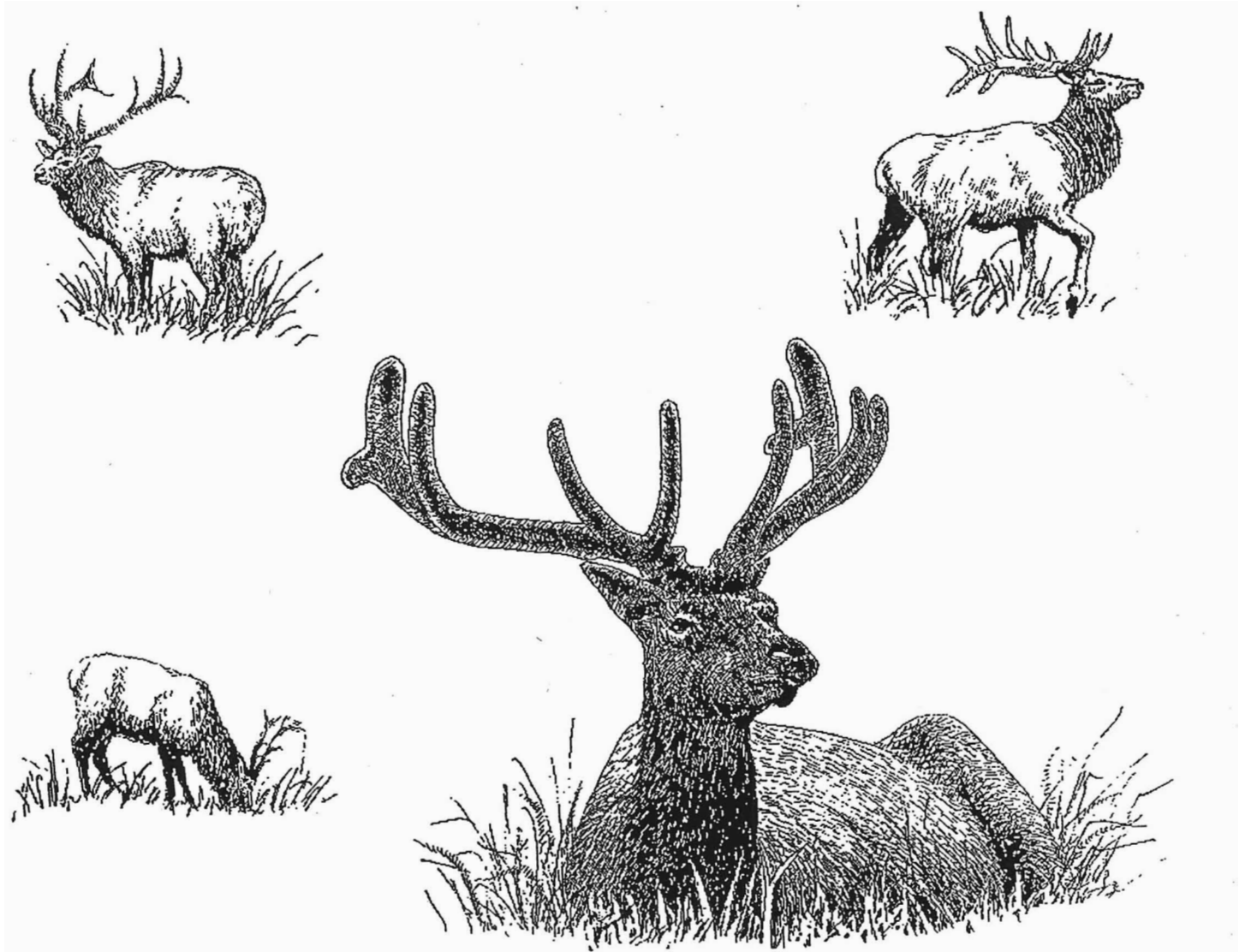


Herbaceous Utilization by Elk in Selected Meadows in the Gila Wilderness, Gila National Forest



Range Improvement Task Force
Agricultural Experiment Station
Cooperative Extension Service



College of Agriculture and Home Economics

**Herbaceous Utilization by Elk in Selected Mountain Meadows in the Gila
Wilderness, Gila National Forest**

by

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INTRODUCTION

The Gila National Forest has experienced rapid growth in numbers of Rocky Mountain elk (*Cervus elaphus canadensis*). Elk were first released into the Gila National Forest in 1926 (Ligon 1927). Their population has increased to levels that are now creating conflicts as agencies and resource managers try to manage lands for multiple uses and maintain sustainable habitats. The growth in elk numbers has resulted in numerous challenges, including the management of forage for both livestock and wildlife species. For example, some of the ranchers in the Gila National Forest argue that the steady increase in elk numbers has caused them to keep livestock numbers below stocking rates allocated by the United States Department of Agriculture (USDA), Gila National Forest (Treadaway et al. 1998):

As demands on natural resources continue to increase and diversify, managing lands for multiple uses will continue to grow in importance. For ranches in the Southwest, this often means producing livestock while maintaining wildlife habitat and while trying to balance the influences that domestic and wild ungulates have on each other and the forage base. Excessive use of herbaceous vegetation may occur in areas with high elk concentrations despite low livestock densities. In some areas, this excessive use appears to occur only during the spring, while other areas experience this level of grazing year-round, especially in riparian/cienega (saturated, sub-irrigated meadow area) areas, where vegetation is more appealing to herbivores. According to the 1996 amendment to the USDA-Gila National Forest Service management plan, the standard of grazing that is acceptable on riparian areas is 35 to 45% utilization, depending on range conditions, for a particular area (Treadaway et al. 1998). If the range condition is rated *excellent* to *good*, the suggested utilization percentage would be higher than for an area that has a range condition rated *fair* to *poor*.

One of the most ecologically significant habitat types in the Gila National Forest are mountain meadows. Not only do these areas tend to be more mesic (requiring a moderate amount of moisture), but they also do not support the dense overstory vegetation typical of surrounding uplands. As a result, they tend to produce a higher quality and quantity of forage per unit area than the surrounding forest. These factors combine to make mountain meadows attractive to wildlife. Also, recent studies have suggested that mountain meadows may be declining as the surrounding forest encroaches.

Because of the ecological, aesthetic, and recreational values associated with mountain meadows, information on elk use of herbaceous forage was monitored in the Gila Wilderness in the Gila National Forest in seven mountain meadows that had been excluded from domestic livestock grazing since 1952. These data should provide valuable information on the impact elk might have on mountain meadows and other habitats, thus helping natural resource managers improve management practices for elk in the Gila National Forest.

STUDY AREA

The Gila National Forest is located in southwestern New Mexico and occupies approximately 3.3 million acres (1.3 million hectares) of publicly owned forest and rangeland interspersed with small amounts of private land. Elevations vary from 4,500 feet to 11,000 feet. Average annual precipitation (rain and snow) ranges from 12 inches to 28 inches, depending on elevation (USDA 1990). Drought conditions are common at lower elevations in the semidesert portions of the forest (Murray 1992). Vegetation often

is stressed from lack of moisture in the early spring and fall. Normally, 2 or 3 years out of a 10-year period are deficient in summer and winter moisture in portions of the Gila National Forest (Murray 1992).

This study was conducted on the 92,000-acre Glenn Allotment in the Gila Wilderness, Gila National Forest (Figure 1). The New Mexico Department of Game and Fish purchased the allotment in 1951. After purchasing the allotment, all domestic livestock were removed and the allotment was restocked with elk. The only domestic livestock present on the allotment in 44 years have been recreational horses used around campsite areas and by outfitter-guides under Special-Use Permits. The Special-Use Permit still being issued today belongs to the Gila Hotsprings Ranch. This permit covers only a portion of the Glenn Allotment (Figure 1).

Seven mountain meadow sites were selected for study sites. These areas included Little Creek, Diablo Park, McKenna Park, Lilley Park, Creel Canyon, Prior Creek, and Woodland Park located in the Glenn Allotment (Figure 1).

METHODS

Data was collected using paired-cage comparisons (Cook and Stubbendieck 1986) from 2 caged/uncaged quadrats per site to determine elk utilization of herbaceous vegetation. At each site, one cage was placed in a more mesic area of the mountain meadow, while the other cage was placed in a more xeric area of the mountain meadow. The exclosures were established in August 1996.

The exclosures were made from 4-gauge hog wire and were in the shape of pyramids, approximately 5 feet tall and 4 ft X 4 ft at the base. Vegetation was clipped inside the exclosures (ungrazed) and outside the exclosures (grazed) using two 1 ft X 2 ft rectangular frames. Vegetation clippings were oven-dried at approximately 120°F for 12 hr to remove moisture. Vegetation was then weighed on a top loading Mettler scale and recorded as dry weight. Production of the ungrazed quadrats was computed by converting grams/2 ft² to lb/acre using the following formula:

$$\text{lb/ac} = \text{g}/2 \text{ ft}^2 \times \text{lb}/453.6\text{g} \times 43,560 \text{ ft}^2/\text{acre}$$

Utilization percentage was calculated by using the following formula:

$$\frac{[(\text{Average dry weight ungrazed quadrats} - \text{Average dry weight grazed quadrats})/\text{Average dry weight ungrazed quadrats}] \times 100}{}$$

After each data collection, exclosures were moved to a new randomly selected area. Data collections were performed prior to the growing season (early June) and following the growing season (early October). Data were collected for 1997, 1998, and 1999.

RESULTS and DISCUSSION

Elk use of herbaceous vegetation varied among mountain meadow sites; within individual sites, elk use of herbaceous vegetation varied between mesic and xeric areas. Also within individual sites, elk use varied by season (Table 1). Therefore, broad generalizations about the impacts of elk on mountain meadows in the Glenn Allotment are difficult to make. For example, elk use of mountain meadow sites depends heavily on the availability of upland forage, and elk densities and distribution. Both these factors vary considerably depending on climatic conditions.

Results suggest that elk use of herbaceous vegetation was greater during the dormant season (October – May, 43.4%) than during the growing season (June – September, 39.8%) (Table 2). Elk utilization of herbaceous vegetation during the growing season may be lower than in the dormant season because during the growing season, forage availability is greater and elk are more dispersed throughout the forest and less attracted to mountain meadow areas. During periods of above-average or adequate precipitation, sufficient quantities of upland forage may relieve grazing pressure on mountain meadows.

On average, elk use of herbaceous vegetation was greater in the more mesic areas (48.0%) than in the more xeric areas (35.2%) of mountain meadow sites (Table 2). This trend could be expected because vegetation is generally more succulent, palatable, and nutritious in mesic than in xeric areas, particularly during periods of low precipitation.

Results indicate that elk use of herbaceous vegetation during the dormant season was approximately 56% in the more mesic areas of mountain meadow sites (Table 2). This is in contrast to 30.8% elk use in more xeric areas of the mountain meadow sites during the dormant season (Table 2). Once again, one would expect the more palatable and succulent vegetation on the more mesic areas to drive higher elk use in them. In contrast, no dramatic differences in elk utilization were observed during the growing season between more mesic and more xeric areas of the mountain meadow sites (40.0% versus 39.7%, respectively). Greater moisture availability to vegetation and greater elk distribution may explain the similarity between more mesic and more xeric areas during the growing season.

Spatial and temporal variability among sites and years show interesting patterns. For example, elk utilization during the 1997 growing season exceeded the 50% utilization standard followed by the Gila National Forest Supervisor's Office in the more mesic areas of Diablo, McKenna, and Lilley Parks (Table 1). This standard also was exceeded in the more xeric area of Prior Creek during that same year. Following the 1998 growing season, elk utilization exceeded the 50% standard in the more mesic areas of McKenna and Woodland Parks and, once again, in the more xeric area of Prior Creek (Table 1). These patterns were more evident following the 1999 growing season. The 50% standard was exceeded dramatically in the more mesic areas of Diablo, McKenna, Lilley, and Woodland Parks (Table 1). During that same year, the 50% utilization standard was exceeded in the more xeric areas of McKenna and Woodland Parks, Creel Canyon, and along Little Creek (Table 1).

Despite these dramatic site-specific utilization levels at specific sites, average utilization over the three-year study period, and across mesic and xeric areas within mountain meadow sites, was below the 50% Gila National Forest utilization standard.

Although mountain meadows certainly are important foraging areas for elk, to further assess the impacts elk are having on the mountain meadows of the Glenn Allotment, changes in species composition need to be monitored. Along with appropriate elk harvest levels, management practices such as tree and shrub thinning, prescribed burning, and fertilization may influence dispersal of elk away from mountain meadow areas by enticing them into adjacent uplands.

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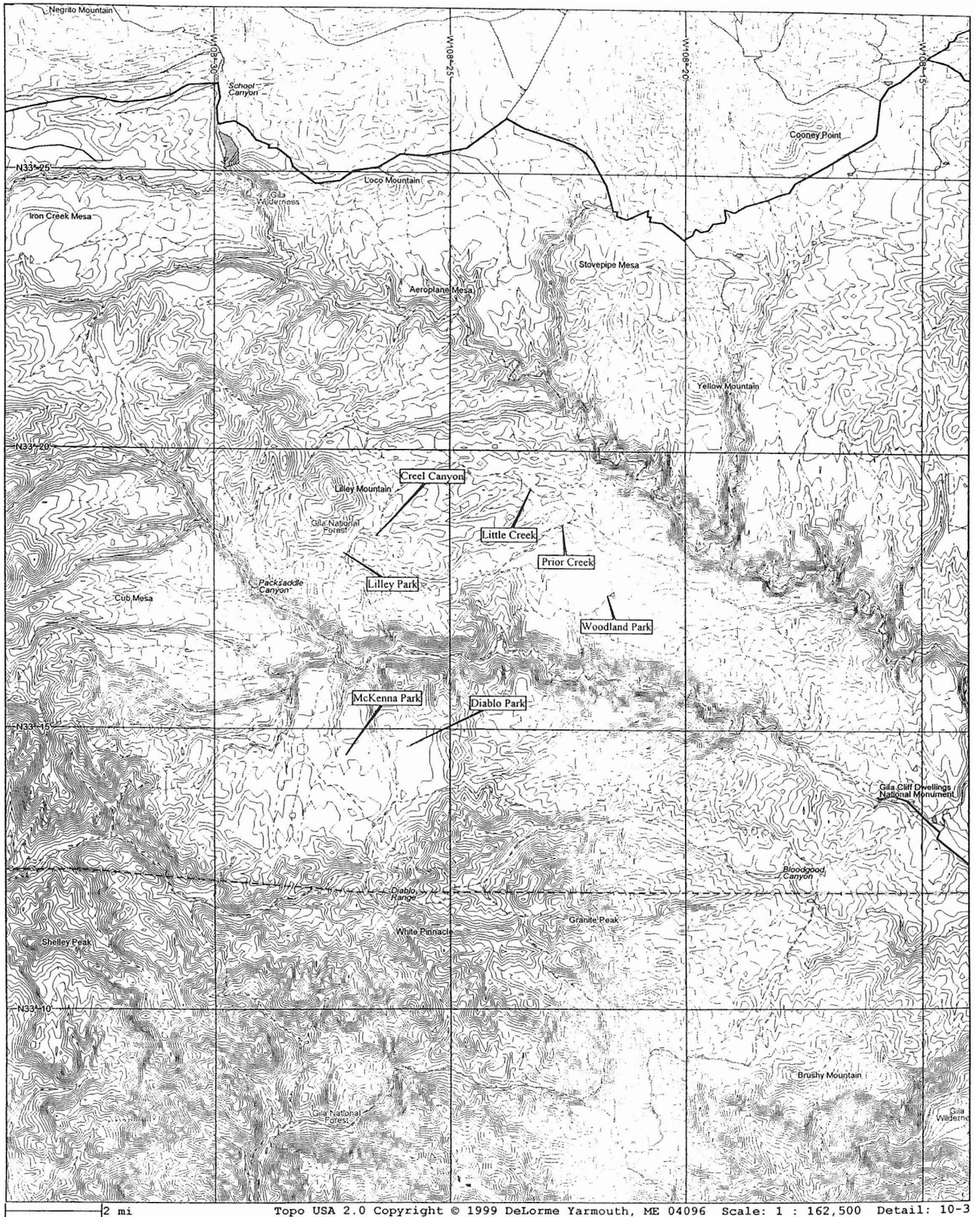
Table 1. Percent herbaceous utilization (\pm SE) in seven mountain meadow sites located on the Glenn Allotment from 1997 to 1999.

Study site	Percent utilization in the mesic area of the mountain meadow	Percent utilization in the more xeric area of the mountain meadow
June 1997		
Little Creek	37.1	49.6
Diablo Park	77.0	22.1
McKenna Park	No data	62.8
Lilley Park	50.5	34.8
Creel Canyon	64.0	-1.9
Prior Creek	67.5	2.8
Woodland Park	No data	-4.4
Average	59.2 \pm 7.0	23.7 \pm 10.0
October 1997		
Little Creek	11.0	25.2
Diablo Park	62.5	38.3
McKenna Park	61.0	25.2
Lilley Park	54.3	45.1
Creel Canyon	44.1	20.1
Prior Creek	29.7	70.3
Woodland Park	12.2	31.7
Average	39.3 \pm 8.3	36.6 \pm 6.5
June 1998		
Little Creek	17.5	12.9
Diablo Park	87.3	54.3
McKenna Park	94.8	No data
Lilley Park	No data	77.3
Creel Canyon	15.8	41.5
Prior Creek	26.3	20.2
Woodland Park	88.9	-3.1
Average	55.1 \pm 15.9	33.9 \pm 12.1
October 1998		
Little Creek	20.9	8.6
Diablo Park	30.1	25.7
McKenna Park	70.6	16.7
Lilley Park	9.1	No data
Creel Canyon	35.3	27.8
Prior Creek	1.4	64.5
Woodland Park	58.0	46.6
Average	32.2 \pm 9.5	31.7 \pm 8.4
June 1999		
Little Creek	68.6	26.7
Diablo Park	29.2	46.2
McKenna Park	83.1	42.1
Lilley Park	24.3	1.6
Creel Canyon	19.2	20.6
Prior Creek	73.4	81.6
Woodland Park	78.2	23.9
Average	53.7 \pm 10.6	34.7 \pm 9.6
October 1999		
Little Creek	25.4	66.0
Diablo Park	93.0	17.1
McKenna Park	82.5	83.7
Lilley Park	53.9	6.9
Creel Canyon	1.6	68.1
Prior Creek	0.8	39.6
Woodland Park	82.6	73.4
Average	48.5 \pm 14.9	50.7 \pm 11.2

Table 2. Average percent herbaceous utilization (\pm SE) in seven mountain meadow sites located on the Glenn Allotment from 1997 to 1999.

Seasonal Comparisons			
Dormant Season (October -- May)		Growing Season (June -- September)	
43.4 (10.8)		39.8 (9.8)	
Site Comparisons			
Mesic Mountain Meadow Sites		Xeric Mountain Meadow Sites	
48.0 (11.0)		35.2 (9.6)	
Site by Season Comparisons			
Mesic Mountain Meadow Sites		Xeric Mountain Meadow Sites	
Dormant Season (October -- May)	Growing Season (June -- September)	Dormant Season (October -- May)	Growing Season (June -- September)
56.0 (11.2)	40.0 (10.9)	30.8 (10.6)	39.7 (8.7)

Figure 1. General location of the Glenn Allotment and mountain meadow sites.



2 mi

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