Identifying Relationships Between Livestock Grazing, Plant Community Characteristics and Soil Attributes in Central Sierra Nevada Meadows

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Mountain meadows are highly productive and support important ecosystem functions and services. Feedbacks between biotic and abiotic components and disturbances are important factors determining the stability and resilience of these systems. In the central Sierra Nevada, most of the forage base in upper montane grazing allotments is provided by wet meadows. There is concern that livestock grazing may have detrimental effects on meadow function; however, there is limited research in this region on the specific interactions between livestock utilization, plant community characteristics, and soil attributes. Our overall objective is to investigate how variation in livestock foraging correlates with variation in soil quality, forage quality, and plant community composition in mountain meadows of the central Sierra Nevada. Nine wet, upper montane meadows in the Sierra National Forest were enrolled into this study. Within each meadow, 3-5 paired plots were located along transects crossing broadly identified plant communities. Livestock utilization, community composition/production, and forage quality were collected at each paired plot. Soil profiles were excavated at each paired plot site to characterize soil morphology (e.g. soil color, structure, presence of redox features). Soil samples were collected from each genetic horizon and analyzed for percent organic matter, degree of decomposition, soil nitrogen analyses (NO3-N, NH4-N), pH, and bulk density. This system provided a unique opportunity to examine ungulate-vegetation interactions within a complex, natural setting of practical importance to land management. Preliminary results and statistical analyses will be reported.

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