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VEGETATIVE RESPONSE TO PACK STOCK GRAZING IN MOUNTAIN MEADOWS

Keywords: horses, meadow productivity, mules, utilization, wilderness, stock grazing

Background & Management Issues:

In many wilderness areas in the mountainous Western United States, visitors use pack stock, such as horses or mules, to access remote areas. Animals are commonly kept overnight and allowed to graze in mountain meadows. Grazing impacts are seldom monitored and stock use is largely unregulated.

Most research on grazing impacts to mountain meadows has focused on the livestock production concepts of sustainable use and forage production, not on preservation of natural conditions. Consequently, wilderness managers lack the information needed to assess pack stock impacts and develop monitoring and management systems targeted at preserving natural conditions in wilderness.

Project Objectives:

- To evaluate the effects of recreational pack stock grazing on mountain meadows in the context of wilderness preservation objectives.

Project Description:

The study was conducted in Yosemite National Park, California. Three distinct meadow types characteristic of upper montane and subalpine meadows in the Sierra Nevada were studied: shorthair sedge (*Carex filifolia*), Brewer's reed grass (*Calamagrostis breweri*), and tufted hairgrass (*Deschampsia cespitosa*). Researchers applied treatments of varying grazing intensity to study plots over a five-year period. Horses and mules were picketed on four-meter long ropes and allowed to graze. Grazing time per plot varied between one and 15 hours depending on meadow type and grazing intensity treatment. Meadow response variables, including biomass, vegetative cover, litter cover, bare soil cover, and species composition, were measured annually before and after grazing.

Results:

Comparison of grazed and ungrazed plots

After the second, third, and fourth year of grazing, grazed plots had less biomass than ungrazed plots, suggesting that grazing reduced meadow productivity. Grazing also resulted in increases in basal bare soil. The percentage of litter cover was less clearly correlated to grazing treatments.

Species composition was also affected by grazing. One year following the final treatment year, differences in composition between grazed and ungrazed plots were statistically significant in each meadow type. The proportion of graminoid cover on grazed plots was consistently less in all meadows.

Effect of grazing intensity

In all three meadows, biomass decreased as grazing intensity increased. Increases in grazing intensity were also associated with increases in bare soil and decreases in vegetation and litter cover. Changes in species composition were not predictably related to differences in grazing intensity.

Management Implications:

❖Grazing by packstock, even at very low intensities of a few hours per year, has the potential to compromise the naturalness of wilderness mountain meadows.

❖Managers are responsible for developing guidelines for how much grazing and impact to allow on a meadow. Guidelines developed for production livestock systems may not be appropriate for managing wilderness.

❖Productivity (biomass), basal vegetation cover, and bare soil cover seem to respond most consistently to increased grazing pressure, making these parameters the most useful in developing a program to monitor grazing impacts.

❖Given the difficulties of monitoring grazing intensity and vegetative characteristics, it may be more effective for managers to develop use guidelines based on animal nights per year for some sites. These guidelines could be adjusted as needed based on monitoring data.

Publications / Products:

❖ Cole, David N., van Wagtendonk, Jan W., McClaran, Mitchel P., Moore, Peggy E., McDougald, Neil K. 2004. Response of mountain meadows to grazing by recreational pack stock. *Journal of Range Management* 57(2): 153-160. **Leopold Publication Number 506**.

❖ McClaran, Mitchel P.; Cole, David N. 1993. Packstock in wilderness: use, impacts, monitoring, and management. Gen. Tech. Rep. INT-301. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 33p. **Leopold Publication Number 243**.

❖ Moore, P. E.; Cole, D. N.; Wagtendonk, J. W. van; McClaran, M. P.; McDougald, N. 2000. Meadow Response to Pack Stock Grazing in the Yosemite Wilderness: Integrating Research and Management. In: Cole, David N.; McCool, Stephen F.; Borrie, William T.; O'Loughlin, Jennifer, comps. Wilderness science in a time of change conference—Volume 5: Wilderness ecosystems, threats, and management; 2000 May 23– 27; Missoula, MT. Proc. RMRS-P-15-VOL-5. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 160-164. **Leopold Publication Number 396**.

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