

EFFECTS OF DOMESTIC LIVESTOCK AND NATIVE WILDLIFE GRAZING IN GRAND TETON NATIONAL PARK

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♦ INTRODUCTION

The Snake River plains and foothill areas of Jackson Hole have been grazed by domestic livestock since settlement of the area. Wildlife populations, including elk, mule deer, and antelope have historically used and continue to use the area. Moose are currently relatively abundant and a small herd of bison have been introduced. Currently, livestock continue to use part of the area contained in Grand Teton National Park either as a concession or due to authorization by Park enabling legislation. Park managers need information concerning the effects of grazing by large ungulates on vegetation resources to assist in effectively managing grazing to achieve desired plant community goals.

♦ OBJECTIVES

The objectives of this research are summarized as follows:

- 1) Determine kind and location of important potential natural plant communities (PNC's) within a study area largely defined by areas of current use by livestock, east of the Snake River, and adjacent comparable areas used only

by wildlife, west of the river.

- 2) Compare current vegetation composition on representative sites used by livestock and wildlife with potential composition for the same sites with an emphasis on comparisons of livestock and wildlife effects.
- 3) Estimate forage utilization on key sites and map utilization patterns.
- 4) Establish permanent vegetation trend monitoring transects.
- 5) Provide grazing management recommendations to the Park Service to assist them in reaching their vegetation management goals.
- 6) In addition to the efforts implied by the above objectives and due to the inclusion of a doctoral candidate in the research effort, we will intensively examine seasonal utilization levels of selected vegetation components in areas differentially occupied by the various grazing animal species of interest. Forage quality attributes; dry matter, N, P, K content, and *in vitro* digestibility; will be determined to provide explanation for differences in use of plant

species and seasonal shifts in use levels. We will test hypotheses concerning possible differences in amount and seasonal patterns of forage utilization by different animal species and that selection and use of forages by animals is related to forage quality attributes.

◆ STUDY AREA

The study area is in Grand Teton National Park and primarily includes areas along and west of the Snake River used by wildlife and areas of similar vegetation east of the river where livestock are a predominant or important user. Livestock areas include the Cunningham Cabin pasture, Triangle X guest ranch horse pasture, and the Uhl Draw/Elk Ranch Reservoir area.

◆ METHODS

Establishment of field sites for data collection began in June of 1991. Specific areas had been examined in August 1990 with respect to potential for high use by grazing animals and need for detailed vegetation analysis and monitoring. In these areas specific selected sites included: 1) In upland plains west of the Snake River, grazed only by wildlife, sites characterized by sagebrush-grass vegetation were located in the Potholes area (sec 23 R115W T44N) and Cow Lake (sec 32 R114W T44N) area. 2) In floodplains (Cottonwood dominated lowlands and wetlands characterized by willow/sedge communities) west of the Snake River, grazed only by wildlife, 2 sites were located across from the Triangle X horse pasture (sec 7 R114W T44N). 3) In the Elk Ranch Reservoir area, grazed predominantly by cattle in summer and by wildlife, sites were located in upland (sec 12 R114W T44N) and lowland (sec 1&2 R114W T44N) sagebrush-grass vegetation, and in a subirrigated graminoid community (sec 6 R113W T44N). 4) In the large pasture east of the Snake River and between the Cunningham Cabin and the river, grazed by both wildlife and livestock in summer, a site was located in a subirrigated graminoid vegetation type (sec 17 R114W T44N). 5) In floodplains east of the Snake River in the Triangle X horse pasture, grazed by horses in summer and wildlife, sites were located in cottonwood lowlands and subirrigated willow/graminoid habitats (sec 24 R115W T44N). 6) In Antelope Flats, the upland plain east of the Snake River, grazed by cattle during

trailing to summer pasture and wildlife, a site was located in sagebrush-grass vegetation (sec 2 R115W T43N). 7) In Blacktail Butte pasture, south of the Butte, grazed by cattle in early summer and wildlife, a site was located in sagebrush-grass vegetation (sec 7 R115W T42N).

Each of the 12 sites' installation had a permanently located trend transect with 20, .25 m², marked quadrats and 5, 1 m², movable cages. An additional 20 temporary quadrats were located parallel to the trend transect when sampling was conducted. Sites also had 2 utilization transects in herbaceous vegetation with 100 marked plants each. Sites in cottonwood and willow communities also had a utilization transect with 100 marked twigs of woody plants.

Permanent quadrat locations on trend transects, inside cages, and, temporary quadrat locations were sampled in July and August, near peak standing crop, with a .25 m² nested frequency quadrat frame (US Forest Service Region 4 Range Analysis Handbook). Nested frequency scores were recorded for every species of herbaceous and low shrub vegetation. Standing crop of major species and functional groups, ie. forbs, was estimated. One-half of the permanent and temporary and all caged quadrats were harvested with major species and functional groups as estimated bagged separately, dried, and weighed. Planned synthesis of these data include determining the relationship between estimated and harvested weights and adjustment of estimated weights by application of regression coefficients. Percent composition by weight of species and groups will be calculated. Relationships of composition to frequency scores will be examined. Comparisons of site frequency scores and composition to available estimates of potential plant community (PNC) scores and composition (from USDA Soil Conservation Service technical guides and Forest Service records) will be made to assess ecological condition.

The utilization transects were examined at about 3 week intervals following installation in June. Estimates of standing crop of marked herbaceous plants and twig lengths of shrubs were taken. Randomly selected samples of each species were harvested during the sampling period for dry weight determination and nitrogen analysis. Percent utilization will be calculated after adjustment of estimated weight for water content.

Density of major trees and shrubs in 3 floodplain/riparian areas was determined to assess relatively large scale use pattern effects on these types of habitats. Predominant use west of the Snake River is by wildlife including large concentrations of elk in late fall; the Triangle X pasture is used by horses and wildlife in summer and wildlife in winter; and Uhl Draw is heavily used by cattle in summer and wildlife in late fall and spring. Hunting may limit elk concentrations east of the river during fall. All areas have moose grazing in winter. Occurrence of different size classes of a species could indicate reproduction is occurring while a restricted number of one age class might suggest some limitation. Sampling consisted of counting the number of plants of each species of tree or shrub in 3 size classes (1 = < 1.5 m, 2 = 1.5-3 m, 3 = > 3 m) in a 20 by 20 m plot. Sampling was stratified into cottonwood communities (n=38 west of river) and willow dominated communities (n=39 west of river). In the floodplain west of the Snake River sample plots were located at about 0.4 km intervals if communities were present from near the old Bar-BC Ranch north to near RKO Road. At each point the nearest stand of cottonwood and willow community was sampled. Randomly located 20 by 20 m plots were placed in cottonwood and willow communities (n=25 in each) in the Triangle X horse pasture. Thirteen 30 by 30 m plots were located at 100 m intervals along Uhl Draw above the reservoir in a willow community. Mapping of utilization patterns was conducted in late August to assist in broadening the area of inference associated with individual study sites. Comments in this regard will primarily address differences in use of different habitats rather than spatial differences as customarily associated with mapping due to the biggest differences typically occurring between habitats rather than between different places in an area with the same habitat.

◆ RESULTS

Data summary is underway. A limited summary of the tree and shrub density without statistical analysis is available. Partial summaries of utilization have been done. Programming of the productivity summarization program has been completed and data entry has begun. Woody plant densities were sampled to test the hypothesis that fall and winter grazing by elk and moose west of the Snake River was limiting the recruitment of smaller plants into

larger size classes. Hunting may limit fall elk use east of the river. Circumstantial evidence of this occurrence would be a reduction west of the river in density of one or more of the smaller size classes. Ultimately taller size classes would also be reduced. For example, if the greater numbers of size class 2 and 3 cottonwoods in the cottonwood community east of the river (Table 1) are significantly greater then our hypothesis would be supported. Willows (*Salix spp.*) may also be more abundant (Table 1) east of the river. Probable trends in abundance of other palatable shrubs such as (water birch (*Betula occidentalis*), silverberry (*Elaeagnus commutata*), buffaloberry (*Shepherdia canadensis*); Table 1) are less obvious. Engelmann spruce (*Picea engelmannia*) appears to be increasing as indicated by the presence of all age classes, suggesting the probable replacement of deciduous tree and shrub communities by spruce. The narrow band of willow community along Uhl Draw does not appear as dense as other willow communities. However, this drainage is quite different in substrate and hydrology from the Snake River. This vegetation type is a small island in a larger area of predominantly sagebrush dominated vegetation and possibly more susceptible to browsing by all classes of grazers. Utilization transect summaries through late August for the Triangle X horse pasture wetland willow community sites indicate the following amounts for 4 common species: Kentucky bluegrass (*Poa pratensis*), 53%, sedges (*Carex sp.*) 41%, clover (*Trifolium sp.*) 40%, and thickspike wheatgrass (*Elymus lanceolatus*), 65%. These use levels are within generally acceptable ranges for riparian sites. The reconnaissance to map utilization patterns generally indicated that utilization levels at the sampling sites was representative of the area where the site was located through late August. Summer utilization of vegetation in the sagebrush-grass-community of the Potholes and Cow Lake areas was low. Elk using the area appeared to have made more use of edges of timbered areas particularly where aspen occurred. Floodplain herbaceous vegetation west of the Snake River was used at light to moderate levels. Highest use occurred in subirrigated perimeters of wet areas dominated by Kentucky blue-grass and clover. In the Cunningham pasture, subirrigated areas dominated by Kentucky bluegrass and clover were heavily used while adjacent wet areas characterized by tall sedges received little use. The Triangle X pasture had received light to moderate use overall. Few areas of intensive use were evident. Grazing in the Uhl Hill pasture by

Table 1. Tree and shrub density (plants/400 m² plot) by size classes (*1 = <1.5 m, 2 = 1.5-3 m, 3 = >3 m) in cottonwood and willow communities in selected areas (floodplain west and east in Triangle X horse pasture, of Snake River, Uhl Draw above reservoir) with differing grazing regimes in Grand Teton National Park.

Species	Size class	Cottonwood community			Willow community		
		West	East	Uhl	West	East	Uhl
Cottonwood (<i>Populus angustifolia</i>)	1*	11.3	11.8	-	2.7	1.2	0
	2	0.4	1.3	-	t	0.1	0
	3	4.3	6.6	-	0.5	0	0
Willow (<i>Salix spp.</i>)	1	2.8	4.6	-	23.6	57.5	9.8
	2	0.1	0	-	6.5	7.0	5.3
	3	0.1	0	-	0.1	t	0
Water birch (<i>Betula occidentalis</i>)	1	1.3	0	-	4.0	2.6	0
	2	0.3	0	-	5.4	2.4	0
	3	0.3	0	-	0.5	0.1	0
Silverberry (<i>Elaeagnus commutata</i>)	1	8.2	25.5	-	11.3	14.5	0
	2	0.4	0	-	t	0	0
	3	0	0	-	0	0	0
Buffaloberry (<i>Shepherdia canadensis</i>)	1	16.9	12.8	-	2.6	0.8	0
	2	0	0	-	0.1	0	0
	3	0	0	-	0	0	0
Spruce (<i>Picea engelmannia</i>)	1	1.8	1.1	-	2.2	3.0	0
	2	1.9	1.0	-	0.6	0.3	0
	3	4.4	2.4	-	0.4	0.1	0
Lodgepole (<i>Pinus contorta</i>)	1	0.7	1.1	-	0	0.2	0
	2	1.0	0.3	-	0	0	0
	3	1.4	0.5	-	0	0	0

cattle was concentrated in the irrigated areas and adjacent lowland sagebrush-grass area downstream from the reservoir. Herbage in the subirrigated zone along Uhl Draw had been used heavily while the wetter soil zone near the channel received only moderate use. Construction work on the reservoir had disrupted water availability. Little grazing was evident on the hills surrounding the reservoir despite abundant forages. Antelope Flats and the Blacktail Butte pasture had received very light use.

The need for improved grazing management in the Uhl Hill pasture is suggested by the concentration of cattle grazing along Uhl Draw riparian zones. Several activities should be considered, but it may be

premature for more detailed or site specific recommendations. Sagebrush burning could be used to increase the availability and quality of forages away from riparian areas. Spring developments or other water source augmentation in areas away from the riparian zone and the reservoir would reduce the continual need for cattle to return to the stream or reservoir for water. Increased herding of animals would minimize time spent near streams and the reservoir. Intensified management of the irrigated pastures such as crossfencing and water management could reduce the grazing time required from rangeland forages. Greater use and intensified management of pastures south and east of Blacktail Butte could also reduce the reliance on forages from the rangelands along Uhl Draw.