. Kentucky bluegrass appeared to be heavily utilized in 2000. Forbs are diverse with several preferred species sampled. The most common species is desert phlox which provided 4% cover in 1994, 5% in 2000, and 6% in 2005. Other abundant forb species include: dandelion, silver lupine, Tolmie owllover, and lobeleaf groundsel.

1994 APPARENT TREND ASSESSMENT

The soil appears stable because of excellent vegetation cover, good litter cover, and a low percentage of bare ground. The browse also appears stable with good vigor and productivity. The herbaceous understory is abundant and diverse with good species diversity and excellent cover values. The Desirable Components Index rated this site as good with a score of 68 due to fair perennial grass cover, excellent browse cover, and excellent perennial forb cover.

winter range condition (DC Index) - good (68) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased, and percent bare soil has increased slightly. However, this is not enough change to warrant a change in trend. Trend for the key browse, mountain big sagebrush is stable. Population density has not changed but the number of decadent plants has declined. Use is mostly light to moderate, vigor is good and reproduction adequate to maintain the stand. Trend for the herbaceous understory is up due to a 21% increase in the sum of nested frequency of grasses and a 31% increase in forbs. A reduction in sagebrush cover would further increase production of the herbaceous understory. The Desirable Components Index rated this site as excellent to good with a score of 80 due to good perennial grass cover, excellent browse cover, and excellent perennial forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - up (+2)

winter range condition (DC Index) - excellent to good (80) Mid-level Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased and the percent bare soil increased by 7%. This change is due mainly to a slight decrease in vegetation and litter with and increase in bare ground. The trend for browse is slightly down. The key browse species, mountain big sagebrush, decreased 17% in density. As well, the decadence also increased from 11% to 41%. Recruitment decreased from 17% young in 2000 to 2% in 2005 with an increase in the dying from 4% to 24%. The densities of serviceberry and basin big sage increased, but not enough to compensate for the loss of mountain big sage. The herbaceous understory trend is stable. The sum of the nested frequencies of perennial grasses and perennial forbs increased very slightly, but not enough to change the trend. The Desirable Components Index rated this site as fair with a score of 55 due to fair perennial grass cover, fair browse cover, and excellent perennial forb cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair (55) Mid-level Potential scale

HERBACEOUS TRENDS --
Management unit 17 , Study no: 59

T y p e	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
G	Agropyron dasystachyum	a ⁸	c ¹⁰¹	b ⁴⁸	.21	1.11	.38
G	Agropyron trachycaulum	a ⁻	a ⁻	b ¹⁴	-	-	.10
G	Bromus anomalus	6	7	11	.01	.04	.06
G	Bromus tectorum (a)	ab ³	b ⁹	a ⁻	.00	.09	.00
G	Carex sp.	a ⁹	b ⁴⁶	a ²⁰	.18	.72	.21
G	Elymus salina	b ²⁴²	a ⁸⁶	b ²⁰⁷	5.72	2.36	4.31
G	Koeleria cristata	a ⁻	a ¹	b ⁵⁴	-	.03	.32
G	Poa fendleriana	b ¹³²	a ⁸⁵	a ⁴¹	.90	1.50	.26
G	Poa pratensis	a ⁻	b ¹¹¹	b ⁷⁸	-	2.58	2.38
G	Poa secunda	a ⁻	ab ¹²	b ²⁵	-	.07	.28
G	Stipa columbiana	-	-	4	-	-	.18
G	Stipa lettermani	a ³²	b ⁷⁰	a ²⁷	.28	1.19	.29
Total for Annual Grasses		3	9	0	0.00	0.08	0.00
Total for Perennial Grasses		429	519	529	7.31	9.63	8.80
Total for Grasses		432	528	529	7.32	9.72	8.80
F	Achillea millefolium	a ³⁴	b ⁶¹	a ²⁴	.17	.73	.33
F	Agoseris glauca	-	-	3	-	-	.00
F	Allium sp.	-	-	4	-	-	.01
F	Antennaria parvifolia	a ³	b ²³	b ²⁷	.06	.32	.20
F	Androsace septentrionalis (a)	a ²	a ⁶	b ⁴⁶	.00	.01	.12
F	Arabis drummondii	a ¹²	a ³	b ⁴⁸	.03	.00	.14
F	Aster chilensis	33	15	15	.14	.19	.25
F	Astragalus convallarius	b ²⁵	a ⁵	ab ²³	.26	.07	.11
F	Astragalus tenellus	b ⁶⁰	b ⁷⁷	a ²⁵	1.14	.57	.11
F	Astragalus sp.	9	-	9	.06	-	.07
F	Astragalus utahensis	a ⁻	ab ⁶	b ¹²	-	.07	.05
F	Castilleja linariaefolia	7	3	5	.16	.00	.04
F	Calochortus nuttallii	a ³	a ⁻	b ²⁶	.00	-	.07
F	Chenopodium album (a)	1	-	1	.00	-	.00
F	Chaenactis douglasii	7	6	2	.01	.05	.00
F	Cirsium sp.	-	2	-	-	.00	-
F	Comandra pallida	a ¹⁴	b ³⁹	ab ²⁰	.03	.25	.08
F	Collinsia parviflora (a)	b ⁴⁴	a ⁻	a ⁵	.19	-	.01
F	Crepis acuminata	ab ³	a ⁻	b ⁸	.41	-	.05
F	Erigeron eatonii	b ⁶⁵	a ³⁴	b ⁷²	.42	.14	.26

T y p e	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
F	<i>Erigeron flagellaris</i>	_a 1	_a 4	_b 22	.00	.01	.14
F	<i>Eriogonum umbellatum</i>	3	4	4	.03	.06	.15
F	<i>Gayophytum ramosissimum</i> (a)	3	2	-	.00	.00	-
F	<i>Gilia</i> sp. (a)	2	-	-	.01	-	-
F	<i>Hedysarum boreale</i>	-	3	1	-	.03	.03
F	<i>Helianthella uniflora</i>	_a 1	_b 24	_a 3	.00	.37	.41
F	<i>Ipomopsis aggregata</i>	-	2	5	-	.00	.03
F	<i>Lomatium</i> sp.	-	2	-	-	.00	-
F	<i>Lupinus argenteus</i>	35	35	23	.21	.59	1.14
F	<i>Lychnis drummondii</i>	1	6	-	.00	.41	-
F	<i>Machaeranthera canescens</i>	5	-	9	.01	-	.05
F	<i>Orthocarpus tolmiei</i> (a)	_a -	_a 1	_b 110	-	.00	1.21
F	<i>Penstemon caespitosus</i>	13	24	6	.07	.19	.01
F	<i>Penstemon humilis</i>	11	13	-	.10	.04	-
F	<i>Penstemon watsonii</i>	23	19	7	.41	.20	.23
F	<i>Phlox austromontana</i>	_a 142	_{ab} 156	_b 199	3.72	5.16	6.25
F	<i>Phlox longifolia</i>	3	1	3	.00	.00	.00
F	<i>Polygonum douglasii</i> (a)	_b 10	_a -	_{ab} 5	.02	-	.02
F	<i>Potentilla gracilis</i>	_a 4	_a 11	_b 25	.01	.08	.09
F	<i>Schoenocrambe linifolia</i>	2	2	3	.00	.01	.03
F	<i>Senecio integerrimus</i>	9	8	6	.03	.07	.04
F	<i>Senecio multilobatus</i>	_a 15	_b 103	_b 77	.04	1.37	.55
F	<i>Sphaeralcea coccinea</i>	3	-	-	.00	-	-
F	<i>Taraxacum officinale</i>	_a 6	_a 31	_b 42	.01	.18	1.23
F	<i>Thalictrum fendleri</i>	3	8	3	.06	.06	.15
F	<i>Zigadenus paniculatus</i>	1	-	9	.00	-	.03
Total for Annual Forbs		62	9	167	0.24	0.02	1.37
Total for Perennial Forbs		556	730	770	7.70	11.31	12.43
Total for Forbs		618	739	937	7.94	11.34	13.80

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

BROWSE TRENDS --

Management unit 17 , Study no: 59

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Amelanchier utahensis	9	8	12	.18	.33	.21
B	Artemisia tridentata tridentata	0	3	11	-	.68	2.20
B	Artemisia tridentata vaseyana	88	93	85	21.89	19.21	12.86
B	Cercocarpus montanus	1	0	0	.03	-	-
B	Chrysothamnus depressus	4	8	14	.19	.27	.45
B	Chrysothamnus viscidiflorus viscidiflorus	74	64	60	3.73	4.61	3.49
B	Gutierrezia sarothrae	3	4	4	.00	.03	.03
B	Mahonia repens	22	23	15	.65	1.06	.85
B	Purshia tridentata	0	1	1	-	-	-
B	Ribes sp.	0	1	0	-	-	-
B	Rosa woodsii	3	3	0	.00	.03	-
B	Symphoricarpos oreophilus	28	24	7	2.66	2.14	.24
B	Tetradymia canescens	1	2	2	-	.00	-
Total for Browse		233	234	211	29.34	28.37	20.36

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 59

Species	Percent Cover
	'05
Amelanchier utahensis	.91
Artemisia tridentata tridentata	4.51
Artemisia tridentata vaseyana	17.75
Chrysothamnus depressus	.53
Chrysothamnus viscidiflorus viscidiflorus	5.33
Gutierrezia sarothrae	.01
Mahonia repens	.30
Purshia tridentata	.08
Symphoricarpos oreophilus	.48
Tetradymia canescens	.08

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 17 , Study no: 59

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	1.6
Purshia tridentata	4.0

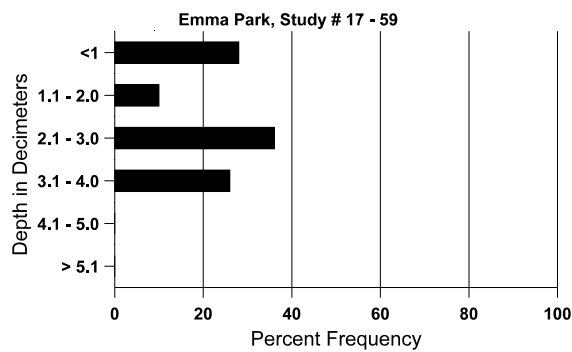
BASIC COVER --
 Management unit 17 , Study no: 59

Cover Type	Average Cover %		
	'94	'00	'05
Vegetation	43.04	50.81	37.15
Rock	5.51	6.91	4.99
Pavement	1.48	7.57	4.17
Litter	47.61	59.09	41.79
Cryptogams	.60	1.20	.35
Bare Ground	14.02	18.48	21.44

SOIL ANALYSIS DATA --
 Herd Unit 17, Study # 59, Study Name: Emma Park

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
14.4	49.2 (14.9)	7.0	29.4	31.1	39.3	4.0	10.6	137.6	0.8

Stoniness Index



PELLET GROUP DATA --
Management unit 17 , Study no: 59

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	16	24	10
Moose	2	2	-
Elk	25	6	13
Deer	19	8	6
Cattle	6	2	3

Days use per acre (ha)	
'00	'05
-	-
-	-
13 (31)	24 (60)
15 (36)	11 (28)
20 (50)	19 (47)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 59

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
94	200	-	20	140	40	20	10	40	20	-	20	16/11
00	200	-	100	80	20	-	40	10	10	10	30	15/17
05	260	20	60	180	20	-	38	54	8	-	0	15/17
Artemisia tridentata tridentata												
94	0	-	-	-	-	-	0	0	0	-	0	-/-
00	60	-	-	60	-	-	0	0	0	-	0	61/45
05	380	-	-	320	60	80	21	11	16	5	5	58/54
Artemisia tridentata vaseyana												
94	4640	40	520	2980	1140	720	8	1	25	5	5	28/34
00	4600	80	780	3300	520	580	17	0	11	4	4	28/35
05	3820	-	80	2180	1560	1040	28	7	41	24	25	24/31
Cercocarpus montanus												
94	20	-	-	20	-	-	100	0	-	-	100	9/12
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus depressus												
94	180	-	-	180	-	-	11	0	0	-	0	4/10
00	300	-	-	300	-	-	7	0	0	-	0	3/7
05	880	-	-	840	40	-	18	0	5	5	5	6/12
Chrysothamnus viscidiflorus viscidiflorus												
94	4800	-	-	4760	40	-	0	0	1	.41	.83	11/13
00	4000	-	140	3720	140	-	.50	0	4	.50	.50	9/13
05	3540	80	-	3460	80	40	0	0	2	-	1	11/18

		Age class distribution (plants per acre)					Utilization						
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)	
Gutierrezia sarothrae													
94	120	-	40	80	-	-	0	0	-	-	0	6/9	
00	240	-	-	240	-	-	0	0	-	-	0	4/7	
05	260	-	-	260	-	-	0	0	-	-	0	6/10	
Mahonia repens													
94	4260	-	700	3560	-	-	0	0	-	-	0	3/4	
00	6380	-	980	5400	-	-	0	0	-	-	0	3/4	
05	1180	-	-	1180	-	-	0	0	-	-	0	2/3	
Purshia tridentata													
94	0	-	-	-	-	-	0	0	-	-	0	17/30	
00	40	-	-	40	-	20	0	100	-	-	0	20/50	
05	40	-	-	40	-	-	0	100	-	-	0	-/-	
Ribes sp.													
94	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	20	-	20	-	-	-	0	0	-	-	0	-/-	
05	0	-	-	-	-	-	0	0	-	-	0	-/-	
Rosa woodsii													
94	140	-	-	140	-	-	0	0	-	-	0	7/7	
00	80	-	40	40	-	-	0	0	-	-	0	19/8	
05	0	-	-	-	-	-	0	0	-	-	0	-/-	
Symphoricarpos oreophilus													
94	1420	-	120	1280	20	-	6	1	1	-	0	18/25	
00	920	-	180	740	-	-	2	0	0	-	2	15/17	
05	200	-	-	100	100	-	0	0	50	50	50	23/24	
Tetradymia canescens													
94	40	-	-	-	40	-	100	0	100	100	100	4/4	
00	80	-	40	40	-	-	0	0	0	-	0	-/-	
05	60	-	-	60	-	-	0	0	0	-	0	6/10	

Trend Study 17-65-05

Study site name: Little Horse Ridge .

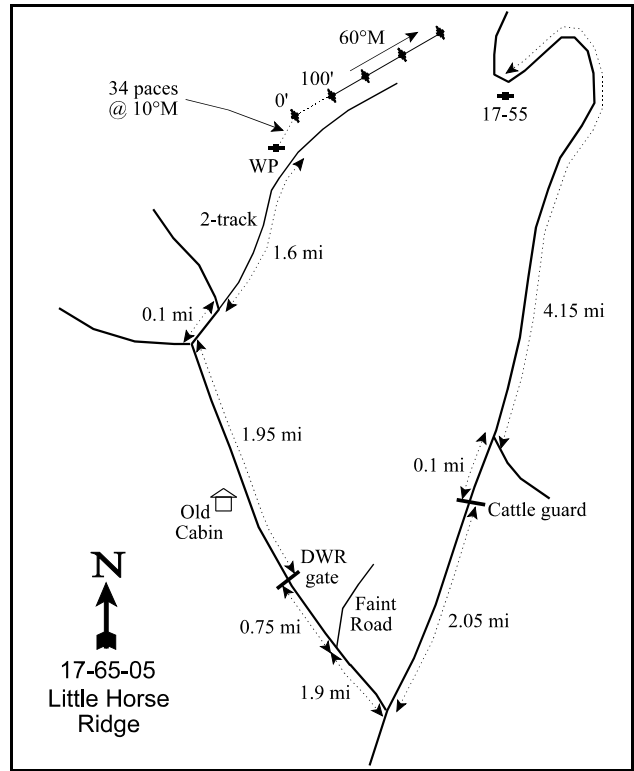
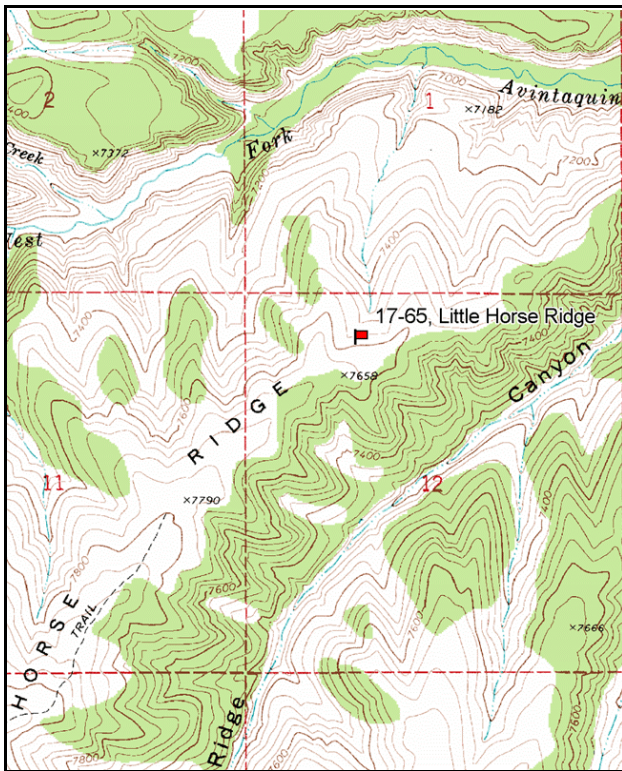
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 60 degrees magnetic.

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

LOCATION DESCRIPTION

From the Strawberry River Road, proceed south up Avintaquin Canyon 12.7 miles. Turn left here onto a road hidden in the trees and cross Avintaquin Creek. Go up Horse Ridge Canyon 0.4 miles to a fence. Continue up the ridge 0.8 miles to a sharp left bend in the road by trend study 17-55. Continue south 4.15 miles to a fork in the road. Stay right and continue 0.1 miles to a cattle guard. After the cattle guard travel 2.05 miles and take a right. Travel 1.9 miles to a faint fork in the road. Stay to the left and continue another 0.75 miles to a DWR gate. Pass through the gate and drive 1.95 miles, passing an old cabin on the left, to a fork in the road. Stay right and travel 0.1 miles to another fork. Take the 2-track to the right and follow it for 1.6 miles to a witness post on the left hand side of the road. The 0' stake is 34 paces from the witness post at 10 degrees magnetic.



Map Name: Grey Head Peak

Diagrammatic Sketch

Township 6S, Range 9W, Section 12

GPS: NAD 27, UTM 12S 4425240 N, 512973 E

DISCUSSION

Little Horse Ridge - Trend Study No. 17-65

The Little Horse Ridge trend study is located on big game winter range near the north end of Little Horse Ridge at about 7,600 feet in elevation. The land is owned and managed by the Division of Wildlife Resources in the Avintaquin Wildlife Management Area. The range type is a mixed mountain brush on a northwest exposure with a 25% to 30% slope. This site was established in 2005 to monitor deer that are staying in the high country during winter, instead of migrating lower. This herd has a high mortality rate for not only fawns, but adults as well. Pellet group data from 2005 was estimated at 3 elk, 34 deer, 2 cow, 6 horse, and 1 moose days use/acre (7 edu/ha, 83 ddu/ha, 5 cdu/ha, 16 hdu/ha, and 2 mdu/ha).

Soil is moderately deep with an effective rooting depth estimated at 16 inches. The soil has a clay loam texture with a slightly alkaline pH of 7.4. Phosphorus levels were measured at 5.2 ppm, values less than 6 ppm can limit normal plant growth and development (Tiedemann and Lopez 2004). Rock and pavement are concentrated on the surface between bunch grass and shrub interspaces. Rock and gravel are also distributed throughout the soil profile. The erosion condition class determined soil movement as stable in 2005.

Several browse species occupy the site, but the key species consist of true mountain mahogany and mountain big sagebrush. True mountain mahogany provided an average cover of 6.5% with a density of 2,600 plants/acre. Almost half of the population was classified in the young age class and showed a good distribution among the age classes. Several seedlings were observed as well. Utilization was moderate to heavy, but vigor was good. Mountain big sagebrush averaged 5% cover with a density of 1,460 plants/acre. This population also showed a well distributed age class with 16% of the population classified as young, but percent decadence was moderately high at 41%. Utilization was moderate with moderate vigor. Drought conditions have persisted since 2000 and would be considered the main factor in the reduced vigor of the sagebrush. Leader growth on all species was good with above normal precipitation in 2005.

Other browse species include serviceberry, pinyon pine, rabbitbrush, and snowberry. Serviceberry shows moderate use with excellent vigor. Pinyon pine appears to be invading the site and point-centerquarter data estimated 233 trees/acre with a mean diameter of 2.7 inches. Some type of thinning of pinyon should be considered before it begins to have a significantly depressing effect on the understory species. Once it begins to approach 10% cover, it begins to have a deleterious effect on the understory species (Tausch and West 1994). Currently it is approaching 8% cover.

The herbaceous understory is dominated by grasses which produced 16% cover in 2005. Two species, bluebunch wheatgrass and Salina wildrye, account for 97% of the grass cover. Forbs are diverse and moderately abundant with 14 perennial species encountered in 2005. Combined they produced less than 3% cover. Common species include: tapertip hawksbeard, gumweed aster, desert phlox.

The Desirable Components Index rated this site as excellent to good in 2005 with a score of 80 due to good shrub cover, low percent decadence, good shrub recruitment, and excellent perennial grasses cover.

2005 winter range condition (DC Index) - excellent to good (80) Mid-level Potential scale

HERBACEOUS TRENDS --
Management unit 17 , Study no: 65

T y p e	Species	Nested Frequency	Average Cover %
		'05	'05
G	Agropyron spicatum	168	6.82
G	Elymus salina	247	9.00
G	Oryzopsis hymenoides	10	.08
G	Poa fendleriana	41	.40
G	Poa secunda	6	.06
Total for Annual Grasses		0	0
Total for Perennial Grasses		472	16.36
Total for Grasses		472	16.36
F	Androsace septentrionalis (a)	15	.08
F	Aster chilensis	2	.01
F	Astragalus convallarius	10	.10
F	Astragalus sp.	7	.07
F	Castilleja chromosa	13	.04
F	Calochortus nuttallii	11	.03
F	Chenopodium leptophyllum(a)	2	.00
F	Crepis acuminata	72	.70
F	Cymopterus sp.	3	.01
F	Ipomopsis aggregata	4	.01
F	Machaeranthera canescens	1	.00
F	Machaeranthera grindelioides	30	.71
F	Penstemon caespitosus	8	.02
F	Phlox austromontana	59	.62
F	Senecio multilobatus	8	.02
F	Taraxacum officinale	9	.09
Total for Annual Forbs		17	0.09
Total for Perennial Forbs		237	2.46
Total for Forbs		254	2.54

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

BROWSE TRENDS --

Management unit 17 , Study no: 65

Type	Species	Strip Frequency	Average Cover %
		'05	'05
B	Amelanchier utahensis	11	1.68
B	Artemisia tridentata vaseyana	50	5.24
B	Cercocarpus montanus	54	6.47
B	Chrysothamnus depressus	2	-
B	Chrysothamnus nauseosus hololeucus	1	.03
B	Chrysothamnus viscidiflorus viscidiflorus	56	1.83
B	Gutierrezia sarothrae	11	.21
B	Pediocactus simpsonii	1	-
B	Pinus edulis	12	5.48
B	Symphoricarpos oreophilus	21	1.03
B	Tetradymia canescens	28	.40
Total for Browse		247	22.40

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 65

Species	Percent Cover
	'05
Amelanchier utahensis	2.68
Artemisia tridentata vaseyana	4.50
Cercocarpus montanus	10.38
Chrysothamnus viscidiflorus viscidiflorus	1.58
Pinus edulis	7.40
Symphoricarpos oreophilus	1.01
Tetradymia canescens	.25

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 17 , Study no: 65

Species	Average leader growth (in)
	'05
Amelanchier utahensis	3.2
Cercocarpus montanus	3.6

POINT-QUARTER TREE DATA --
Management unit 17 , Study no: 65

Species	Trees per Acre	Average diameter (in)
	'05	'05
Pinus edulis	233	2.7

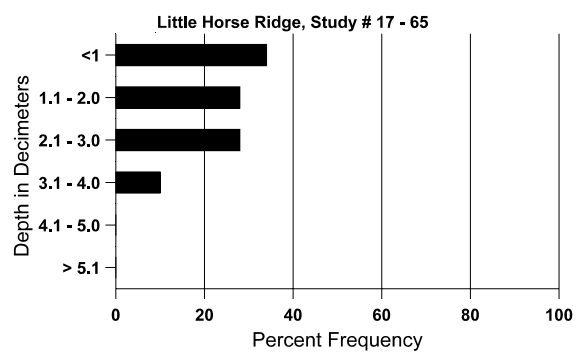
BASIC COVER --
Management unit 17 , Study no: 65

Cover Type	Average Cover %
	'05
Vegetation	39.93
Rock	3.64
Pavement	16.93
Litter	35.96
Cryptogams	1.19
Bare Ground	15.76

SOIL ANALYSIS DATA --
Herd Unit 17, Study # 65, Study Name: Little Horse Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
16.0	45.0 (16.5)	7.4	25.1	41.7	33.2	3.5	5.2	220.8	0.7

Stoniness Index



PELLET GROUP DATA --
 Management unit 17 , Study no: 65

Type	Quadrat Frequency	Days use per acre (ha)
	'05	'05
Rabbit	53	-
Moose	2	1 (2)
Horse	3	6 (16)
Elk	-	3 (7)
Deer	17	34 (83)
Cattle	-	2 (6)

BROWSE CHARACTERISTICS --
 Management unit 17 , Study no: 65

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
05	400	20	160	240	-	-	25	20	-	-	0	50/48
<i>Artemisia tridentata vaseyana</i>												
05	1460	280	240	620	600	820	41	10	41	21	21	25/32
<i>Cercocarpus montanus</i>												
05	2600	740	1160	1400	40	60	17	65	2	.76	.76	43/41
<i>Chrysothamnus depressus</i>												
05	140	-	-	140	-	-	57	0	-	-	0	4/5
<i>Chrysothamnus nauseosus hololeucus</i>												
05	20	-	-	20	-	-	0	0	-	-	0	8/4
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
05	2400	40	180	2220	-	20	3	0	-	-	0	10/11
<i>Gutierrezia sarothrae</i>												
05	300	-	80	220	-	-	0	0	-	-	0	6/6
<i>Juniperus osteosperma</i>												
05	0	40	-	-	-	-	0	0	-	-	0	-/-
<i>Pediocactus simpsonii</i>												
05	20	-	-	20	-	-	0	0	-	-	0	-/-
<i>Pinus edulis</i>												
05	240	20	80	160	-	-	0	0	-	-	0	-/-
<i>Purshia tridentata</i>												
05	0	-	-	-	-	-	0	0	-	-	0	9/11

		Age class distribution (plants per acre)					Utilization						
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)	
Symphoricarpos oreophilus													
05	720	20	180	520	20	-	3	3	3	3	3	15/21	
Tetradymia canescens													
05	720	20	60	520	140	20	19	6	19	14	14	9/9	

Trend Study 17-66-05

Study site name: Sand Wash .

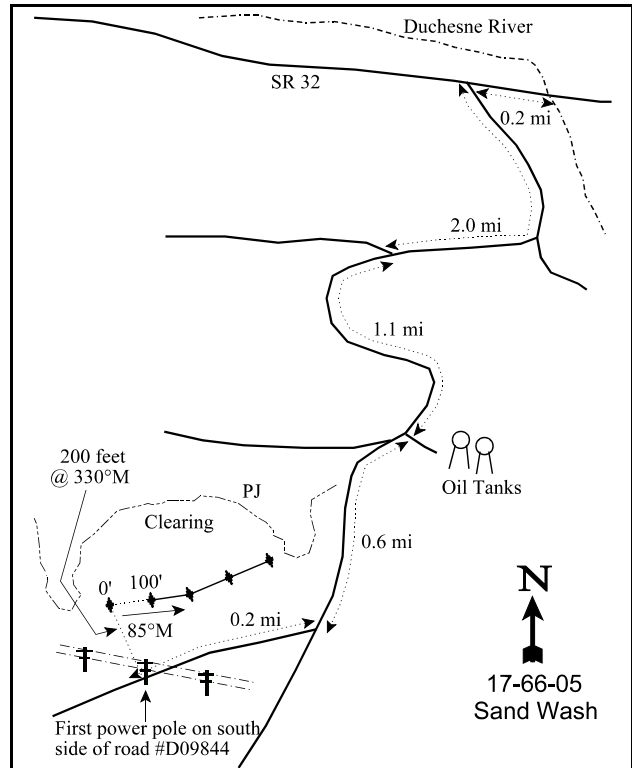
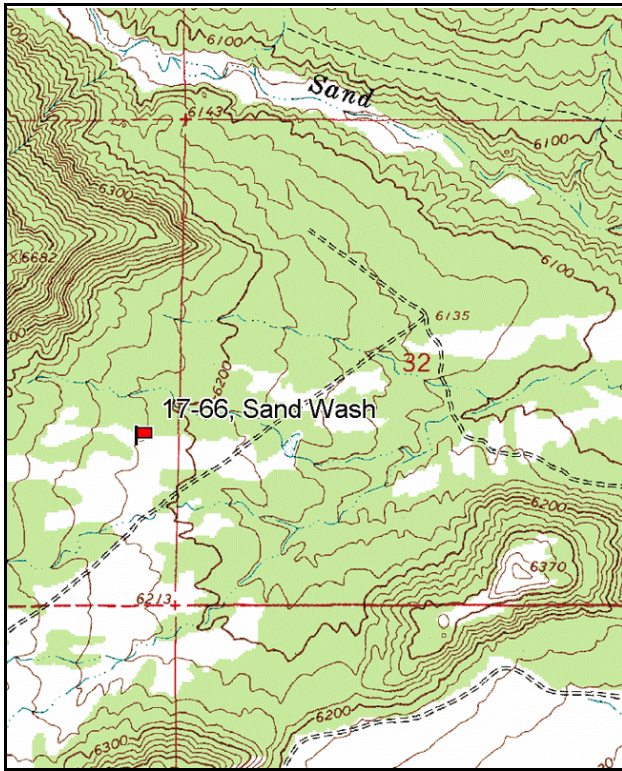
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 85 degrees magnetic.

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

LOCATION DESCRIPTION

From State Route 87 turn onto State Route 32 heading west. Turn left onto a road heading south 0.2 miles after crossing the Duchesne River. Travel 2.0 miles to a fork in the road and stay to the left. Continue another 1.1 miles to a fork that goes to some oil tanks. Drive straight for 0.6 miles to another fork. Go to the right and drive 0.2 miles to the first power pole on the south side of the road, #D09844. From here walk 200 feet at 330 degrees magnetic to the 0' stake.



Map Name: Talmage

Diagrammatic Sketch

Township 2S, Range 5W, Section 31

GPS: NAD 27, UTM 12T 4456642 N, 543822 E

DISCUSSION

Sand Wash - Trend Study No. 17-66

The Sand Wash trend study was established in 2005. The land is owned and managed by the Division of Wildlife Resources in the Rabbit Gulch Management Area. The range type is a Wyoming big sagebrush/Pinyon-Juniper with an eastern exposure at 6,220 feet. Slope is slight at 4%. This area receives high deer use and may be chained in the future. Because of the moderately low densities and relatively small diameter trees (especially the pinyon trees), some treatment other than chaining would be more practical. Hand thinning with chain saws would work well in this situation. Pellet group data from 2005 was estimated at 19 elk and 21 deer days use/acre (48 edu/ha and 51 ddu/ha).

Soil is moderately deep with an effective rooting depth estimated at 13 inches. The soil has a sandy loam texture with a slightly alkaline pH of 7.7. No stones are located in the profile and surface rock and pavement are minimal. Bare ground cover was moderately high at 51%. The erosion condition class determined soil movement as stable in 2005.

Browse species are not abundant, but the key browse species is Wyoming big sagebrush. Wyoming big sagebrush had an average cover of just over 3% with a density of 1,120 plants/acre in 2005. Decadence is extremely high at 77%, although this is not unusual for Wyoming big sagebrush in the Uinta Basin area. Just under half (46%) of the population was classified as dying in 2005. Young or seedling plants were not observed in 2005 and probably competitively excluded because of the competition for resources from the dense stand of needle-and-thread grass and pinyon and juniper woodland. Several years of drought have also been a factor. This population of sagebrush may die off in the future if young recruitment is not able to replace dying plants. The extended drought conditions since 2000 have had more influence on this condition other than the mostly light to moderate utilization of the mature plants. In 2005, precipitation was above normal and leader growth and seed head production were relatively moderate.

Other shrubs include a small population of winter fat, yucca, pinyon pine, and juniper. Pinyon and juniper are very abundant surrounding the site and point-center quarter data estimated 45 juniper trees/acre with a mean diameter of 7 inches in 2005. Pinyon pine estimated 21 trees/acre with a mean diameter of only 1.9 inches.

The herbaceous understory is dominated by perennial grasses, mainly needle-and-thread. Needle-and-thread had an average cover of 13% and accounted for over half of the vegetation cover in 2005. Other perennial grasses include galleta, Indian ricegrass, and salina wildrye. Forbs are few and one-half are low growing annual species.

The Desirable Components Index rated this site as fair with a score of 29 in 2005 due to low shrub cover, high browse decadence, and although it had excellent perennial grass cover.

2005 winter range condition (DC Index) - fair (29) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 17 , Study no: 66

Type	Species	Nested Frequency	Average Cover %
		'05	'05
G	<i>Bouteloua gracilis</i>	8	.11
G	<i>Elymus salina</i>	71	.67
G	<i>Hilaria jamesii</i>	134	3.61
G	<i>Oryzopsis hymenoides</i>	4	.03
G	<i>Sitanion hystrix</i>	1	.00
G	<i>Stipa comata</i>	319	12.82
G	<i>Vulpia octoflora</i> (a)	3	.01
Total for Annual Grasses		3	0.00
Total for Perennial Grasses		537	17.27
Total for Grasses		540	17.28
F	<i>Chenopodium album</i> (a)	7	.01
F	<i>Chenopodium leptophyllum</i> (a)	2	.00
F	<i>Collinsia parviflora</i> (a)	3	.01
F	<i>Cryptantha</i> sp.	1	.00
F	<i>Descurainia pinnata</i> (a)	10	.03
F	<i>Eriogonum cernuum</i> (a)	57	.21
F	<i>Haplopappus acaulis</i>	14	.31
F	<i>Hymenoxys acaulis</i>	11	.06
F	<i>Lappula occidentalis</i> (a)	17	.50
F	<i>Navarretia intertexta</i> (a)	11	.05
F	<i>Phlox austromontana</i>	2	.03
F	<i>Sphaeralcea coccinea</i>	11	.13
F	<i>Townsendia incana</i>	8	.02
Total for Annual Forbs		107	0.82
Total for Perennial Forbs		47	0.56
Total for Forbs		154	1.38

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

BROWSE TRENDS --

Management unit 17 , Study no: 66

Type	Species	Strip Frequency	Average Cover %
		'05	'05
B	Artemisia tridentata wyomingensis	39	3.38
B	Ceratoides lanata	2	.15
B	Juniperus osteosperma	4	1.83
B	Leptodactylon pungens	1	.00
B	Opuntia sp.	13	.15
B	Sclerocactus sp.	1	.03
B	Yucca sp.	1	.15
Total for Browse		61	5.72

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 66

Species	Percent Cover
	'05
Artemisia tridentata wyomingensis	4.80
Juniperus osteosperma	4.46
Opuntia sp.	.21

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 17 , Study no: 66

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.1

POINT-QUARTER TREE DATA --

Management unit 17, Study no: 66

Species	Trees per acre	Average diameter (in)
	'05	
Juniperus osteosperma	45	7.0
Pinus edulis	21	1.9

BASIC COVER --

Management unit 17 , Study no: 66

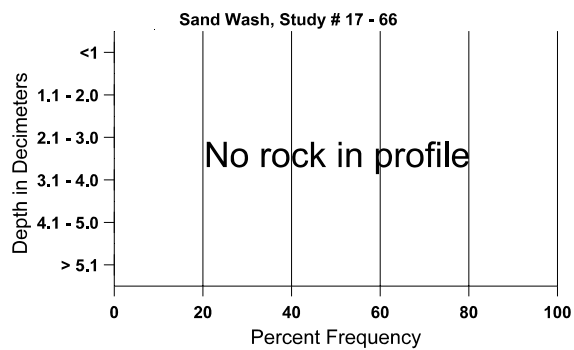
Cover Type	Average Cover %
	'05
Vegetation	25.61
Rock	.06
Pavement	.16
Litter	27.84
Cryptogams	2.95
Bare Ground	51.04

SOIL ANALYSIS DATA --

Herd Unit 17, Study # 66, Study Name: Sand Wash

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
12.8	59.8 (14.7)	7.7	64.7	17.1	18.2	0.6	6.4	64.0	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 17 , Study no: 66

Type	Quadrat Frequency	Days use per acre (ha)
	'05	'05
Rabbit	50	-
Elk	26	19 (48)
Deer	19	21 (51)
Cattle	1	-

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 66

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
05	1120	-	-	260	860	2340	43	20	77	46	48	16/28
<i>Ceratoides lanata</i>												
05	40	-	-	40	-	-	0	50	-	-	0	9/13
<i>Grayia spinosa</i>												
05	0	-	-	-	-	-	0	0	-	-	0	23/30
<i>Juniperus osteosperma</i>												
05	100	-	20	80	-	-	0	0	-	-	0	-/-
<i>Leptodactylon pungens</i>												
05	20	-	-	-	20	-	100	0	100	100	100	-/-
<i>Opuntia sp.</i>												
05	400	-	20	380	-	40	0	0	-	-	0	4/14
<i>Sclerocactus sp.</i>												
05	60	-	60	-	-	20	0	0	-	-	0	-/-
<i>Yucca sp.</i>												
05	80	-	80	-	-	-	0	0	-	-	0	10/15

Trend Study 17-67-05

Study site name: Rabbit Gulch.

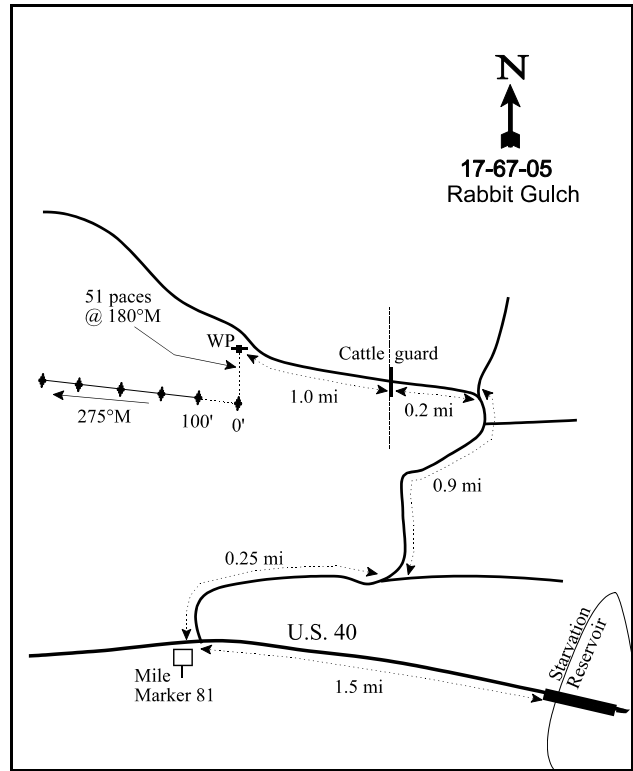
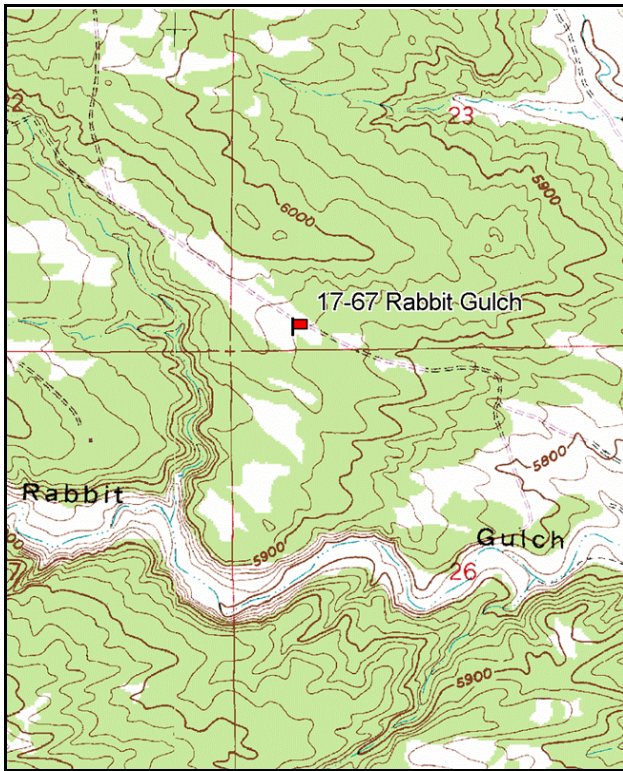
Vegetation type: Wyoming Big Sagebrush.

Compass bearing: frequency baseline 275 degrees magnetic.

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

LOCATION DESCRIPTION

From the Starvation Bridge on U.S. 40 travel west 1.5 miles to a turnoff on the north side of the road. Follow this road 0.25 miles to a fork. Continue left 0.9 miles and staying left. Continue 0.2 miles to a cattleguard and fence. After the cattleguard proceed 1.0 mile to a witness post on the left side of the road. From the witness post walk 51 paces at 180 degrees magnetic to the 0-foot stake. The 0-foot stake is marked by browse tag #94.



Map name: Rabbit Gulch

Diagrammatic Sketch

Township 3S, Range 6W, Section 23

GPS: NAD 27, UTM 12T 4449679 N, 539431 E

DISCUSSION

Rabbit Gulch - Trend Study No. 17-67

The Rabbit Gulch study was established in 1997 to monitor critical deer winter range on the south side of the Uintah Mountains. The study is on a gentle (3%), east-facing slope at an elevation of 5,900 feet. Starvation Reservoir lies about 2 miles to the east. The land is owned and managed by the Division of Wildlife Resources in the Rabbit Gulch Management Area. Deer use was heavy in both 1997 and 2001, then decreased slightly in 2005. Elk use was light in 1997 and has continued at that level. Quadrat frequency for deer pellet groups was 72% in 1997, 85% in 2001, and 53% in 2005. Pellet group data from 2001 was estimated at 171 deer, 26 elk, and 2 cow days use/acre (423 ddu/ha, 65 edu/ha, and 5 cdu/ha). Pellet group data from 2005 was estimated at 94 deer, 17 elk, and 12 cow days use/acre (231 ddu/ha, 43 edu/ha, and 30 cdu/ha).

Soils have a sandy loam texture with a moderately alkaline pH of 8.0. Estimated effective rooting depth was over 16 inches with little to no rock being sampled on the surface or within the profile. Phosphorus is low at 5.1 ppm. Values below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Nearly half of the soil surface is covered by bare ground, while vegetation and litter cover have only moderate values. Cryptogams were much less abundant in 2001 and 2005, which lowered the amount of the protective ground cover. An erosion condition class assessment done in 2001 and 2005 categorized soil to be stable to slightly eroding. Excessive pedestaling around shrub stems provided the most evidence of erosion.

The key browse consists of Wyoming big sagebrush hybridized with black sagebrush. Both species were classified together as Wyoming big sagebrush because of difficulty in differentiating between the two species. Sagebrush density estimates were 3,060 plants/acre in 1997, 3,080 in 2001, and dropped to 1,840 in 2005. Average cover estimates were 4% in 1997 and 2001, then dropped to 2% in 2005. Due to the abundance of pellet groups during all samples, it was not surprising that sagebrush showed moderate to heavy use. Percent decadence has steadily increased since 1997, reaching a high point in 2005 of 46%. In 2005, 30% of the population was classified as dying. Young recruitment was very low in 2005, but several seedlings were observed that may help replace dying plants if they survive and become established. Average leader growth for Wyoming big sagebrush was less than 2 inches in 2001 and almost 3 inches in 2005.

Other less abundant browse includes fourwing saltbush, shadscale, winterfat, and stickyleaf low rabbitbrush. Pinyon and juniper trees have begun to invade the old chaining. In 2001, the estimated density of pinyon trees was 29 trees/acre and 68 juniper trees/acre. Most trees are small as stem diameter averaged less than 3 inches for both pinyon and juniper. The encroaching pinyon-juniper trees were hand cut in the fall of 2004.

The herbaceous component is comprised primarily of perennial grasses. Crested wheatgrass was seeded sometime in the past and in 2001 it was the most abundant species. The average cover of crested wheatgrass was 15% and needle-and-thread was 3.5% in 2001. In 2005, crested wheatgrass averaged only 3% cover and needle-and-thread increased to 17% average cover. Six weeks fescue was fairly abundant around the base of sagebrush plants. Grasses appeared moderately hedged. Forbs are rare and insignificant, especially perennial species.

2001 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover increased. Bare ground remains relatively high, but similar to 1997 estimates. Trend for browse is slightly down. Sagebrush was split into both Wyoming big sagebrush and black sagebrush, although most of the sagebrush is likely a hybrid between the two species. Wyoming big sagebrush still shows moderate to heavy use, elevated poor vigor, and increased percent decadency. Black sagebrush also displays moderate to heavy use, but percent decadency and poor vigor are lower than that of Wyoming big sagebrush. Trend for the herbaceous understory is stable. Sum of nested frequency for

perennial grasses slightly increased. Crested wheatgrass, blue grama, and needle-and-thread remain the dominant species. Forbs are still rarely encountered. The Desirable Components Index rated this site as good to fair with a score of 46 due to low shrub cover, moderate shrub decadence, and excellent perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - stable (0)

1997 winter range condition (DC Index) - good (53) Lower Potential scale

2001 winter range condition (DC Index) - good to fair (46) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Bare ground remained similar to previous years and the ratio of protective cover (vegetation, litter, cryptograms) to bare ground has changed little. Trend for key browse Wyoming big sagebrush is down. Density decreased from 3,080 plants/acre in 2001 to 1,840 in 2005. Percent decadency is high at 46% with 30% of the sagebrush population being classified as dying. Young recruitment is low and not enough to replace the number of dying plants in the population. Utilization is moderate to heavy and vigor is poor. Trend for the herbaceous understory is stable. The sum of nested frequency and the percent cover of perennial grasses has not changed although the composition has changed. Crested wheatgrass was the dominate grass with 15% average cover in 2001 and needle-and-thread with 3.5% cover. These two grasses swapped places and in 2005 needle-and-thread had 17% average cover and crested wheatgrass had just over 3%. The Desirable Components Index rated this site as fair with a score of 37 due to low shrub cover, high shrub decadence, with an excellent perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair (37) Lower level Potential scale

HERBACEOUS TRENDS --

Management unit 17 , Study no: 67

T y p e	Species	Nested Frequency			Average Cover %		
		'97	'01	'05	'97	'01	'05
G	Agropyron cristatum	b ₃₄₇	b ₃₁₂	a ₁₅₃	8.44	15.27	3.39
G	Agropyron dasystachyum	b ₂₂	a ₁	a ₋	.16	.00	-
G	Bouteloua gracilis	a ₇₁	b ₁₄₁	a ₅₈	.85	6.03	1.25
G	Bromus tectorum (a)	-	-	-	.00	-	-
G	Elymus junceus	a ₃	b ₂₂	ab ₁₀	.03	.43	.21
G	Hilaria jamesii	-	-	8	-	-	.18
G	Oryzopsis hymenoides	13	15	15	.17	.25	.26
G	Stipa comata	a ₇₆	a ₇₅	b ₂₉₅	1.03	3.54	17.02
G	Vulpia octoflora (a)	b ₁₂₇	a ₄₄	c ₁₉₂	.61	.15	2.36

T y p e	Species	Nested Frequency			Average Cover %		
		'97	'01	'05	'97	'01	'05
	Total for Annual Grasses	127	44	192	0.62	0.15	2.36
	Total for Perennial Grasses	532	566	539	10.71	25.53	22.32
	Total for Grasses	659	610	731	11.33	25.68	24.69
F	<i>Alyssum alyssoides</i> (a)	4	-	2	.00	-	.01
F	<i>Chenopodium fremontii</i> (a)	_a 2	_a 2	_b 21	.01	.01	.25
F	<i>Chenopodium leptophyllum</i> (a)	_a -	_a -	_b 27	-	-	.22
F	<i>Collomia linearis</i> (a)	3	-	-	.00	-	-
F	<i>Collinsia parviflora</i> (a)	_a -	_{ab} 6	_b 12	-	.01	.05
F	<i>Cryptantha</i> sp.	3	-	-	.00	-	-
F	<i>Descurainia pinnata</i> (a)	_a -	_a 6	_b 43	-	.42	.35
F	<i>Draba</i> sp. (a)	-	-	1	-	-	.00
F	<i>Eriogonum cernuum</i> (a)	5	6	-	.01	.04	-
F	<i>Gilia</i> sp. (a)	-	-	2	-	-	.00
F	<i>Hymenoxys richardsonii</i>	-	4	9	-	.06	.23
F	<i>Lappula occidentalis</i> (a)	_a -	_b 33	_b 91	_c -	.51	.91
F	<i>Machaeranthera grindelioides</i>	1	-	1	.00	-	.00
F	<i>Phlox longifolia</i>	-	6	-	-	.01	-
F	<i>Plantago patagonica</i> (a)	-	-	3	-	-	.03
F	<i>Sphaeralcea coccinea</i>	_a 4	_a 6	_b 23	.01	.01	.38
F	<i>Townsendia incana</i>	_{ab} 6	_a -	_b 14	.01	-	.28
	Total for Annual Forbs	14	53	202	0.03	1.00	1.84
	Total for Perennial Forbs	14	16	47	0.03	0.07	0.90
	Total for Forbs	28	69	249	0.07	1.07	2.75

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

BROWSE TRENDS --

Management unit 17 , Study no: 67

T y p e	Species	Strip Frequency			Average Cover %		
		'97	'01	'05	'97	'01	'05
B	Artemisia tridentata wyomingensis	70	62	50	4.35	4.43	2.42
B	Atriplex canescens	0	0	1	-	-	-
B	Atriplex confertifolia	0	1	1	-	.03	.15
B	Ceratoides lanata	1	2	0	-	-	-
B	Chrysothamnus nauseosus consimilis	0	2	0	-	.60	-
B	Chrysothamnus viscidiflorus viscidiflorus	15	12	4	.61	.84	.53
B	Eriogonum microthecum	0	1	0	-	-	-
B	Gutierrezia sarothrae	25	24	30	.16	.98	.64
B	Juniperus osteosperma	1	1	0	1.03	.76	-
B	Opuntia sp.	24	22	28	.27	.36	.78
B	Sclerocactus sp.	1	2	1	.03	.06	.03
Total for Browse		137	129	115	6.47	8.07	4.56

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 67

Species	Percent Cover	
	'01	'05
Artemisia tridentata wyomingensis	-	2.31
Atriplex confertifolia	-	.28
Chrysothamnus viscidiflorus viscidiflorus	-	.20
Gutierrezia sarothrae	-	.90
Juniperus osteosperma	.20	-
Opuntia sp.	-	.25
Sclerocactus sp.	-	.08

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 17 , Study no: 67

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.8

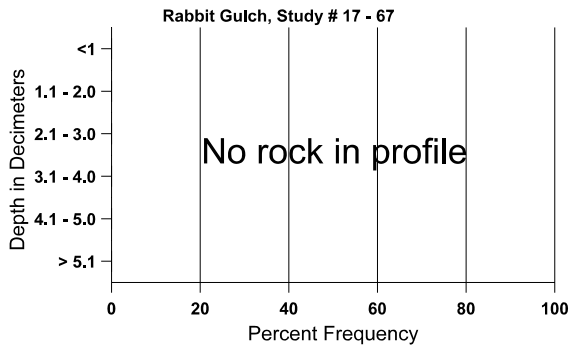
BASIC COVER --
 Management unit 17 , Study no: 67

Cover Type	Average Cover %		
	'97	'01	'05
Vegetation	14.82	33.59	29.00
Rock	.01	0	0
Pavement	.08	0	.15
Litter	23.74	27.52	24.78
Cryptogams	5.82	.94	.72
Bare Ground	47.28	48.83	54.71

SOIL ANALYSIS DATA --
 Herd Unit 17, Study no: 67, Rabbit Gulch

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
16.3	74.8 (14.0)	8.0	78.6	10.8	10.6	0.6	5.1	96.0	0.4

Stoniness Index



PELLET GROUP DATA --
Management unit 17 , Study no: 67

Type	Quadrat Frequency		
	'97	'01	'05
Rabbit	16	31	42
Elk	3	22	10
Deer	72	85	53
Cattle	3	1	5

Days use per acre (ha)	
'01	'05
-	-
26 (65)	17 (43)
171 (423)	94 (231)
2 (5)	12 (31)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 67

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
97	3060	60	860	1860	340	260	63	22	11	6	42	19/31
01	3080	-	220	2040	820	200	37	42	27	20	20	11/19
05	1840	280	20	980	840	660	29	63	46	30	36	17/24
<i>Atriplex canescens</i>												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
01	0	-	-	-	-	-	0	0	-	-	0	43/62
05	60	-	60	-	-	-	0	0	-	-	0	26/37
<i>Atriplex confertifolia</i>												
97	0	-	-	-	-	-	0	0	0	-	0	-/-
01	20	-	-	-	20	20	0	0	100	-	0	13/31
05	60	-	-	60	-	-	0	0	0	-	0	21/39
<i>Ceratoides lanata</i>												
97	20	-	-	20	-	-	100	0	-	-	0	7/7
01	40	-	40	-	-	-	0	0	-	-	0	14/10
05	0	-	-	-	-	-	0	0	-	-	0	23/26
<i>Chrysothamnus nauseosus consimilis</i>												
97	0	-	-	-	-	-	0	0	0	-	0	-/-
01	40	-	-	20	20	20	0	0	50	50	50	11/10
05	0	-	-	-	-	-	0	0	0	-	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
97	560	-	220	340	-	-	11	0	0	-	4	15/24
01	400	-	60	300	40	20	0	0	10	5	40	11/20
05	100	-	-	100	-	-	0	0	0	-	0	15/21

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Eriogonum microthecum</i>												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
01	40	-	-	40	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Gutierrezia sarothrae</i>												
97	980	80	120	860	-	-	0	0	0	-	0	7/8
01	1280	-	-	1200	80	280	0	0	6	-	6	6/8
05	1060	-	-	1060	-	-	0	0	0	-	0	9/11
<i>Juniperus osteosperma</i>												
97	20	-	20	-	-	-	0	0	-	-	0	-/-
01	20	-	-	20	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	20	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
97	560	-	60	480	20	40	0	0	4	4	4	5/12
01	620	40	80	500	40	-	0	0	6	-	0	3/12
05	620	-	40	540	40	20	0	0	6	-	0	6/19
<i>Sclerocactus sp.</i>												
97	20	-	-	20	-	-	0	0	-	-	0	-/-
01	40	-	20	20	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	5/4

Trend Study 17R-7-05

Study site name: Emma Park Harrow-Grazed .

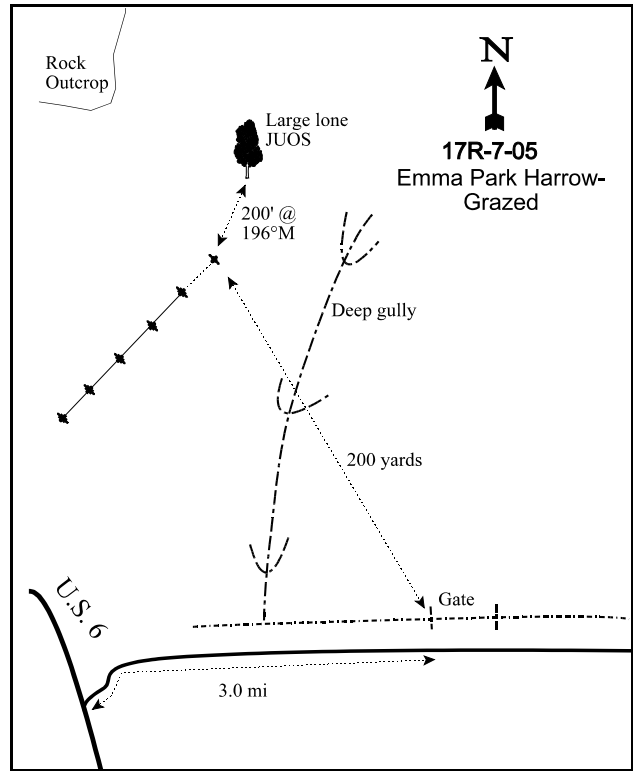
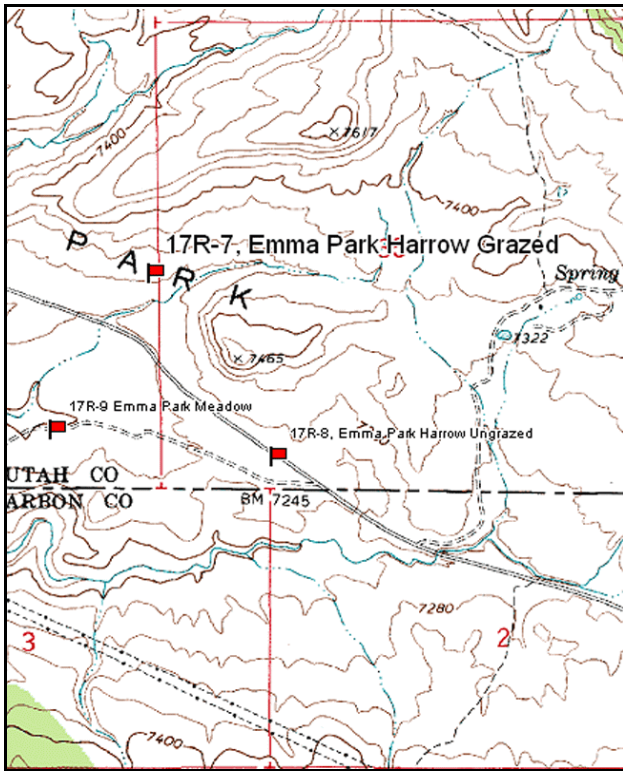
Vegetation type: Harrowed Big Sagebrush .

Compass bearing: frequency baseline 246 degrees magnetic.

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

LOCATION DESCRIPTION

From the Kyune turnoff on U.S. 6 travel 3.0 miles to a gate on the north side of the road. From the gate walk approximately 200 yards towards a lone, large juniper on the other side of the deep gully. The 0-foot post is about 200 feet south of the juniper. The 0-foot stake is marked by browse tag #422.



Map name: Kyune

Diagrammatic Sketch

Township 11S, Range 9E, Section 34

GPS: NAD 27, UTM 12S 4407534 N, 508979 E

DISCUSSION

Emma Park Harrow Grazed - Trend Study No. 17R-7

The Emma Park Harrow Grazed study is located about 3 miles east of the junction of Highway 6 and Kyune in Spanish Fork Canyon. This study was established in 2001 to monitor a sagebrush pipe harrow treatment conducted by the Bureau of Land Management and Utah Division of Wildlife Resources. This area had been pipe harrowed one-way and seeded prior to placement of the transect. This study was paired with study 17R-8 to monitor site differences with and without livestock grazing following a pipe harrow treatment. Cattle grazing will still occur on this site, but not on study 17R-8. Pellet group data from 2001 was estimated at 9 deer and less than 1 elk days use/acre (22 ddu/ha and 2 edu/ha). No cattle pats were sampled. Pellet group data from 2005 estimated 5 deer, 5 elk, and 15 cow days use/acre (12 ddu/ha, 13 edu/ha, and 36 cdu/ha).

Elevation at this study is approximately 7,200 feet. The site has a gentle slope of 3-5% with a south aspect. Soils are clay loam in texture with a soil reaction that is slightly alkaline (7.5 pH). Phosphorus is very low at 2.8 ppm. Values below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). A stoniness index determined from penetrometer readings indicated that most of the rock in the profile to be 8 to 16 inches below the surface. Effective rooting depth was estimated at less than 14 inches in 2001. An erosion condition class assessment done in 2001 and 2005 determined soils to be slightly eroding. Excessive pedestaling around vegetation provided the most evidence of past erosion. Several active gullies also traverse the study.

The dominant browse species is mountain big sagebrush, which had an average cover of 11% in 2001 and 14% in 2005. Sagebrush density estimates were nearly 4,000 plants/acre in 2001 and slightly increased to 4,360 in 2005. In 2001, the initial harrow treatment left the sagebrush decadent and in poor vigor. Percent decadence was 39% with over half of the population classified with poor vigor. In 2005, percent decadence dropped to 9% and only 4% of population displayed poor vigor. Young plants were abundant in 2001 and 2005 ranging from 660 to 780 plants/acre. With above normal precipitation in 2005, seedlings were very abundant. Use on sagebrush was light in 2001 and 2005. Annual leader growth averaged just over 2 inches in 2001 and 2005. Other browse sampled include stickyleaf low rabbitbrush, snowberry, rubber rabbitbrush, and gray horsebrush.

The herbaceous understory is abundant and diverse with 13 grasses and 30 forbs sampled in 2005. Some of the herbaceous species present are native residuals, while others were seeded as part of the pipe harrow treatment. Grasses averaged 11% cover in 2001 and 13% in 2005, while forbs averaged 5% cover in 2001 and 4% in 2005. Western wheatgrass and Salina wildrye are the most abundant grasses in 2001 and 2005. Grasses were difficult to identify in 2001 due to the lack of seedheads on many individuals. Western wheatgrass and Salina wildrye were particularly hard to distinguish from each other. Yellow Indian paintbrush and desert phlox were the most abundant forbs in 2001. By 2005, yellow indian paintbrush decreased significantly. Annual species were rarely encountered. There was noticeable utilization on grasses in 2001 with some individuals displaying heavy use, while light use was reported in 2005.

2001 APPARENT TREND ASSESSMENT

Soil condition is slightly down. Disturbance from the pipe harrow treatment has increased the amount of bare soil over what would normally occur. Erosion is slight, but soils should stabilize after the vegetative community has a few year to recover. The browse component is in a slightly downward condition due to the pipe harrow treatment. Percent decadence and poor vigor within the sagebrush population are high at the present time. However, the number of young in the population is encouraging. Percent decadence should decrease and vigor improve after a few growing seasons. The herbaceous understory is abundant and diverse and appears strong with few annual species present. The Desirable Components Index rated this site as fair

with a score of 62 due to moderate shrub cover, high percent decadence on shrubs, but excellent perennial grass cover.

2001 winter range condition (DC Index) - fair (62) Mid-level Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. Bare ground remained similar to 2001 observations and the ratio of protective cover (vegetation, litter, and cryptograms) to bare ground did not change much either. Trend for the key browse mountain big sagebrush is slightly up. Density increased from 3,980 plants/acre in 2001 to 4,360 in 2005. Percent decadency decreased from 39% in 2001 to 9% in 2005. The number of plants classified with poor vigor decreased from 57% in 2001 to 4% in 2005. Trend for the herbaceous understory is slightly up. The harrow treatment opened up the understory to allow herbaceous species to increase. Perennial grasses are fairly dominant and increased in sum of nested frequency by 25%, although perennial forbs decreased 18%. The Desirable Components Index rated this site as good with a score of 76 due to moderate shrub cover, low percent decadence on shrubs, and excellent perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - good (76) Mid-level Potential scale

HERBACEOUS TRENDS --

Management unit 17R, Study no: 7

T y p e	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
G	Agropyron dasystachyum	-	4	-	.16
G	Agropyron intermedium	9	10	.07	.16
G	Agropyron smithii	_b 208	_a 137	7.38	2.05
G	Agropyron spicatum	18	17	.27	.31
G	Bromus inermis	-	1	-	.00
G	Carex sp.	-	7	.03	.04
G	Elymus cinereus	2	-	.03	-
G	Elymus junceus	-	-	-	.03
G	Elymus salina	_a 87	_b 164	2.52	6.44
G	Oryzopsis hymenoides	4	2	.06	.00
G	Poa fendleriana	_a 4	_b 92	.01	2.46
G	Poa pratensis	_b 17	_a 4	.43	.06
G	Poa secunda	20	36	.54	.81
G	Stipa lettermani	17	11	.14	.27
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		386	485	11.49	12.83

Type	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
Total for Grasses		386	485	11.49	12.83
F	<i>Antennaria rosea</i>	4	4	.03	.00
F	<i>Androsace septentrionalis</i> (a)	-	2	-	.03
F	<i>Arabis</i> sp.	_a 2	_b 27	.00	.10
F	<i>Aster chilensis</i>	-	10	-	.19
F	<i>Astragalus cicer</i>	_b 13	_a -	.41	-
F	<i>Astragalus convallarius</i>	18	12	.21	.04
F	<i>Astragalus tenellus</i>	1	3	.03	.00
F	<i>Castilleja flava</i>	_b 66	_a 6	1.18	.04
F	<i>Chenopodium album</i> (a)	-	8	-	.02
F	<i>Chaenactis douglasii</i>	24	26	.14	.35
F	<i>Chenopodium leptophyllum</i> (a)	15	11	.04	.02
F	<i>Cirsium</i> sp.	-	3	-	.03
F	<i>Cleome serrulata</i> (a)	-	-	.00	-
F	<i>Descurainia pinnata</i> (a)	2	-	.00	-
F	<i>Erigeron</i> sp.	-	2	-	.00
F	<i>Gilia</i> sp. (a)	4	-	.01	-
F	<i>Hedysarum boreale</i>	_a 11	_b 29	.06	.96
F	<i>Ipomopsis aggregata</i>	_a -	_b 19	-	.06
F	<i>Lactuca serriola</i>	-	2	-	.00
F	<i>Linum lewisii</i>	7	6	.04	.05
F	<i>Lomatium</i> sp.	-	-	-	.00
F	<i>Lotus utahensis</i>	2	-	.00	-
F	<i>Machaeranthera canescens</i>	36	45	.43	.76
F	<i>Medicago sativa</i>	4	-	.03	.00
F	<i>Penstemon caespitosus</i>	_b 71	_a 20	.65	.15
F	<i>Penstemon palmeri</i>	15	7	.40	.04
F	<i>Petroradia pumila</i>	-	5	-	.00
F	<i>Penstemon watsonii</i>	-	1	-	.00
F	<i>Phlox austromontana</i>	64	72	1.06	1.16
F	<i>Phlox longifolia</i>	-	5	-	.03
F	<i>Polygonum douglasii</i> (a)	2	2	.00	.00
F	<i>Potentilla gracilis</i>	7	-	.04	-
F	<i>Sanguisorba minor</i>	_b 13	_a 2	.18	.00
F	<i>Schoenocrambe linifolia</i>	-	3	-	.01
F	<i>Senecio multilobatus</i>	3	1	.01	.01

Type	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
F	<i>Sphaeralcea coccinea</i>	_b 39	_a 24	.25	.29
F	<i>Taraxacum officinale</i>	2	-	.03	-
F	<i>Tragopogon dubius</i>	4	-	.00	-
F	<i>Trifolium sp.</i>	2	-	.01	-
Total for Annual Forbs		23	23	0.07	0.08
Total for Perennial Forbs		408	334	5.26	4.34
Total for Forbs		431	357	5.33	4.42

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

BROWSE TRENDS --

Management unit 17R, Study no: 7

Type	Species	Strip Frequency		Average Cover %	
		'01	'05	'01	'05
B	<i>Amelanchier utahensis</i>	0	0	.00	-
B	<i>Artemisia tridentata vaseyana</i>	82	82	11.17	13.79
B	<i>Chrysothamnus nauseosus</i>	9	12	.21	1.58
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	48	45	2.52	2.35
B	<i>Gutierrezia sarothrae</i>	0	11	-	1.21
B	<i>Symphoricarpos oreophilus</i>	5	10	.00	.01
B	<i>Tetradymia canescens</i>	4	8	-	.15
Total for Browse		148	168	13.92	19.10

CANOPY COVER, LINE INTERCEPT --

Management unit 17R, Study no: 7

Species	Percent Cover
	'05
<i>Artemisia tridentata vaseyana</i>	17.63
<i>Chrysothamnus nauseosus</i>	1.60
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	4.13
<i>Gutierrezia sarothrae</i>	.15
<i>Symphoricarpos oreophilus</i>	.48
<i>Tetradymia canescens</i>	.21

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17R, Study no: 7

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	2.2

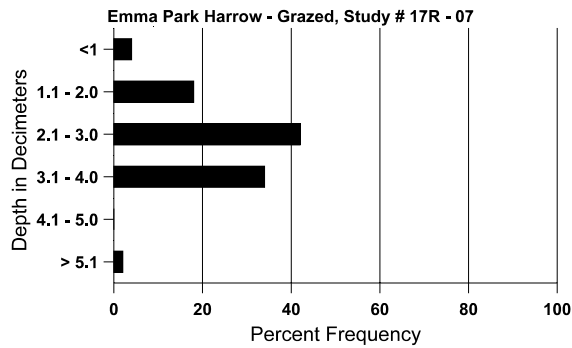
BASIC COVER --
Management unit 17R, Study no: 7

Cover Type	Average Cover %	
	'01	'05
Vegetation	32.43	33.45
Rock	.14	.01
Pavement	.38	.40
Litter	46.17	38.37
Cryptogams	.31	.06
Bare Ground	35.73	38.75

SOIL ANALYSIS DATA --
Herd Unit 17R, Study no: 07, Emma Park Harrow-Grazed

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.8	60.0 (16.1)	7.5	38.9	31.4	29.7	1.8	2.8	332.8	0.7

Stoniness Index



PELLET GROUP DATA --
 Management unit 17R, Study no: 7

Type	Quadrat Frequency		Days use per acre (ha)	
	'01	'05	'01	'05
Rabbit	5	14	-	-
Elk	-	4	1 (2)	5 (13)
Deer	8	-	9 (22)	5 (12)
Cattle	-	3	-	15 (36)

BROWSE CHARACTERISTICS --
 Management unit 17R, Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
01	0	-	-	-	-	-	0	0	-	-	0	13/21
05	0	-	-	-	-	-	0	0	-	-	0	11/15
<i>Artemisia tridentata vaseyana</i>												
01	3980	260	660	1780	1540	340	0	0	39	5	57	17/24
05	4360	3800	780	3180	400	920	2	0	9	4	4	20/27
<i>Chrysothamnus nauseosus</i>												
01	180	-	40	40	100	-	0	0	56	-	22	19/21
05	260	40	20	240	-	-	0	0	0	-	0	22/25
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
01	3820	-	120	3540	160	-	0	0	4	-	1	5/9
05	2600	20	40	2480	80	20	0	0	3	.76	.76	8/14
<i>Eriogonum corymbosum</i>												
01	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	11/17
<i>Gutierrezia sarothrae</i>												
01	0	-	-	-	-	-	0	0	-	-	0	-/-
05	340	-	-	340	-	-	0	0	-	-	0	8/13
<i>Symphoricarpos oreophilus</i>												
01	240	-	100	60	80	-	0	0	33	8	8	9/16
05	280	-	140	140	-	-	0	7	0	-	0	11/20
<i>Tetradymia canescens</i>												
01	80	20	-	20	60	-	0	0	75	25	50	-/-
05	220	20	80	140	-	-	0	0	0	-	0	9/12

Trend Study 17R-8-05

Study site name: Emma Park Harrow-Ungrazed.

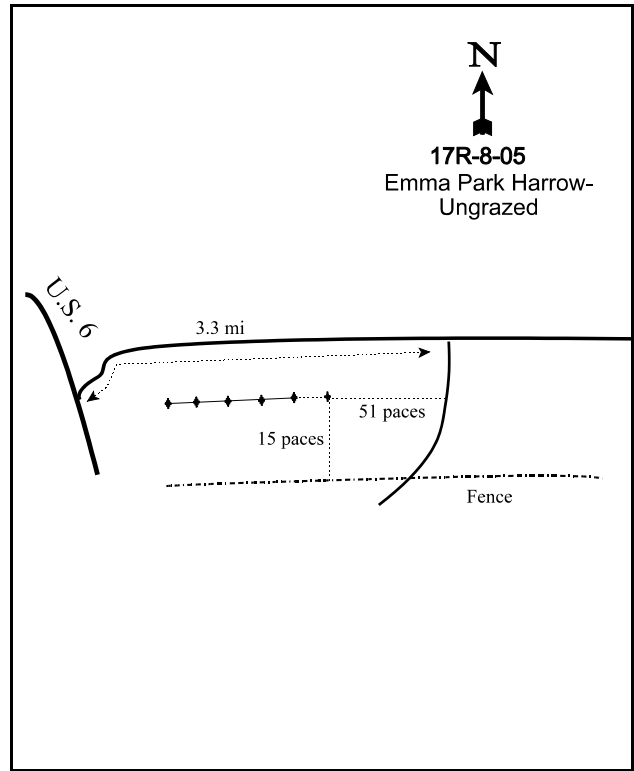
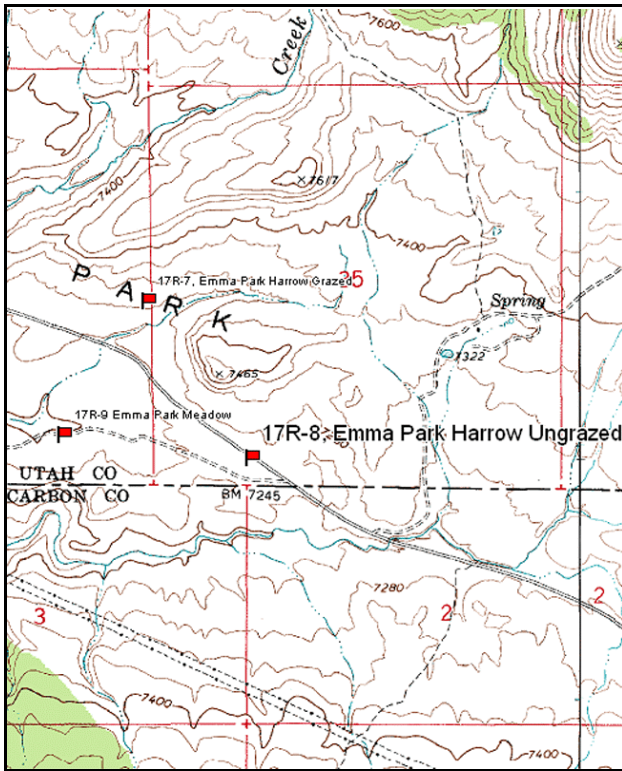
Vegetation type: Harrowed Big Sagebrush.

Compass bearing: frequency baseline 298 degrees magnetic.

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

LOCATION DESCRIPTION

From the Kyune turnoff on U.S. 6 travel 3.3 miles to a turnoff on the south side of the road. The study site is located between the road and the fence 51 paces west of the turnoff. The 0-foot stake is 15 paces north of the fence. The 0-foot stake is marked by browse tag #425.



Map name: Kyune

Diagrammatic Sketch

Township 11S, Range 9E, Section 35

GPS: NAD 27, UTM 12S 4406912 N, 509391 E

DISCUSSION

Emma Park Harrow Ungrazed - Trend Study No. 17R-8

The Emma Park Harrow Ungrazed study is located about 3½ miles east of the junction of Highway 6 and Kyune in Spanish Fork Canyon. This study was established in 2001 to monitor a sagebrush pipe harrow treatment conducted by the Bureau of Land Management and Utah Division of Wildlife Resources. This area had been pipe harrowed one-way and seeded prior to site placement. This study was paired with study 17R-7 to monitor site differences with and without livestock grazing following a pipe harrow treatment. Cattle grazing is not supposed to occur on this location, but will occur on study 17R-7. Pellet group data from 2001 estimated densities at 12 deer and less than 1 elk days use/acre (30 ddu/ha and 2 edu/ha). No cattle pats were sampled in 2001. Pellet group data from 2005 was estimated at 1 deer, 8 elk, and 1 cow days use/acre (3 ddu/ha, 20 edu/ha, and 2 cdu/ha). Grouse pellets were observed at 122 pellet groups/acre.

The elevation at this study is approximately 7,200 feet with nearly flat terrain. Soils are a clay loam in texture with a soil reaction that is slightly alkaline (7.6 pH). Phosphorus is quite low at 2.9 ppm. Values below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Effective rooting depth is estimated at over 17 inches, which is considerably deeper than study 17R-7. A stoniness index determined from penetrometer readings that most of the rock in the profile is 8 to 20 inches below the surface. An erosion condition class assessment determined soils to be stable in 2001, but slight in 2005. Moderate pedestaling around vegetation provides the past evidence of erosion. A few small gullies and rills were added to the pedestaling in 2005.

The dominant browse species is mountain big sagebrush which averaged 13% cover in 2001 and 11% in 2005. Sagebrush density was estimated just over 4,500 plants/acre in 2001 and decreased to 3,760 plants/acre in 2005. Due to the pipe harrow treatment in 2001, sagebrush decadence and poor vigor were understandably high at 42% and 72% respectively. By 2005, the sagebrush population appeared to have stabilized with only 14% decadency and 7% with poor vigor. This is consistent with the data collected at study 17R-7, which underwent the same treatment. Young plant abundance is moderately high at an estimated 560 plants/acre in 2001 and 300 in 2005. Use on sagebrush was light in 2001 and 2005 where annual leader growth averaged about 2 inches both years.

Other browse sampled include stickyleaf low rabbitbrush, snowberry, rubber rabbitbrush, and gray horsebrush. In 2001, the density of low rabbitbrush was nearly 40% higher than study 17R-7. Both studies decreased in abundance for low rabbitbrush by over 30% in 2005. Rubber rabbitbrush density was nearly five times (840 plants/acre) higher in 2001 and three times (740 plants/acre) higher in 2005 on this study than study 17R-7.

The herbaceous understory is not as diverse as study 17R-7. In 2005, 11 grasses and 17 forbs were sampled. Grasses averaged 14% cover in 2001 and 20% in 2005. Forbs averaged only 2% in 2001 and 4% in 2005. Western wheatgrass was sampled in nearly three-fourths of the quadrats and provided 12% average cover in 2001. In 2005, Western wheatgrass was differentiated from Salina wildrye, so 2005 data showed a decrease in western wheatgrass cover. Bluebunch wheatgrass was second in abundance, contributing 2% average cover in 2001 and increased to 7% in 2005. All other grasses were sampled infrequently. Sweet milkvetch and desert phlox were the most abundant forbs in 2005, while annual species were rarely encountered. There was no noticeable utilization on the herbaceous species in 2001 or 2005.

2001 APPARENT TREND ASSESSMENT

Soils appear to be stable. Disturbance from the pipe harrow treatment has increased the amount of bare soil over what would normally occur. Even with the treatment, vegetation and litter cover are adequate and erosion minimal. Browse, primarily mountain big sagebrush, is in a downward condition due to the pipe harrow

treatment. Percent decadence and poor vigor are moderately high at the present time. However, the number of young in the population is good. Percent decadence should decrease and vigor improve after a few growing seasons. Diversity for herbaceous species should improve in the future. Annual species are nearly nonexistent. The Desirable Components Index rated this site as fair with a score of 61 due to moderate shrub cover, high percent decadence on shrubs, and excellent perennial grass cover.

2001 winter range condition (DC Index) - fair (61) Mid-level Potential scale

2005 TREND ASSESSMENT

Soil trend is stable. Vegetation and bare ground nested frequency both increased by 5%, while litter decreased by 7%. The ratio of protective cover (vegetation, litter and cryptogams) to bare ground declined slightly, but appears adequate to protect the soil from erosion. Trend for the key browse mountain big sagebrush is slightly up. Density has decreased due to the pipe harrow treatment, but overall health of the browse is good. Percent decadency decreased from 42% in 2001 to 14% in 2005 and vigor of the plants are good. Trend for the herbaceous understory is slightly up. Nested frequency for bluebunch wheatgrass, mutton bluegrass, and Sandberg bluegrass all increased significantly. Perennial forbs decreased slightly while annuals increased, although both provide very little cover. The Desirable Components Index rated this site as fair to good with a score of 69 due to moderate shrub cover, low percent decadence on shrubs, and excellent perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - up (+2)

winter range condition (DC Index) - fair to good (69) Mid level Potential scale

HERBACEOUS TRENDS --

Management unit 17R, Study no: 8

T y p e	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
G	Agropyron intermedium	3	3	.03	.15
G	Agropyron smithii	_b 243	_a 68	12.08	3.02
G	Agropyron spicatum	_a 53	_b 104	2.00	7.48
G	Bromus inermis	1	4	.00	.06
G	Carex sp.	2	-	.00	-
G	Elymus salina	_a -	_b 151	-	8.07
G	Koeleria cristata	-	2	-	.06
G	Oryzopsis hymenoides	-	-	-	.00
G	Poa fendleriana	_a -	_b 12	.00	.07
G	Poa pratensis	1	4	.00	.03
G	Poa secunda	_a 1	_b 39	.00	1.06
G	Stipa lettermani	10	14	.24	.36
Total for Annual Grasses		0	0	0	0

Type	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
	Total for Perennial Grasses	314	401	14.40	20.40
	Total for Grasses	314	401	14.40	20.40
F	<i>Achillea millefolium</i>	8	5	.09	.18
F	<i>Arabis</i> sp.	-	3	-	.04
F	<i>Astragalus cicer</i>	_b 25	_a 5	.66	.03
F	<i>Astragalus convallarius</i>	_a -	_b 9	-	.03
F	<i>Astragalus tenellus</i>	_b 13	_a -	.21	-
F	<i>Aster</i> sp.	-	10	-	.06
F	<i>Chenopodium leptophyllum</i> (a)	_a 5	_b 22	.00	.04
F	<i>Cirsium</i> sp.	3	2	.00	.03
F	<i>Descurainia pinnata</i> (a)	-	3	-	.03
F	<i>Erigeron</i> sp.	4	-	.01	-
F	<i>Hedysarum boreale</i>	_a 6	_b 35	.21	2.18
F	<i>Lappula occidentalis</i> (a)	-	-	.00	-
F	<i>Lactuca serriola</i>	2	1	.00	.00
F	<i>Linum lewisii</i>	9	3	.01	.03
F	<i>Machaeranthera canescens</i>	2	3	.01	.16
F	<i>Medicago sativa</i>	3	-	.03	-
F	<i>Penstemon caespitosus</i>	_b 31	_a 8	.19	.07
F	<i>Phlox austromontana</i>	34	39	.60	1.13
F	<i>Potentilla gracilis</i>	7	7	.03	.07
F	<i>Sanguisorba minor</i>	6	2	.04	.03
F	<i>Senecio multilobatus</i>	-	2	-	.03
F	<i>Taraxacum officinale</i>	1	-	.00	-
F	<i>Trifolium</i> sp.	2	-	.00	-
	Total for Annual Forbs	5	25	0.00	0.07
	Total for Perennial Forbs	156	134	2.13	4.11
	Total for Forbs	161	159	2.14	4.19

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

BROWSE TRENDS --

Management unit 17R, Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'01	'05	'01	'05
B	<i>Artemisia tridentata vaseyana</i>	77	74	13.20	10.83
B	<i>Chrysothamnus nauseosus</i>	26	24	2.26	2.54
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	57	62	3.26	7.40
B	<i>Gutierrezia sarothrae</i>	3	1	.41	-
B	<i>Symphoricarpos oreophilus</i>	1	1	-	.00
B	<i>Tetradymia canescens</i>	1	1	.03	.03
Total for Browse		165	163	19.18	20.81

CANOPY COVER, LINE INTERCEPT --

Management unit 17R, Study no: 8

Species	Percent Cover
	'05
<i>Artemisia tridentata vaseyana</i>	15.30
<i>Chrysothamnus nauseosus</i>	4.63
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	8.21
<i>Gutierrezia sarothrae</i>	.15
<i>Symphoricarpos oreophilus</i>	.28

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 17R, Study no: 8

Species	Average leader growth (in)
	'05
<i>Artemisia tridentata vaseyana</i>	2.2

BASIC COVER --

Management unit 17R, Study no: 8

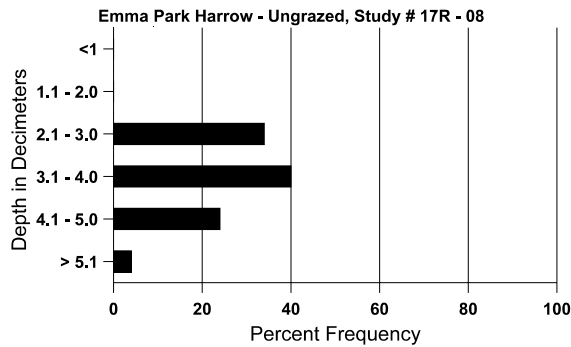
Cover Type	Average Cover %	
	'01	'05
Vegetation	34.19	43.14
Rock	.02	.01
Pavement	.10	.43
Litter	55.72	38.42
Cryptogams	.85	.37
Bare Ground	28.29	32.29

SOIL ANALYSIS DATA --

Herd Unit 17R, Study no: 08, Emma Park Harrow-Ungrazed

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
17.2	55.8 (18.1)	7.6	33.9	32.4	33.7	2.2	2.9	297.6	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 17R, Study no: 8

Type	Quadrat Frequency		Days use per acre (ha)	
	'01	'05	'01	'05
Rabbit	39	16	-	-
Grouse	-	2	-	122/acre
Elk	-	5	1 (2)	8 (20)
Deer	5	2	12 (30)	1 (3)
Cattle	-	-	-	1 (2)

BROWSE CHARACTERISTICS --
Management unit 17R, Study no: 8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>												
01	4540	20	560	2060	1920	540	.44	0	42	9	72	20/24
05	3760	340	300	2940	520	1400	0	.53	14	7	7	22/32
<i>Chrysothamnus nauseosus</i>												
01	840	-	180	600	60	-	0	0	7	-	5	17/22
05	740	-	-	700	40	20	0	0	5	3	3	23/33
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
01	6440	-	180	5820	440	80	0	0	7	1	14	6/9
05	3980	-	180	3680	120	20	0	0	3	1	1	8/15
<i>Gutierrezia sarothrae</i>												
01	180	-	-	160	20	-	0	0	11	-	0	4/7
05	40	-	-	40	-	-	0	0	0	-	0	6/13
<i>Symphoricarpos oreophilus</i>												
01	40	-	40	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	-/-
<i>Tetradymia canescens</i>												
01	60	-	-	-	60	-	0	0	100	-	0	-/-
05	40	-	-	40	-	-	100	0	0	-	0	10/12

Trend Study 17R-9-01

Study site name: Emma Park Meadow .

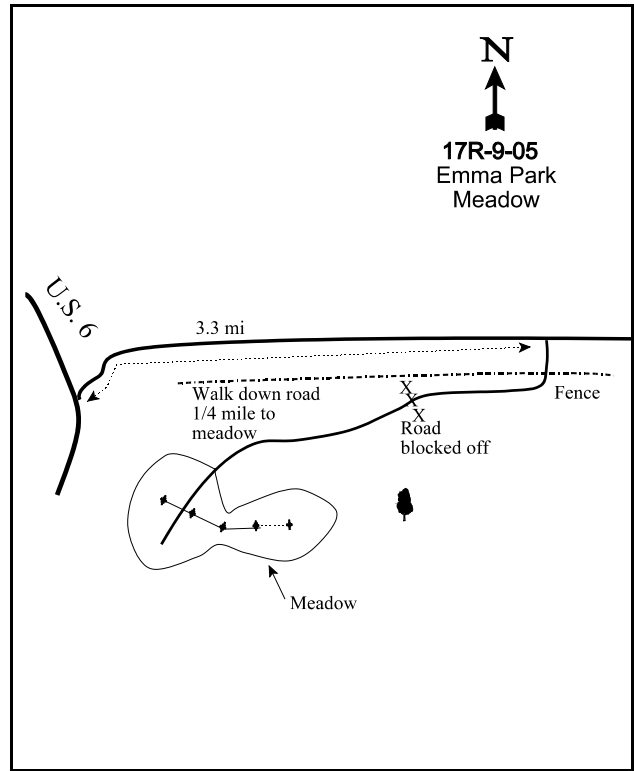
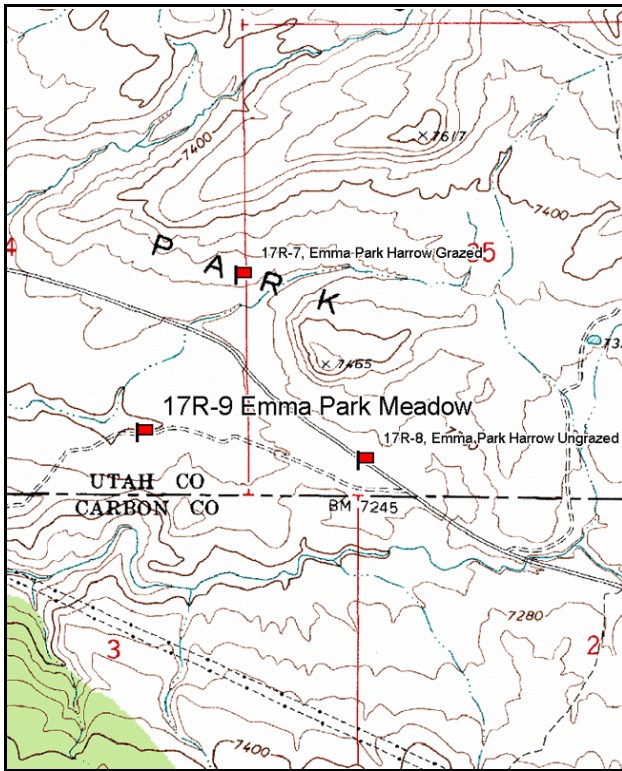
Vegetation type: Dry Meadow .

Compass bearing: frequency baseline 271 degrees magnetic.

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

LOCATION DESCRIPTION

From the Kyune turnoff on U.S. 6 travel 3.3 miles to a turnoff on the south side of the road. Continue on this road through a gate and head back to the west until the road is blocked off. From here walk down the old road 1/4 mile to a meadow. The 0-foot stake is on the east side of the meadow and marked by browse tag #430.



Map name: Kyune

Diagrammatic Sketch

Township 11S, Range 9E, Section 34

GPS: NAD 27, UTM 12S 4407006 N, 508648 E

DISCUSSION

Emma Park Meadow - Trend Study No. 17R-9

The Emma Park Meadow study is located just over 3 miles from the junction of Kyune and Highway 6 in Spanish Fork Canyon. Study 17R-8 is about a half mile to the east. This transect lies in a small depression and is best classified as a dry meadow. The BLM is attempting to convert this site to more of a wet meadow type by raising the water table with small check dams along the gullies that run through the area. This study was established in 2001 to monitor the changes in vegetation during this transition period. Site elevation is about 7,200 feet on terrain that slopes gently to the northwest. Wildlife and livestock use appears to be low. Pellet group data from 2001 was estimated at 4 deer, 3 elk and 2 cow days use/acre (10 ddu/ha, 8 edu/ha, and 5 cdu/ha). Grouse pellets were also noticed in the dry meadow type. Pellet group data from 2005 was estimated at 5 elk, 38 cow, and 2 horse days use/acre (13 edu/ha, 93 cdu/ha, 6 hdu/ha).

Soils are clay loam in texture with a soil reaction that is neutral (7.3 pH). Effective rooting depth is estimated at just under 15 inches. There is very little rock and pavement on the surface or within the profile. Vegetation cover is high at an estimated 55% average cover in 2001 and 46% in 2005. Litter cover was lower than anticipated in 2001 at 24%, but slightly increased in 2005 to 34%. Percent bare ground is moderately high at nearly 30% cover in both years. Cryptogams decreased from 6% cover in 2001 to less than 1% in 2005. A large gully to the north of the site displays signs of active cutting, although the thick herbaceous understory appears to be stabilizing the surrounding area.

Browse appears mainly on the edges of the meadow. However, mountain big sagebrush is fairly abundant and surrounds the site in all directions, except for several small meadows such as the one this study monitors. Mountain big sagebrush had an average cover of 2% and an estimated 1,240 plants/acre in 2001. Cover averaged slightly more than 2% in 2005 and density decreased to 620 plants/acre. Percent decadence was high in 2001 at 39%. It then increased to 77% in 2005. As most of the decadent plants occur on the meadow's edge, high decadence and poor vigor are likely due to the higher water table that exists within the meadow. Young plants were moderate numbers in 2001 at 200 plants/acre, but almost nonexistent in 2005. Other browse sampled included silver sagebrush, stickyleaf rabbitbrush, rubber rabbitbrush, and cinquefoil. Raising the water table has reduced the shrub component and is looking more like a wet meadow.

The site is dominated by low growing grasses and forbs, many of which are increasers. Perennial grasses averaged 16% cover in 2001 and 10% in 2005. Sandberg bluegrass, Kentucky bluegrass, western wheatgrass, Prairie junegrass, a sedge, and a rush are the most common grasses sampled. Perennial forbs averaged 33% cover in 2001 and 22% in 2005. *Aster*, yarrow, and yellow owlclover dominate the forb component, although both significantly decreased in nested frequency in 2005. In 2001, production was relatively low and seed stalks were in low numbers on herbaceous species.

2005 TREND ASSESSMENT

Soil trend is stable. The ratio of protective cover (vegetation, litter and cryptogams) to bare ground declined slightly, but appears adequate to protect the soil from erosion. Cryptogams decreased in 2005 and caused the slight decline in the ratio of protective cover to bare ground. Trend for browse mountain big sagebrush is down. Density decreased from 1,240 plants/acre in 2001 to 620 in 2005. Seventy-five percent of the population is decadent and 29% were classified as dying. Recruitment of the young age class is low and vigor is poor. Transition from a shrub community to a wet meadow appears to be working. Trend for herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs are relatively the same to 2001 observations. Although, perennial forb cover decreased from 33% in 2001 to 22% in 2005.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - stable (0)

winter range condition (DC Index) - Not applicable

HERBACEOUS TRENDS --

Management unit 17R, Study no: 9

T y p e	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
G	Agropyron smithii	189	182	4.15	3.01
G	Bromus anomalus	-	3	-	.00
G	Carex sp.	_a 72	_b 144	1.58	2.57
G	Juncus sp.	_b 76	_a 32	1.27	.13
G	Koeleria cristata	_b 43	_a 13	.27	.12
G	Poa pratensis	23	53	.49	.40
G	Poa secunda	_b 332	_a 306	8.34	3.98
G	Stipa lettermani	_b 16	_a 3	.13	.01
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		751	736	16.26	10.25
Total for Grasses		751	736	16.26	10.25
F	Achillea millefolium	_b 327	_a 255	9.56	4.58
F	Antennaria rosea	_b 25	_a 12	.29	.22
F	Androsace septentrionalis (a)	-	2	-	.00
F	Aster chilensis	_b 432	_a 396	21.88	14.96
F	Astragalus sp.	31	18	.27	.11
F	Chenopodium album (a)	-	3	-	.00
F	Comandra pallida	-	1	-	.00
F	Collinsia parviflora (a)	_a -	_b 105	-	.64
F	Gayophytum ramosissimum(a)	-	2	-	.00
F	Gentiana sp.	_a -	_b 35	-	.33
F	Iva axillaris	-	4	-	.03
F	Machaeranthera canescens	-	4	-	.01
F	Orthocarpus luteus (a)	_a 235	_b 269	4.39	2.54
F	Penstemon sp.	_b 52	_a 3	.76	.00
F	Phlox austromontana	17	17	.48	.72
F	Phlox longifolia	4	-	.00	-
F	Polygonum douglasii (a)	_a -	_b 13	-	.07
F	Potentilla gracilis	_a 1	_b 11	.00	.11
F	Schoenocrambe linifolia	-	3	-	.00

Type	Species	Nested Frequency		Average Cover %	
		'01	'05	'01	'05
F	Taraxacum officinale	_a 11	_b 83	.10	1.12
F	Zigadenus paniculatus	-	3	-	.00
Total for Annual Forbs		235	394	4.39	3.27
Total for Perennial Forbs		900	845	33.37	22.23
Total for Forbs		1135	1239	37.76	25.50

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

BROWSE TRENDS --

Management unit 17R, Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'01	'05	'01	'05
B	Artemisia cana	2	4	-	.03
B	Artemisia tridentata vaseyana	26	17	1.82	2.48
B	Chrysothamnus nauseosus	6	8	.30	.53
B		1	1	-	-
B	Potentilla fruticosa	1	2	-	.03
Total for Browse		36	32	2.12	3.07

CANOPY COVER, LINE INTERCEPT --

Management unit 17R, Study no: 9

Species	Percent Cover
	'05
Artemisia cana	.25
Artemisia tridentata vaseyana	2.56
Chrysothamnus nauseosus	.96
Chrysothamnus viscidiflorus viscidiflorus	.10

BASIC COVER --

Management unit 17R, Study no: 9

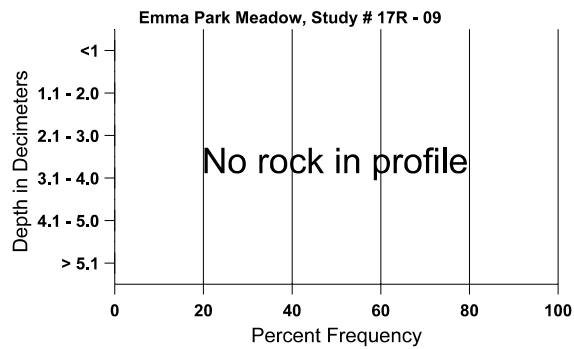
Cover Type	Average Cover %	
	'01	'05
Vegetation	55.73	45.95
Rock	.04	0
Pavement	.29	.35
Litter	23.79	33.73
Cryptogams	6.00	.46
Bare Ground	29.82	30.38

SOIL ANALYSIS DATA --

Herd Unit 17R, Study no: 09, Emma Park Meadow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
14.7	52.4 (16.1)	7.3	23.9	38.4	37.7	4.3	6.7	214.4	1.1

Stoniness Index



PELLET GROUP DATA --

Management unit 17R, Study no: 9

Type	Quadrat Frequency		Days use per acre (ha)	
	'01	'05	'01	'05
Rabbit	50	8	-	-
Grouse	-	1	-	-
Elk	7	2	3 (8)	5 (13)
Deer	3	4	4 (10)	-
Horse	-	-	-	2 (6)
Cattle	9	16	2 (5)	38 (93)

BROWSE CHARACTERISTICS --
Management unit 17R, Study no: 9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia cana</i>												
01	40	-	-	20	20	-	0	0	50	-	50	10/9
05	80	-	-	80	-	-	0	0	0	-	0	13/19
<i>Artemisia tridentata vaseyana</i>												
01	1240	-	200	560	480	240	0	2	39	18	39	15/19
05	620	-	20	120	480	680	26	0	77	29	29	17/23
<i>Chrysothamnus nauseosus</i>												
01	140	-	60	80	-	-	0	0	-	-	14	16/18
05	200	-	-	200	-	40	0	0	-	-	0	20/26
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
01	20	-	-	20	-	-	0	0	-	-	0	-/-
05	80	-	-	80	-	-	0	0	-	-	0	10/16
<i>Potentilla fruticosa</i>												
01	20	-	-	20	-	-	0	0	0	-	100	11/18
05	40	-	-	20	20	-	0	0	50	-	0	11/20

SUMMARY

DEER HERD UNIT - 17 - WASATCH MOUNTAINS

The portion of Wildlife Management Unit 17 read in 2005 contains the subunits Currant Creek and Avintaquin. This section contains 18 trend studies of which 16 were read in 2005. Six studies are dominated by Wyoming big sagebrush, 5 have mountain big sagebrush, 3 are mountain brush, and 2 are pinyon-juniper chainings. Two trends studies were established in 2005 at Sand Wash (17-66) and Little Horse Ridge (17-65), both located on DWR Wildlife Management Areas. The two studies that were not read in 2005 were Blacktail Ridge (17-48), due to road closure in 2000, and Peatross Ranch (17-54) which has very little wildlife use.

In 2000, the browse component on the majority of the studies in this unit showed negative characteristics due to drought. This trend continued in 2005 to a greater extent with large decreases in sagebrush density observed. The herbaceous vegetation cover was very low in 2000, but typically increased with above normal precipitation in 2005. Of the trend studies read in 2005 (excluding new studies):

The key browse species, Wyoming big sagebrush and mountain big sagebrush, are of primary importance during the critical months of winter. These principal species have shown continuing increases in decadence and loss of plants. Their respective perennial understories have also shown similar downward changes. Mountain big sagebrush, because of its better site potential, has declining population characteristics that are not as severely depressed as those for Wyoming big sagebrush which always appears to occur on sites of poorer site potential. The following series of values are averages listed in order of year sampled (1995, 2000, and 2005). These values help illustrate best the differences between the two species of sagebrush. These averages are as follows:

- percent decadence..... 24%, 34%, and 40% for mountain big sagebrush
- percent decadence..... 10%, 21%, and 45% for Wyoming big sagebrush
- percent dying..... 9%, 10%, and 18% for mountain big sagebrush
- percent dying..... 5%, 10%, and 31% for Wyoming big sagebrush
- population changes..... 2,893 (1995) and 2,489 plants/acre for mountain big sagebrush (-14% change)
- population changes..... 3,780 (1995) and 1,990 plants/acre for Wyoming big sagebrush (-47% change)

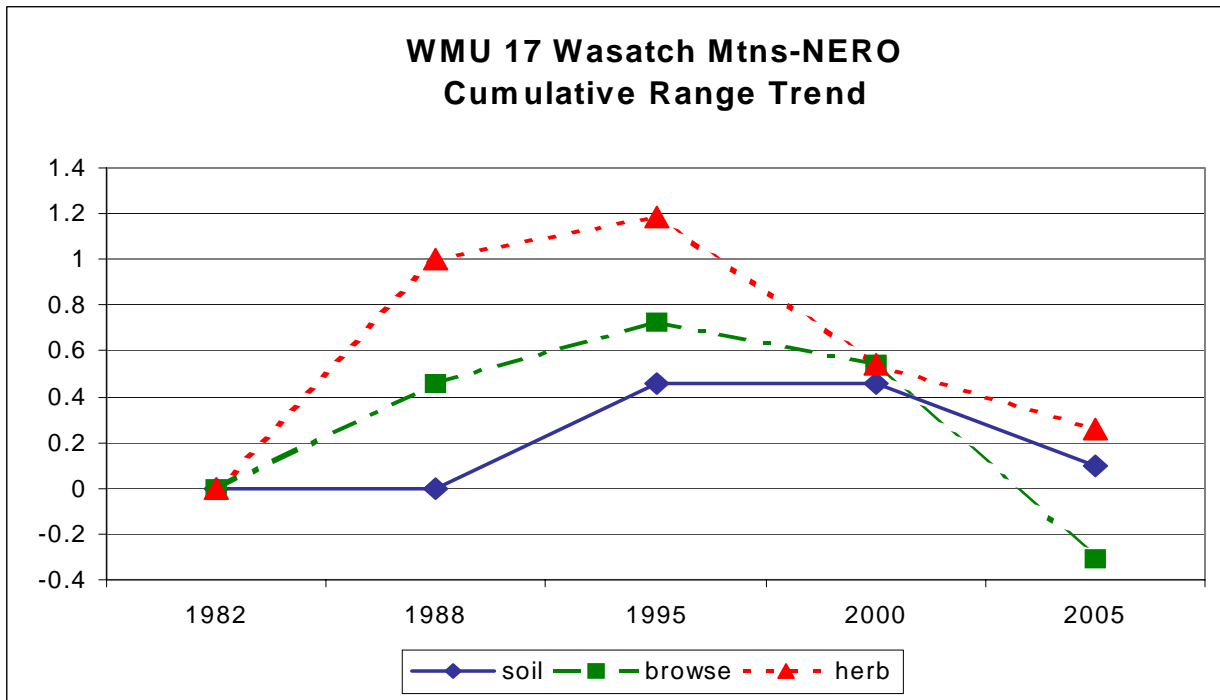
The perennial herbaceous understories associated with mountain big sagebrush and Wyoming big sagebrush have similar downward trends with regard to the site potentials of the two sagebrush subspecies communities. The following values show percent change in nested frequency for perennial grasses and forbs for both subspecies of sagebrush from 1995 and 2005:

- percent change for perennial grasses... -3% for mountain big sagebrush
- percent change for perennial grasses... -7% for Wyoming big sagebrush
- percent change for perennial forbs..... -11% for mountain big sagebrush
- percent change for perennial forbs..... -40% for Wyoming big sagebrush

Increases in decadency and poor vigor for key browse populations, specifically sagebrush, resulted in a downward browse trend for all populations of Wyoming big sagebrush and black sagebrush in 2005. For mountain big sagebrush, 4 populations were stable to improving, while 3 showed downward trends for 2005.

Cumulative Range Trends -- WMU 17 Wasatch Mountains-NERO

	1982	1988	1995	2000	2005
soil	0	0.0	0.5	0.5	0.1
browse	0	0.5	0.7	0.5	-0.3
herb	0	1.0	1.2	0.5	0.3
	11 sites	11 sites	11 sites	11 sites	14 sites



TREND SUMMARY

	Category	1982	1988	1995	2000	2005
Blacktail Ridge 17-48	soil	est	+2	0	NR	NR
	browse	est	-2	+1	NR	NR
	herbaceous understory	est	+2	-1	NR	NR
Grey Wolf Mountain 17-49	soil	est	0	0	0	0
	browse	est	+2	0	0	-2
	herbaceous understory	est	+1	+1	-1	-1
Lower Santaquin Draw 17-50	soil	est	0	+1	0	-1
	browse	est	0	+1	0	-2
	herbaceous understory	est	+2	0	-1	0
Santaquin's Cabin 17-51	soil	est	-1	+1	0	-1
	browse	est	-1	0	-2	-1
	herbaceous understory	est	0	+1	-2	-1
Cutoff 17-52	soil	est	0	+1	0	0
	browse	est	-1	0	0	-1
	herbaceous understory	est	+1	+1	-1	+1
Two Bar Ranch 17-53	soil	est	-1	+1	0	0
	browse	est	+2	0	0	-2
	herbaceous understory	est	0	+2	0	-2
Peatross Ranch 17-54	soil	est	-1	+1	0	NR
	browse	est	+1	0	0	NR
	herbaceous understory	est	+1	-2	0	NR
Lower Horse Ridge 17-55	soil	est	+1	0	0	0
	browse	est	+2	0	0	0
	herbaceous understory	est	+2	-1	-2	0
Sam's Canyon 17-56	soil	est	0	0	NR	0
	browse	est	0	0	NR	-1
	herbaceous understory	est	0	+1	NR	-2

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up
 est = site established, NA = data not available, NR = site not read

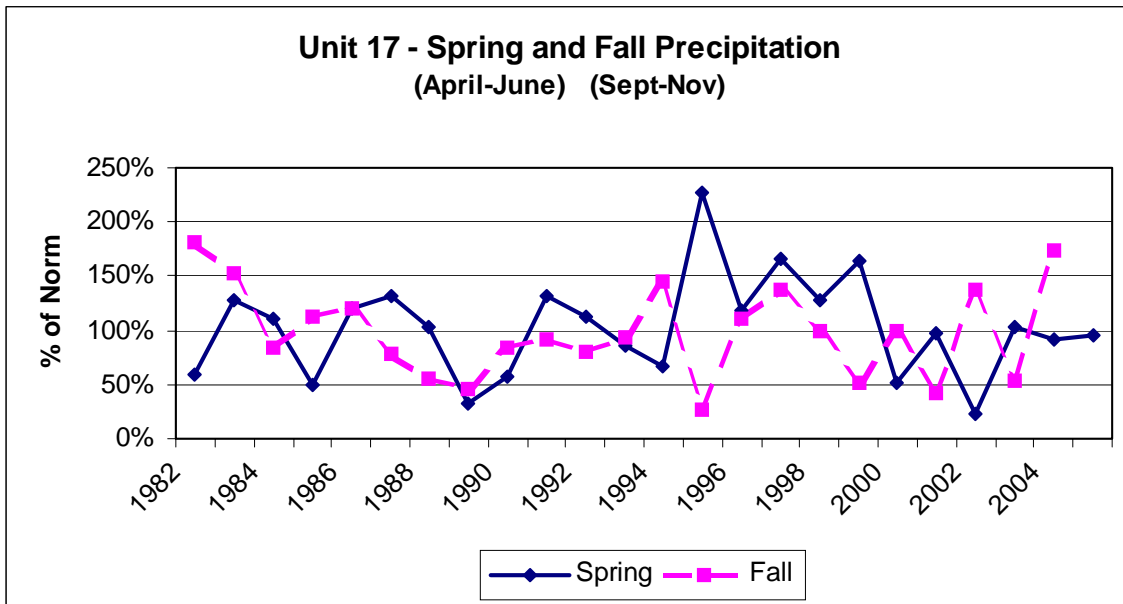
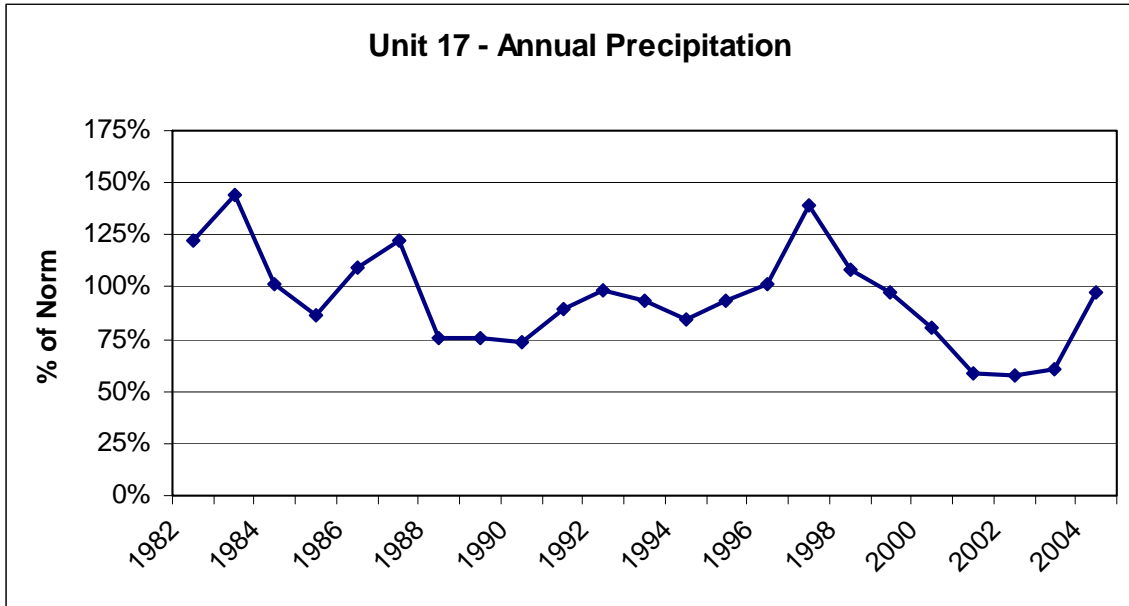
	Category	1982	1988	1995	2000	2005
Skitzzy Canyon 17-57	soil	est	0	0	0	-1
	browse	est	+1	+1	+1	-2
	herbaceous understory	est	+1	0	0	-2
Buck Knoll 17-58	soil	est	0	0	0	-1
	browse	est	+1	0	0	+2
	herbaceous understory	est	+1	0	-2	0
Emma Park 17-59	soil			est	0	-1
	browse			est	0	-1
	herbaceous understory			est	+2	0
17-65 Little Horse Ridge	soil					est
	browse					est
	herbaceous understory					est
17-66 Sand Wash	soil					est
	browse					est
	herbaceous understory					est
	Category			1997	2001	2005
17-67 Rabbit Gulch	soil			est	0	0
	browse			est	-1	-2
	herbaceous understory			est	0	0
17R-7 Emma Park Harrow Grazed	soil			est		0
	browse			est		+1
	herbaceous understory			est		+1
17R-8 Emma Park Harrow Ungrazed	soil			est		0
	browse			est		+1
	herbaceous understory			est		+2
17R-9 Emma Park Meadow	soil			est		0
	browse			est		-2
	herbaceous understory			est		0

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up
est = site established, NA = data not available, NR = site not read

	Category	1982	1988	1995/ 1997	2000/ 2001	2005
Average Range Trend	soil	est	0.0	0.5	0.0	-0.4
	browse	est	0.5	0.3	-0.2	-0.9
	herbaceous understory	est	1.0	0.2	-0.6	-0.3
Number of Sites Read		11	11	13	14	16

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up
 est = site established, NA = data not available, NR = site not read

Precipitation graphs for the Wasatch Mountains NERO unit. Data is percent of normal precipitation averaged for weather stations in Duchesne, Altamont, and Helper (Utah Climate Summaries 2005).



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