



By Matt Germino

Browsing the Literature

The writing of this issue of Browsing the Literature comes just a short period after the writing of the last issue, and so fewer new papers readily appeared in my literature searches on terms like “rangelands,” “livestock,” “grazing,” and “semiarid.” The resulting papers in this issue are oriented to ecological problems in rangelands, two of which are from an issue of *Ecosphere* dedicated to “Desert Dynamics” and two other papers regarding vegetation recovery on the 2015 Soda Wildfire, which is the first rangeland fire response in the United States to formally incorporate adaptive management.

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Soil water dynamics at 15 locations distributed across a desert landscape: insights from a 27-yr dataset. Duniway, M.C., Petrie, M.D., Peters, D.P.C., Anderson, J.P., Crossland, K., and Herrick, J.E. 2018. *Ecosphere* 9(7).

Using a 27-year archive of soil moisture data from the Chihuahuan Desert of North America, these authors describe the spatiotemporal patterns of soil water in relation to climate variation, soils, topography, and vegetation type. Deep soil (to 3 m depth) wetting occurred mainly after just three episodic precipitation events over the 27 years. Another interesting result was similar soil water dynamics in different plant community types compared with stronger variation among undershrub and interspace microsites within stands.

Shrub encroachment, productivity pulses, and core-transient dynamics of Chihuahuan Desert rodents. Schooley, R.L., Bestelmeyer, B.T., and Campanella, A. 2018. *Ecosphere* 9(7).

Long-term data from the Jornada Long-Term Ecological Research site in the Chihuahuan Desert suggest that rodents are more abundant on unencroached areas on a biomass basis, as measured along a gradient of conversion from blue grama grass to mesquite shrubland. Granivorous rodents were common across sites, whereas those eating leaves were more responsive to local-scale dynamics.

Thresholds and hotspots for shrub restoration following a heterogeneous megafire. Germino, M.J., Barnard, D.M., Davidson, B.E., Arkle, R.S., Pilliod, D.S., Fisk, M.R., and Applestein, C. 2018. *Landscape Ecology* 33:1177–1194.

Despite widespread seeding of sagebrush after wildfire, it is declining, and insights on factors affecting its recovery are needed to improve restoration. Using a rare dataset with >2,500 large plots measured over nearly 300,000 rugged acres that were recently burned on the Soda Wildfire in Oregon and Idaho, these authors revealed that seeding sagebrush can greatly increase its abundance, particularly where fertile soil islands left by sagebrush before fire or other soil-surface features are present and where annual grasses are scarce and perennial grasses are moderately abundant. Thresholds in the response of sagebrush to these factors were revealed, which are particularly valuable for setting seeding treatment objectives and evaluating treatment success.

Community response to landscape-scale post-fire herbicide (imazapic) application. Applestein, C., Germino, M.J., and Fisk, M.R. 2018. In Press. *Invasive Plant Science and Management*.

Herbicides are a critical tool for temporarily reducing the ever-increasing threats of exotic invaders, but few tests of the target and nontarget effects of herbicides are made at the scale at which management treatments are applied. This is particularly true for herbicides used on widespread species in rangelands. This study evaluated a pre-emergent herbicide for exotic annual grasses in manager's treatments applied on thousands of hectares on the Soda Wildfire area, and revealed that delayed spraying after fire can still reduce exotic annuals with minimal nontarget effects on native and seeded perennials.

Habitat-contingent responses to disturbance: impacts of cattle grazing on ant communities vary with habitat complexity. Arcoverde, G.B., Andersen, A.N., Leal, I.R., and Setterfield, S.A. 2018. In Press. *Ecological Applications*.

The responses of ant communities to grazing (measured as distance from water) increased with habitat complexity in semiarid rangelands of Australia. This finding highlights how the same type and intensity of disturbance can have different impacts depending on the site and community context. Litter cover was an important variable linking ant responses, habitat complexity, and livestock grazing.

Vulnerabilities of Southwestern US rangeland-based animal agriculture to climate change. Havstad, K.M., Brown, J.R., Estell, R., Elias, E., Rango, A., and Steele, C. 2018. *Climatic Change* 148:371–386.

Livestock grazing has been a part of the Southwestern US for the last four centuries in many different management regimes. This forum-opinion style paper describes the elements of the different management regimes that have conferred resilience to the well-known wet and drought cycles

known in this region and the socioeconomic and management factors that need change to sustain rangeland resilience.

Adapting management to a changing world: Warm temperatures, dry soil, and interannual variability limit restoration success of a dominant woody shrub in temperate drylands. Shriver, R.K., Andrews, C.M., Pilliod, D.S., Arkle, R. S., Welty, J.L., Germino, M.J., Duniway, M.C., Pyke, D.A., and Bradford, J.B. 2018. In Press. *Global Change Biology*.

Sagebrush steppe is threatened by invasive grasses and wildfires, and insights on how success of restoration seedings of sagebrush and other native species is needed. Over 771 large plots spanning 177 wildfires that occurred in recent decades throughout the Great Basin, sagebrush recovery was far more related (positively) to winter snowpack and spring water availability than to any other climate variables. In addition, the Bayesian modeling used revealed how iterative seeding attempts made over years can increase the likelihood that seedlings can coincide with these favorable weather conditions and increase likelihood of restoration success.

Changes in structure and physiological functioning due to experimentally enhanced precipitation seasonality in a widespread shrub species. Reinhardt, K., McAbee, K., and Germino, M.J. 2018. In Press. *Plant Ecology*.

In sagebrush steppe of the Snake River Plain, Idaho, nearly 20 years of sustained annual increases in precipitation led to much stronger structural changes in big sagebrush, such as adjustments in community leaf area, amount of water-conducting vascular tissue, and hydraulic conductivity of stems, than leaf-level physiological changes such as in photosynthesis. Timing of precipitation appears more important than the annual amount for sagebrush.

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