Trend Study 17-44-07

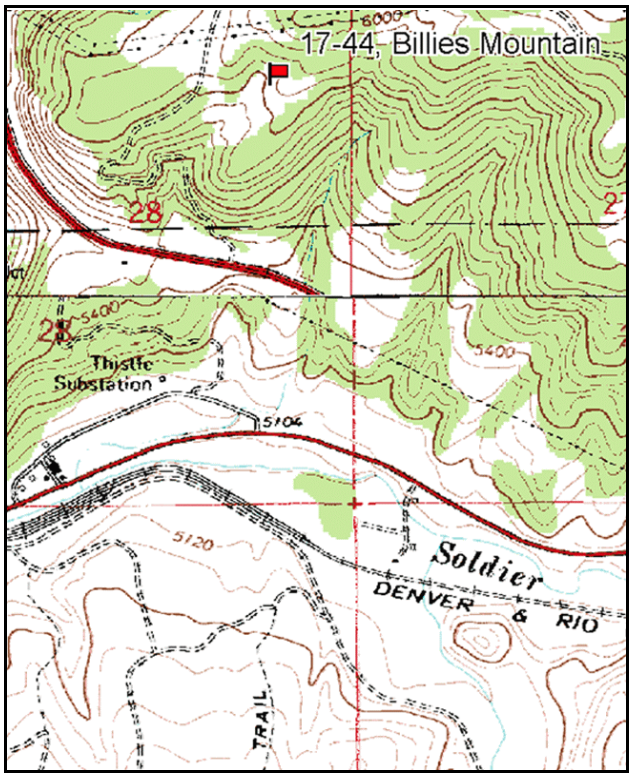
Study site name: Billies Mountain . Vegetation type: Big Sagebrush-Grass .

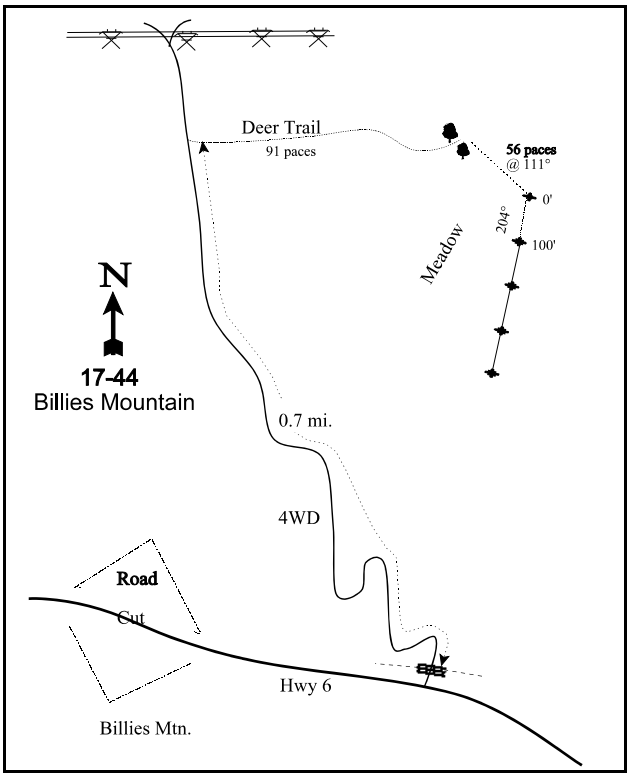
Compass bearing: frequency baseline 204 degrees magnetic.

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

LOCATION DESCRIPTION

On Highway 6 and 89 in Spanish Fork Canyon, east of the new road cut through Billies Mountain and 0.9 miles west of the junction of Route 89 south to Manti and US 6, turn north onto a dirt road. Cross a cattle guard and follow the road up 0.7 miles to where it breaks out into a sagebrush/grass flat. On the right, at the head of a small drainage, a game trial heads east towards a small meadow. Follow this trail approximately 150 yards to 2 large junipers at the edge of the meadow. From the junipers, walk up the near slope 56 paces bearing 111 degrees to the 0-foot baseline stake. This fencepost is marked by browse tag number 3951.





Map Name: Billies Mountain

Diagrammatic Sketch

Township 9S , Range 4E , Section 28

GPS: NAD 83, UTM 12T 458808 E 4428476 N

DISCUSSION

Billies Mountain - Trend Study No. 17-44

Study Information

This winter range study is located east of US-6 near the town of Thistle [elevation: 5,800 feet (1,768 m), slope: 5%-20%, aspect: southwest]. The nearest perennial source of water is Spanish Fork 0.7 miles (1.1 km) to the west, on the far side of US-6. The range type is big sagebrush-grass with a variety of other shrubs interspersed throughout. Deer and elk use has been moderate, and deer use may occur year-round. A cattle allotment overlays the study area, though the allotment was rested in 1989. From the pellet group transect data, deer use was estimated at 36 days use/acre (89 ddu/ha) in 2002 and 29 days use/acre (73 ddu/ha) in 2007. Elk use was estimated at 11 days use/acre (28 edu/ha) in 2002 and 51 days use/acre (126 edu/ha) in 2007. Most of the big game pellet groups appear to be from winter use. Cattle use was estimated at 15 days use/acre (38 cdu/ha) in 2002 and 2 days use/acre (4 cdu/ha) in 2007.

Soil

The soil is relatively deep, grey in color, and has little rock. It has a clay texture and a mildly alkaline reaction (pH of 7.4). Soil phosphorous is quite low at only 4.6 ppm. Values less than 6 ppm have been found to limit plant growth and development (Tiedemann and Lopez 2004). Relative vegetation cover has increased from 39% in 1997 to 49% in 2007, and relative bare ground cover was fairly constant at 12%-17% during that time. The study is located near the head of a small swale, where erosion has been common. However, the erosion condition was classified as stable in 2002 and 2007.

Browse

The study supports a variety of browse species. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the dominant species. In 2007, canopy cover was 4%. The population density increased from 2,333 plants/acre (5,775 plants/ha) in 1983 to 2,433 plants/acre (6,022 plants/ha) in 1989, and decreased to 980 plants/acre (2,426 plants/ha) by 2007. Few seedling plants have been sampled, and young plants have only been sampled since 1997, ranging from 5% to 10% of the population. Decadent plants have accounted for greater than half of the population each sample year, and were most numerous in 1989 when 86% of the population was decadent. The density of dead plants decreased from 860 plants/acre (2,129 plants/ha) in 1997 to 520 plants/acre (1,287 plants/ha) in 2007. The proportion of plants with poor vigor has oscillated between increasing and decreasing in alternate sample years, and was the highest in 1983 (63%) and lowest in 1989 (12%). In 2007, 41% of the population had poor vigor. The average annual leader growth was 2.1 inches (5.3 cm) in 2002 and 1.7 inches (4.4 cm) in 2007. Browse use shifted from moderate-heavy in 1983 and 1989 to light-moderate in 1997. In 2002, browse use increased to moderate-heavy, and in 2007 it decreased to light-moderate. The thick grass understory and heavy winter use may be limiting the establishment of new sagebrush plants. Continued, moderate livestock use in the spring and early summer could help to improve the sagebrush stand by reducing grass competition.

A small population of antelope bitterbrush (*Purshia tridentata*) provides some additional forage. Bitterbrush canopy cover was 3% in 2007. The density increased from 266 plants/acre (658 plants/ha) in 1983 to 540 plants/acre (1,337 plants/ha) in 1997, and decreased to 380 plants/acre (941 plants/ha) in 2002. In 2007, the density increased to 400 plants/acre (990 plants/ha). The population has been largely comprised of mature, healthy plants. Browse use has ranged from light to heavy. It was lightest in 1989, and heaviest in 2002. The average annual leader growth was 1.7 inches (4.3 cm) in 2002 and 2 inches (5.1 cm) in 2007.

Other browse species that are present include serviceberry (*Amelanchier alnifolia*), dwarf rabbitbrush (*Chrysothamnus depressus*), white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), broom snakeweed (*Gutierrezia sarothrae*), chokecherry (*Prunus virginiana*), Woods' rose (*Rosa woodsii*), snowberry (*Symphoricarpos oreophilus*), and

gray horsebrush (*Tetradymia canescens*). These populations have either changed very little since 1983, or have shown little browse use.

Herbaceous Understory

The herbaceous understory is abundant and exceptionally diverse. Perennial grass cover was 24% in 1997, 19% in 2002, and 23% in 2007. Between 12 and 18 perennial species have been sampled. The dominant perennial species is bluebunch wheatgrass (*Agropyron spicatum*), which has had an average cover of 9% since 1997. Other abundant perennial species include crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Agropyron intermedium*), western wheatgrass (*Agropyron smithii*), smooth brome (*Bromus inermis*), prairie junegrass (*Koeleria cristata*), bulbous bluegrass (*Poa bulbosa*), Kentucky bluegrass (*Poa pratensis*), and Sandberg bluegrass (*Poa secunda*). Bulbous bluegrass has a phenology that is similar to annual grasses (Stewart and Hull 1949), and has increased in quadrat frequency from 2% in 1983 to 41% in 2007. Cheatgrass (*Bromus tectorum*) is present but has provided less than 1% cover since 1997.

Perennial forb cover was 20% in 1997, and 18% in 2002 and 2007. Between 17 and 23 perennial species have been sampled. The dominant perennial forb is western aster (*Aster chilensis*), which has accounted for an average 9% cover since 1997. Other common perennial species include western yarrow (*Achillea millefolium*), cudweed sagewort (*Artemisia ludoviciana*), thistle (*Cirsium* sp.), rock goldenrod (*Petradoria pumila*), and American vetch (*Vicia americana*). The composition of the dominant forbs is indicative of heavy grazing pressure in the past. Annual forbs are present, but have provided 1% cover or less since 1997. Houndstongue (*Cynoglossum officinale*), a noxious weed, was sampled in 1997 and 2002 in 3% and 2% of the quadrats, respectively.

1989 TREND ASSESSMENT

The browse trend is slightly down. The density of sagebrush increased 4%, but decadence increased from 53% of the population to 86%. Plants with poor vigor decreased from 63% of the population to 12%. Browse use on sagebrush remained moderate-heavy. The average crown width of sagebrush decreased 14 inches (36 cm). The bitterbrush density increased 13%, and there continued to be no decadent plants. Browse use on bitterbrush shifted from light-moderate to light, and heavily browsed plants decreased from 25% of the population to 0%. No seedling or young plants of either species were sampled. The grass trend is stable. Excluding bulbous bluegrass, the sum of nested frequency of perennial grasses increased 11%, including significant decreases in the nested frequencies of two native grasses: mutton bluegrass (*Poa fendleriana*) and Letterman needlegrass (*Stipa lettermani*). There was a significant increase in the nested frequency of Kentucky bluegrass, which is an introduced species. The forb trend is stable. The sum of nested frequency of perennial forbs increased 7%. The nested frequencies of western yarrow and alfalfa (*Medicago sativa*) decreased significantly, while that of wild onion (*Allium* sp.) and longleaf phlox (*Phlox longifolia*) increased significantly.

browse - slightly down (-1) grass - stable (0) forb - stable (0)

1997 TREND ASSESSMENT

The browse trend is slightly down. The density of sagebrush decreased 48%. However, some of this decrease is likely the result of the larger area sampled beginning in 1997, otherwise the browse trend would have been down. Young sagebrush increased from 0% of the population to 5%, and decadence decreased to 54%. The proportion of plants with poor vigor increased to 40%, and all of those were classified as dying. Browse use on sagebrush shifted to light-moderate, and heavily browsed plants decreased to 2% of the population. The average crown width of sagebrush increased 17 inches (43 cm). The density of bitterbrush increased 80%, and young plants increased to 4% of the population. Decadent plants increased to 7% of the population. Browse use on bitterbrush increased to moderate-heavy, and 56% of the plants had been heavily browsed. The grass trend is slightly up. Excluding bulbous bluegrass, the sum of nested frequency of perennial grasses increased 15%. There were significant increases in the nested frequencies of Sandberg bluegrass and bulbous bluegrass,

and a significant decrease in the nested frequency of bottlebrush squirreltail (*Sitanion hystrix*). The forb trend is stable. Excluding noxious weeds, the sum of nested frequency of perennial forbs increased 13%. There was a significant increase in the nested frequency of prickly lettuce (*Lactuca serriola*), and significant decreases in the nested frequencies of western aster and longleaf phlox. The number of perennial species sampled increased from 18 to 23. However, one of the new species was houndstongue, a noxious weed. It had a quadrat frequency of 3%. The Desirable Components Index (DCI) score was fair due to low browse cover and recruitment, high browse decadence, high perennial grass and forb cover, and the presence of one noxious weed species.

winter range condition (DCI) - fair (54) Mid-level potential scale
browse - slightly down (-1) grass - slightly up (+1) forb - stable (0)

2002 TREND ASSESSMENT

The browse trend is stable. The density of sagebrush decreased 8%. Young plants increased to 10% of the sagebrush population, and decadence increased slightly to 57%. The density of dead plants decreased from 860 plants/acre (2,129 plants/ha) to 600 plants/acre (1,485 plants/ha). Dying plants decreased to 29% of the population. Browse use on sagebrush increased to moderate-heavy, and heavily browsed plants increased to 55% of the population. The density of bitterbrush decreased 30%. No seedling or young plants were sampled, and decadent plants increased to 21% of the bitterbrush population. Browse use on bitterbrush increased to heavy; 79% of the plants had been heavily browsed. The grass trend is stable. Excluding bulbous bluegrass, the sum of nested frequency of perennial grasses decreased 11%. There were significant decreases in the nested frequencies of Kentucky and Sandberg bluegrasses. However, there was a significant increase in the nested frequency of crested wheatgrass, and a significant decrease in that of cheatgrass. There was some difficulty in identifying some grasses due to grazing use and lack of seed heads. The forb trend is slightly down. Excluding noxious weeds, the sum of nested frequency of perennial forbs decreased 17%. There were significant decreases in timber poisonvetch (*Astragalus convallarius*), bastard toadflax (*Comandra pallida*), and American vetch. Houndstongue had a quadrat frequency of 2%. The DCI score remained fair.

winter range condition (DCI) - fair (54) Mid-level potential scale
browse - stable (0) grass - stable (0) forb - slightly down (-1)

2007 TREND ASSESSMENT

The browse trend is slightly down. The density of sagebrush decreased 16%. The young and decadent age classes remained fairly stable. The density of dead sagebrush decreased to 520 plants/acre (1,287 plants/ha). Plants with poor vigor increased to 41% of the population, but dying plants continued to comprise 29% of the population. Browse use shifted to light-moderate, and heavily browsed plants decreased to 10% of the population. The bitterbrush density increased 5%. Seedling bitterbrush plants were sampled for the first time, and young plants increased to 10% of the population. The population was comprised entirely of young and mature plants, all of which were vigorous. Browse use on bitterbrush shifted to light-moderate, and heavily browsed plants decreased to 15% of the population. The grass trend is stable. Excluding bulbous bluegrass, the sum of nested frequency of perennial grasses increased 13%. There were significant increases in the nested frequencies of western wheatgrass and prairie junegrass. The number of perennial grass species sampled increased from 13 to 18. However, Japanese brome (*Bromus japonicus*) was sampled for the first time and had a quadrat frequency of 25%. Additionally, the quadrat frequency of bulbous bluegrass increased from 28% to 41%. Again, there was some difficulty in identifying some grasses due to lack of seed heads. The forb trend is stable. The sum of nested frequency of perennial forbs changed little, increasing 1%. There was a significant increase in the nested frequency of wayside gromwell (*Lithospermum ruderale*) and a significant decrease in that of longleaf phlox. Houndstongue was not sampled. The DCI score remained fair.

winter range condition (DCI) - fair (58) Mid-level potential scale
browse - slightly down (-1) grass - stable (0) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 17 , Study no: 44

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	-	-	$_{a}$11	$_{b}$55	$_{b}$45	.48	1.99	2.62
G	Agropyron intermedium	-	-	-	-	22	-	-	1.26
G	Agropyron smithii	-	$_{a}$6	$_{a}$13	$_{a}$21	$_{b}$51	.05	.58	1.03
G	Agropyron spicatum	$_{a}$149	$_{ab}$182	$_{b}$202	$_{ab}$175	$_{ab}$167	8.94	9.46	8.42
G	Agropyron trachycaulum	$_{a}$9	$_{a}$22	-	$_{a}$13	$_{a}$26	-	.19	.84
G	Bromus inermis	-	-	$_{a}$7	$_{a}$10	$_{a}$12	.30	.79	1.16
G	Bromus japonicus (a)	-	-	-	-	63	-	-	.20
G	Bromus tectorum (a)	-	-	$_{b}$60	$_{a}$4	$_{a}$19	.87	.01	.35
G	Carex sp.	$_{a}$6	-	-	-	$_{a}$2	-	-	.00
G	Elymus glaucus	$_{a}$9	-	$_{a}$3	-	-	.63	-	-
G	Elymus junceus	-	-	-	$_{a}$4	$_{a}$4	-	.63	.38
G	Koeleria cristata	$_{ab}$24	$_{a}$4	$_{ab}$26	$_{a}$7	$_{b}$32	.70	.09	1.20
G	Melica bulbosa	$_{ab}$14	$_{b}$24	$_{b}$38	$_{ab}$13	$_{a}$3	1.52	.13	.01
G	Oryzopsis hymenoides	$_{a}$4	$_{a}$2	-	-	$_{a}$2	-	-	.03
G	Poa bulbosa	$_{a}$5	$_{a}$7	$_{b}$58	$_{bc}$82	$_{c}$96	1.60	2.79	2.14
G	Poa fendleriana	$_{b}$37	$_{a}$16	$_{a}$13	$_{ab}$31	$_{a}$16	.66	.66	.49
G	Poa nevadensis	-	-	-	-	3	-	-	.03
G	Poa pratensis	$_{ab}$99	$_{c}$156	$_{bc}$126	$_{ab}$97	$_{a}$66	6.76	1.46	1.83
G	Poa secunda	-	$_{a}$1	$_{c}$69	$_{b}$34	$_{bc}$68	1.58	.35	1.87
G	Sitanion hystrix	$_{ab}$16	$_{b}$23	$_{a}$7	-	$_{a}$4	.06	-	.04
G	Stipa lettermani	$_{b}$44	$_{a}$22	$_{a}$10	$_{a}$8	$_{a}$4	.31	.07	.03
Total for Annual Grasses		0	0	60	4	82	0.87	0.00	0.55
Total for Perennial Grasses		416	465	583	550	623	23.62	19.21	23.44
Total for Grasses		416	465	643	554	705	24.50	19.22	24.00
F	Achillea millefolium	$_{b}$89	$_{a}$32	$_{a}$33	$_{a}$41	$_{a}$47	1.06	.91	1.43
F	Alyssum alyssoides (a)	-	-	$_{a}$2	-	$_{a}$1	.00	-	.00
F	Allium sp.	$_{a}$3	$_{b}$15	$_{b}$22	$_{ab}$12	$_{ab}$6	.05	.39	.02
F	Antennaria rosea	10	-	-	-	-	-	-	-
F	Artemisia ludoviciana	$_{a}$37	$_{a}$55	$_{a}$42	$_{a}$45	$_{a}$58	1.49	1.05	1.91
F	Aster chilensis	$_{bc}$301	$_{c}$310	$_{a}$225	$_{a}$248	$_{ab}$245	8.27	10.07	8.68
F	Astragalus convallarius	$_{bc}$68	$_{c}$82	$_{bc}$58	$_{a}$24	$_{ab}$40	.78	.34	.57
F	Astragalus sp.	$_{a}$3	$_{a}$7	-	-	-	-	-	-
F	Astragalus utahensis	$_{a}$12	$_{a}$14	$_{a}$14	$_{a}$10	$_{a}$12	.25	.33	.22
F	Camelina microcarpa (a)	-	-	$_{ab}$16	$_{a}$1	$_{b}$13	.13	.00	.06
F	Calochortus nuttallii	$_{a}$11	$_{a}$19	$_{a}$21	$_{a}$19	$_{a}$17	.05	.07	.05

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	Cirsium sp.	$_{a}$7	$_{ab}$21	$_{b}$47	$_{b}$36	$_{ab}$31	1.50	.39	.62
F	Collomia linearis (a)	-	-	$_{a}$7	-	$_{a}$1	.02	-	.00
F	Comandra pallida	-	-	$_{b}$11	$_{a}$1	-	.03	.00	-
F	Crepis acuminata	-	-	$_{a}$6	$_{a}$8	$_{a}$11	.02	.09	.30
F	Cymopterus sp.	-	-	$_{a}$9	$_{a}$12	$_{a}$16	.07	.37	.13
F	Cynoglossum officinale	-	-	$_{a}$5	$_{a}$2	-	.01	.01	-
F	Descurainia pinnata (a)	-	-	-	-	20	-	-	.06
F	Epilobium brachycarpum (a)	-	-	$_{c}$81	$_{b}$33	$_{a}$6	.51	.06	.01
F	Eriogonum brevicaule	$_{a}$4	$_{a}$6	$_{a}$11	$_{a}$3	$_{a}$7	.10	.04	.10
F	Eriogonum racemosum	-	-	-	1	-	-	.00	-
F	Eriogonum umbellatum	-	$_{a}$3	$_{a}$5	$_{a}$3	$_{a}$6	.01	.03	.06
F	Galium aparine (a)	-	-	$_{b}$29	$_{ab}$22	$_{a}$6	.56	.19	.01
F	Hackelia patens	$_{ab}$11	$_{ab}$2	$_{b}$12	$_{ab}$4	$_{a}$-	.03	.00	.00
F	Helianthus annuus (a)	1	-	-	-	-	-	-	-
F	Lappula occidentalis (a)	-	-	-	-	3	-	-	.01
F	Lactuca serriola	-	$_{a}$12	$_{b}$33	-	-	.24	-	-
F	Lithospermum ruderale	-	-	$_{a}$1	$_{a}$1	$_{b}$14	.03	.15	.29
F	Medicago sativa	$_{b}$113	$_{a}$10	$_{a}$18	-	$_{a}$13	.35	-	.22
F	Petradoria pumila	-	-	$_{a}$25	$_{ab}$32	$_{b}$37	1.05	1.81	2.49
F	Phlox longifolia	$_{a}$4	$_{c}$128	$_{b}$67	$_{b}$88	$_{a}$15	.21	.66	.05
F	Polygonum douglasii (a)	-	-	$_{a}$2	$_{a}$1	-	.00	.00	-
F	Sphaeralcea coccinea	-	-	-	$_{a}$3	$_{a}$3	-	.00	.00
F	Taraxacum officinale	$_{a}$1	$_{a}$1	-	-	-	-	-	-
F	Tragopogon dubius	$_{a}$12	$_{a}$16	$_{a}$31	$_{a}$9	$_{a}$34	.90	.06	.35
F	Veronica biloba (a)	-	-	-	3	-	-	.00	-
F	Vicia americana	-	-	$_{b}$131	$_{a}$98	$_{ab}$106	2.65	.89	.71
F	Viguiera multiflora	$_{a}$17	$_{a}$22	$_{a}$30	$_{a}$10	-	.56	.04	-
Total for Annual Forbs		1	0	137	60	50	1.23	0.27	0.18
Total for Perennial Forbs		703	755	857	710	718	19.77	17.76	18.25
Total for Forbs		704	755	994	770	768	21.01	18.04	18.43

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

BROWSE TRENDS --
Management unit 17 , Study no: 44

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Amelanchier alnifolia	2	3	1	.03	-	-
B	Artemisia tridentata vaseyana	50	48	41	4.69	4.34	3.80
B	Chrysothamnus depressus	7	6	6	.03	.03	.06
B	Chrysothamnus nauseosus albicaulis	21	16	14	.48	.54	.54
B	Chrysothamnus viscidiflorus viscidiflorus	24	25	23	1.67	1.21	1.29
B	Gutierrezia sarothrae	17	20	10	.31	.16	.04
B	Juniperus osteosperma	2	2	4	1.78	1.78	2.14
B	Prunus virginiana	1	2	1	.15	-	.15
B	Purshia tridentata	14	12	13	1.89	2.50	1.47
B	Rosa woodsii	3	3	3	.15	.15	.15
B	Symphoricarpos oreophilus	9	10	10	1.16	1.82	1.60
B	Tetradymia canescens	9	9	12	.30	.09	.39
Total for Browse		159	156	138	12.67	12.66	11.67

CANOPY COVER, LINE INTERCEPT --
Management unit 17 , Study no: 44

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	-	4.28
Chrysothamnus depressus	-	.18
Chrysothamnus nauseosus albicaulis	-	1.20
Chrysothamnus viscidiflorus viscidiflorus	-	1.21
Gutierrezia sarothrae	-	.13
Juniperus osteosperma	.30	7.18
Prunus virginiana	-	.43
Purshia tridentata	-	2.56
Rosa woodsii	-	.03
Symphoricarpos oreophilus	-	2.78
Tetradymia canescens	-	.35

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17 , Study no: 44

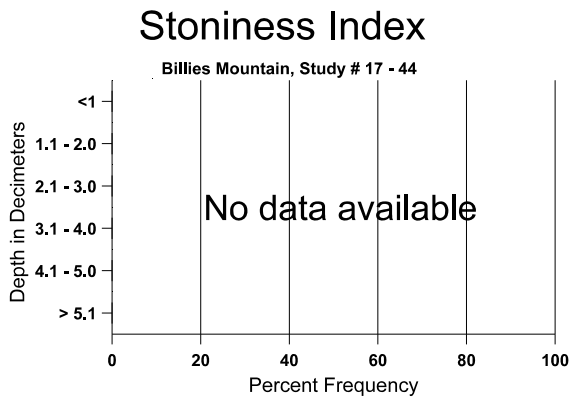
Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	2.1	1.7
Purshia tridentata	-	2.0

BASIC COVER --
Management unit 17 , Study no: 44

Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	5.25	12.50	46.86	54.50	56.66
Rock	.50	.75	.68	.42	.27
Pavement	1.25	4.75	1.09	1.27	2.65
Litter	64.00	58.25	54.79	38.76	38.87
Cryptogams	0	0	1.70	.42	.15
Bare Ground	29.00	23.75	14.87	19.72	16.60

SOIL ANALYSIS DATA --
Herd Unit 17, Study no: 44, Billies Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	Clay			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
21.1	49.0 (17.7)	7.4	23.4	20.7	55.8	2.2	4.6	323.2	.7



PELLET GROUP DATA --
Management unit 17 , Study no: 44

Type	Quadrat Frequency			Days use per acre (ha)	
	'97	'02	'07	'02	'07
Sheep	-	1	-	1 (2)	-
Rabbit	-	1	2	-	-
Elk	25	18	12	11 (28)	51 (126)
Deer	37	15	33	36 (89)	29 (73)
Cattle	2	9	7	15 (38)	2 (4)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 44

		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 alnifolia												
83	**99**	-	33	66	-	-	33	67	-	-	0	34/40
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**40**	-	-	40	-	-	50	0	-	-	0	21/25
02	**60**	-	20	40	-	-	33	33	-	-	0	23/34
07	**20**	-	-	20	-	-	100	0	-	-	0	34/32
Artemisia tridentata vaseyana												
83	**2333**	100	-	1100	1233	-	54	33	53	-	63	22/34
89	**2433**	-	-	333	2100	-	56	26	86	11	12	24/20
97	**1260**	20	60	520	680	860	52	2	54	40	40	27/37
02	**1160**	-	120	380	660	600	26	55	57	29	29	27/31
07	**980**	-	100	360	520	520	55	10	53	29	41	25/34
Chrysothamnus depressus												
83	**133**	-	-	133	-	-	0	0	0	-	0	9/11
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**460**	-	20	440	-	-	0	0	0	-	0	8/11
02	**180**	-	-	160	20	-	11	0	11	-	0	7/10
07	**220**	-	-	220	-	-	0	0	0	-	0	7/12
Chrysothamnus nauseosus albicaulis												
83	**366**	-	66	300	-	-	36	0	0	-	0	18/13
89	**732**	-	166	333	233	-	5	0	32	-	0	20/17
97	**660**	-	60	600	-	-	3	0	0	-	0	19/19
02	**420**	-	-	280	140	20	19	5	33	-	0	22/30
07	**320**	-	-	280	40	-	13	0	13	-	0	28/33

		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)
Chrysothamnus viscidiflorus viscidiflorus												
83	**833**	-	100	733	-	-	0	0	0	-	0	16/13
89	**1698**	-	366	1166	166	-	0	0	10	-	2	14/16
97	**700**	-	20	660	20	20	0	0	3	-	0	15/18
02	**720**	-	60	660	-	-	0	0	0	-	0	11/17
07	**680**	-	-	640	40	20	0	0	6	-	0	15/22
Gutierrezia sarothrae												
83	**399**	-	66	333	-	-	0	0	0	-	0	9/8
89	**666**	-	-	633	33	-	0	0	5	5	5	9/10
97	**920**	-	280	600	40	-	0	0	4	-	0	9/8
02	**940**	-	-	920	20	-	0	0	2	-	0	8/6
07	**320**	20	-	260	60	-	0	0	19	6	6	9/8
Juniperus osteosperma												
83	**0**	-	-	-	-	-	0	0	0	-	0	-/-
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**40**	20	-	40	-	-	0	0	0	-	0	-/-
02	**60**	-	-	60	-	-	0	0	0	-	0	-/-
07	**120**	-	80	20	20	-	0	0	17	-	0	-/-
Prunus virginiana												
83	**133**	33	133	-	-	-	100	0	0	-	25	-/-
89	**200**	-	200	-	-	-	0	0	0	-	0	-/-
97	**60**	-	-	60	-	-	0	0	0	-	0	16/16
02	**40**	-	-	20	20	-	0	50	50	-	0	27/23
07	**20**	-	-	20	-	-	0	0	0	-	0	28/35
Purshia tridentata												
83	**266**	-	33	233	-	-	38	25	0	-	0	16/33
89	**300**	-	-	300	-	-	11	0	0	-	0	16/29
97	**540**	-	20	480	40	-	37	56	7	7	7	20/37
02	**380**	-	-	300	80	-	16	79	21	5	5	15/34
07	**400**	20	40	360	-	-	60	15	0	-	0	22/45
Rosa woodsii												
83	**0**	-	-	-	-	-	0	0	-	-	0	-/-
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**100**	-	40	60	-	-	0	0	-	-	0	10/13
02	**160**	-	100	60	-	-	0	0	-	-	0	7/10
07	**180**	-	120	60	-	-	0	0	-	-	0	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)
Symphoricarpos oreophilus												
83	**1299**	33	866	433	-	-	18	3	0	-	3	13/14
89	**1332**	-	566	766	-	-	0	0	0	-	0	17/11
97	**320**	20	220	100	-	-	0	0	0	-	0	20/47
02	**680**	-	180	500	-	-	6	0	0	-	0	15/32
07	**520**	-	40	460	20	-	31	27	4	-	0	18/36
Tetradymia canescens												
83	**66**	-	66	-	-	-	0	0	0	-	0	-/-
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**520**	-	120	400	-	-	0	0	0	-	0	10/14
02	**560**	60	80	480	-	-	4	0	0	-	0	8/15
07	**640**	-	60	420	160	-	3	0	25	-	0	9/16