



Denitrification as a Function of Moisture Gradients and Annual Livestock Utilization in Upper Montane Meadows of the Central Sierra Nevada

Leslie M. Roche, K.W. Tate, A.T. O'Geen and D.J. Eastburn; University California-Davis; Contact Author Email: lmroche@ucdavis.edu

Mountain meadows are highly productive and support important ecosystem functions and services. In the central Sierra Nevada, wet meadows provide most of the forage base on high elevation livestock grazing allotments, resulting in concerns about effects of livestock grazing on meadow function. Soil compaction, vegetation removal, and nutrient redistribution by livestock can alter meadow nutrient cycling and productivity. Several studies have suggested that denitrification is a major pathway of nitrogen loss in grazed systems; however, there is limited research that examines: 1) denitrification rates in grazed, wet meadows in the Sierra Nevada; 2) environmental factors that determine denitrification rates; and 3) denitrification rates as a function of grazing intensity. Our objectives were to quantify changes in denitrification rates in relation to: 1) degree of decomposition and organic matter availability within the soil profile, 2) soil moisture gradients within meadow catenas, and 3) livestock utilization. Four upper montane meadows on the Sierra National Forest were selected for this study. Sample sites were established along transects, perpendicular to meadow flow. During the 2006 and 2007 seasons, paired plots were established at each sample site to measure annual herbaceous production, livestock utilization and species composition. Soil profiles were excavated at each site to characterize soil morphology (e.g. color, structure, redox features). Soil samples were collected from each genetic horizon for denitrification potential analyses (incl. C:N ratio, NO₃-N, NH₄-N, pH). To quantify landscape variation in nutrient deposition, fecal loading was determined along each transect. Preliminary results and statistical analyses will be reported.

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