



By Matt Germino

Browsing the Literature

This edition of Browsing the Literature includes papers that are global in scope, or papers from Australia, China, Africa, and the USA. This suite of publications includes papers with generalizable impact. Additionally, we have a nice contribution from Jocelyn Aycrigg at the University of Idaho.

As always, please let me know of forthcoming literature in journals other than Rangeland Ecology and Management or Rangelands. If you provide a summary using the style and format below, I will also include it in the column and acknowledge you.

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Papers of global scope

Strategies for global rangeland stewardship: Assessment through the lens of the equilibrium-non-equilibrium debate

Briske, D.D., Coppock, D.L., Illius, A.W. and Fuhlendorf, S.D. 2020. *Journal of Applied Ecology* (In Press). <https://ida.lib.uidaho.edu:3454/10.1111/1365-2664.13610>

This review suggests that equilibrium and non-equilibrium relationships between herbivores and plants coexist in a given rangeland. Furthermore, resource heterogeneity influences herbivore persistence, feedbacks vary with scale, and different stable community states can co-occur in a rangeland site. The implications of these findings for grazing management strategies that has led to overstocking during conditions such as drought are addressed.

Accelerated dryland expansion regulated future variability in dryland gross primary production

Yao, J., Lui, H., Huang, J., et al. 2020. *Nature Communications* 11:1665. <https://doi.org/10.1038/s41467-020-15515-2>

This modeling exercise demonstrated that by 2100, the gross primary production (GPP) attributed to the earth's drylands will increase by 12% compared to the years from 2000–2014, but the corresponding displacement of more productive ecosystems and the expected degradation of existing drylands is expected to decrease global GPP overall.

From Australia

Livestock and kangaroo grazing have little effect on biomass and fuel hazard in semi-arid woodlands

Travers, S.K., Eldridge, D.J., Koen, T.B., Val, J., and Oliver, I. 2020. *Forest Ecology and Management* 467. <https://doi.org/10.1016/j.foreco.2020.118165>

In three plant communities of eastern Australian rangelands, biomass measurements suggest that kangaroo grazing could reduce understory wildfire fuels in one community, but livestock grazing either increased fuel loading by causing increased shrubs in another of the

communities or had no effect on fuel loads in the other communities. A model created from the measurements suggested that increasing livestock grazing by two-fold also only had trace effects on litter fuel loads. Rabbits had no effect on fuel loads.

From Africa

Grasses continue to trump trees at soil carbon sequestration following herbivore exclusion in a semiarid African savanna

Wigley, B.J., Augustine, D.J., Coetsee, C., Ratnam, J., and Sankaran, M. 2020. *Ecology* e03008. 10.1002/ecy.3008.

In three 20-year old exclosures in Kenyan rangelands, exclusion of herbivores with fencing led to large increases in grass cover and abundance of woody plants, causing an estimated capture of 8.5 tons/ha in carbon aboveground. Belowground, carbon increased 54% to 20.5 tons/ha. C4 grasses appeared to contribute largely to the carbon capture.

From China

Climate–grazing interactions in Mongolian rangelands: Effects of grazing change along a large-scale environmental gradient

Ahlborn, J., von Wehrden, H., Lang, B., Römermann, C., Oyunbileg, M., Oyuntsetseg, B. and Wesche, K., 2020. *Journal of Arid Environments* 173: <https://doi.org/10.1016/j.jaridenv.2019.104043>

On 15 transects placed across a 600 km climate gradient in Mongolia, grazing was limited to sacrifice areas in drier regions deemed to be non-equilibrium rangelands, and in the wettest regions considered equilibrium rangelands, grazing-tolerant species were more abundant. The authors suggest that grazing impacts need to be more carefully managed in rangelands in the transition between equilibrium and non-equilibrium conditions.

Livestock overgrazing disrupts the positive associations between soil biodiversity and nitrogen availability

Wang, L., Delgado-Baquerizo, M., Zhao, X., Zhang, M., Song, Y., Cai, J., Chang, Q., Li, Z., Chen, Y., Liu, J., Zhu, H., Wang, D., Han, G., Liang, C., Wang, C., and Xin, X. 2020. *Functional Ecology* (In Press) <https://doi.org/10.1111/1365-2435.13575>

In long-term grazing exclosures in northern China, fungal diversity and presence of Actinobacteria and nitrogen are positively related, but this relationship is absent in grazed areas. In overgrazed areas, nitrogen was positively related to Bacteroidetes and Acidobacteria.

From the USA

Modifying connectivity to promote state change reversal: the importance of geomorphic context and plant–soil feedbacks

Peters, D.P., Okin, G.S., Herrick, J.E., Savoy, H.M.,

Anderson, J.P., Scroggs, S.L., and Zhang, J. 2020. *Ecology* (In Press). 10.1002/ecy.3069

Over 9 years in the southwestern US rangelands, experimentally blocking flow of water, wind, and soil among microsites led to increased litter and perennial grass cover. The effects were strongest on sandy soils influenced by wind but were also detected on alluvial soils influenced by water erosion.

Responses and resilience of tallgrass prairie streams to patch-burn grazing

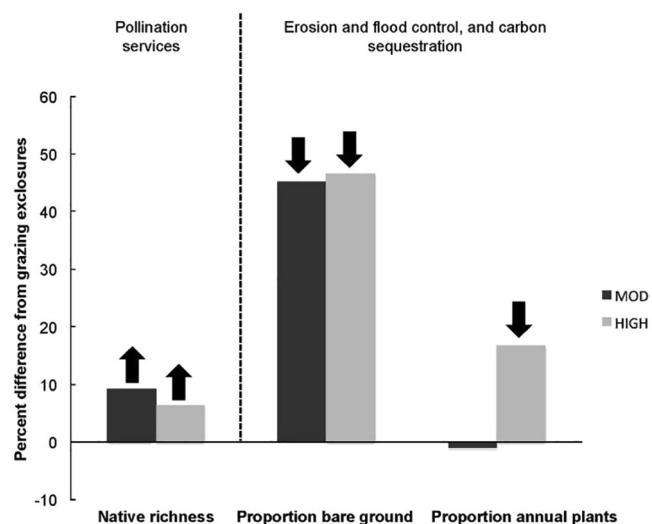
Fulgoni, J.N., Whiles, M.R., Dodds, W.K., Larson, D.M., Jackson, K.E., Grudzinski, B.P. 2020. *Journal of Applied Ecology* (In Press). <https://ida.lib.uidaho.edu:3454/10.1111/1365-2664.13623>

Stream responses to domestic grazing were evaluated in Missouri, USA, for 2 years before and 3 years following patch burns for 1) exclosures covering entire watersheds, or 2) just riparian areas. Riparian fencing was sufficient to alleviate grazing impacts on channel morphology, water quality, and insect communities, and 2 years of rest led to recovery of all stream properties except channel morphology.

Complex response of vegetation to grazing suggests need for coordinated, landscape-level approaches to grazing management

Souther, S. Loeser, M., Crews, T.E., and Sisk, T. 2019. *Global Ecology and Conservation*, 20, <https://doi.org/10.1016/j.gecco.2019.e00770>

Over a 20-year study in a high elevation semiarid grassland, moderate cattle grazing was found to increase native species richness and correlated ecosystem services like pollination services, while also increasing erosion, reducing water infiltration and altering nutrient cycling, due to increased soil exposure and disturbance (See figure, permission from Creative Commons CC-BY-NC-ND; solid bars are moderate' grazing, grey bars are high' grazing levels). The potential for cattle grazing to exert antagonistic effects on ecosystem services, depending on grazing intensity, suggests that livestock management decision should be tailored to individual management and conservation goals that address the spatio-



temporal variability of arid grasslands. (Paper found and summarized by Jocelyn L. Aycrigg)

Papers on sagebrush seedling establishment in the western US

Small-scale water deficits after wildfires create long-lasting ecological impacts

O'Connor, R.C., Germino, M.J., Barnard, D.M., Andrews, C.M., Bradford, J.B., Pilliod, D.S., Arkle, R.S., Shriver, R.K. 2020. *Environmental Research Letters*, <https://doi.org/10.1088/1748-9326/ab79e4>

Detailed soil-water availability model and vegetation data for hundreds of previously burned areas in sagebrush-steppe rangelands across the western US reveal that sites where sagebrush did not recover after fire had subtle but critical deficit in soil water compared to sites where sagebrush did recover. The deficit was less soil water in the top 5 cm of soil for about a week period in the first spring (March) following wildfire, which is a critical window for sagebrush establishment. This water deficit constitutes ecological drought because it causes a major shift in long-term rangeland plant communities.

Intraspecific variation in surface water uptake in a perennial desert shrub

Zaiats, A., Lazarus, B.E., Germino, M.J., Serpe, M., Richardson, B., Buerki, S., Caughlin, T., 2020. *Functional Ecology*, <https://doi.org/10.1111/1365-2435.13546>

Seed-zone guidance for restoration plantings and seedings use common-garden studies for parameterization. Common gardens have plants from different geographies (and climates) planted together in the same environment, and any differences in growth and survival can be related to the climate of plant origin and used to create seed zones. This study injected stable-isotope labeled water under select plants in a common garden of sagebrush, and found that many neighboring plants captured the label. The overlapping root systems indicate that growth and survival of plants in the gardens is likely affected by biotic interactions, and not just climate effects.

Improving restoration success through microsite selection: an example with planting sagebrush seedlings after wildfire

Davies K.W., Bates J.D., and Clenet D. 2020. *Restoration Ecology*, <https://ida.lib.uidaho.edu:3454/10.1111/rec.13139>

In rangelands of the Northern Great Basin USA, sagebrush seedlings planted after wildfire into microsites where sagebrush existed before fire (and created resource islands) had greater establishment than seedlings planted into bare interspaces. This pattern was in spite of exotic annual grass competitors also increasing over time in the resource islands.

Rangelands 42(3):84-86

doi: <https://doi.org/10.1016/j.rala.2020.04.008>

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