

Livestock Grazing and Landscape Diversity in Vernal Pools

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Overview and Approach

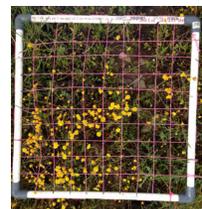
Livestock grazing is increasingly being used as a management tool to control exotic species in California's vernal pool ecosystems. It is important to understand the long-term impacts of livestock grazing on patterns of plant diversity and composition. In spring 2015 I conducted an experimental comparison of plant diversity between historically grazed and ungrazed vernal pools.

Methods

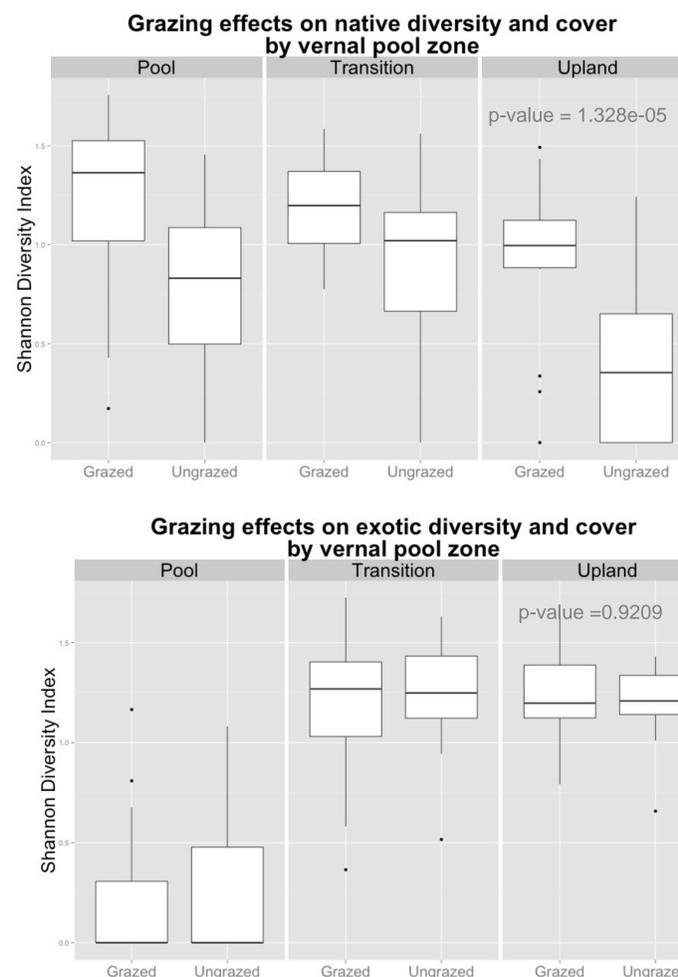
Study Site: Rancho Seco is a 1132-acre site in SE Sacramento County owned by the Sacramento Municipal Utility District (SMUD) with over 50 acres of protected vernal pools across several soil types and a wide range of pool characteristics. A fence divides vernal pools that have been grazed continuously for over 45 years and pools that have been fenced off from livestock since the 1970s.

Comparing Plant Communities: I paired 15 grazed and 15 ungrazed pools based on soil type, water depth, depth to claypan, and size. I established nine vegetation quadrats per pool, spanning the pool bottom, edges, and upland (30 pools, 270 quadrats total). During peak flowering season, I

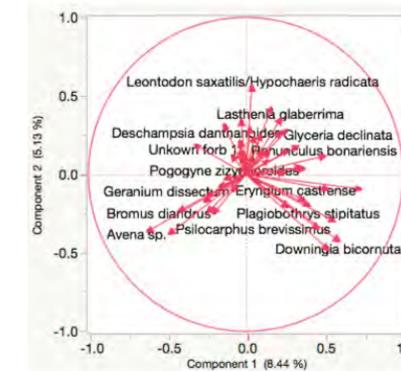
sampled these quadrats for grasses and forbs, and calculated richness, cover and abundance, for both individual species and for native vs. exotic species.



Preliminary Results



Results Summary:

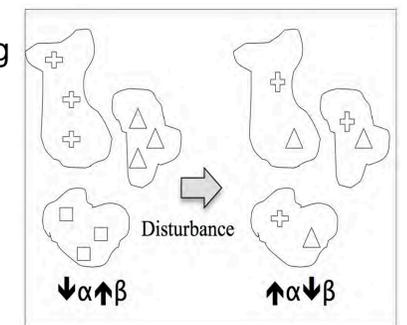


- **Grazed pools had significantly higher native diversity and cover than ungrazed pools**
- **There was no significant difference in exotic diversity and cover between grazed and ungrazed pools**

PCA analysis reveals species clustering significantly associated with grazing along PC #1 ($p=0.0049$)

Future Research Directions

I am interested in whether disturbance-mediated changes in diversity may be stronger between pools (β diversity) than within-pools (α diversity). It is possible that disturbance could increase plant diversity within pools while homogenizing plant communities between pools. I will investigate grazing effects on α and β diversity across site characteristics, grazing level, and regional climate.



Vernal pools are characterized by high β diversity--adjacent pools may host unique species assemblages

Acknowledgements

This research was made possible by grants from the Davis Botanical Society, CNPS Santa Clara Valley Chapter, Northern California Botanists. Special thanks to Emily Bacchini, Sacramento County Utilities District, and Research Assistants: Paola Pomeroy and Jared Borba.



I am seeking field sites with grazed vernal pools for my cross-sectional study. Please contact jmichaels@ucdavis.edu if you are interested.