Editor's Choice from *Rangeland Ecology & Management*

Volume 43

A change in the ecological understanding of rangelands in the Great Basin and Intermountain West, and implications for management: Revisiting Mack and Thompson (1982)

Barry L. Perryman, Brad W. Schultz, and Paul J. Meiman

Humanists and ecologists have a lot in common with respect to change. They both work to foster positive trajectories in community change toward sustainable and healthy futures. In their view, the past provides experiences and lessons to guide the creation of the future. However, most will agree, experience is a tough teacher because you get the test first, and then you get the lesson. Everyone agrees that the only constant within communities is change. Creating the future is an exciting and motivating endeavor because it provides an opportunity to change it for the better.

In rangeland management, we are adopting a new sounding paradigm that makes me wonder if we are setting managers up to fail. The concepts of resistance and resilience are becoming important plant community objectives in land management. Resistance is the ability for an ecosystem to remain unchanged when subjected to a disturbance(s). High resistance is good in most cases, unless the community is dominated by invasive weeds. Resilience is the ability and rate of an ecosystem to recover from a disturbance and return to its pre-disturbed state. Some ecosystems can shift from their previous state and still return to pre-disturbance conditions. Amplitude is a measure of the extent an ecosystem can be shifted from its previous state and still return to a pre-existing state.

If change is one characteristic that seems to occur without a doubt, it seems our management objective should be to direct that change in a positive way. If our goal is to make the future better than the past, the concept of ecological resistance and resilience needs additional thinking, especially in the face of ecological disturbances, such as climate change. Ultimately, as environmental conditions and selection pressures change, plant communities adapt and evolve to "fit" new environmental conditions. Some plants evolve, while others acclimate, but regardless these mechanisms allow communities to change for the better. The tendency to think of resistance and resilience as moving towards a desired plant community that is stable and resists change or recovers to a predetermine community composition may, in fact, be asking managers to design programs in contrast to natural evolutionary trajectories. These situations will force scientists and managers to develop and adopt new management paradigms.

The Editor's Choice for *Rangeland Ecology & Management* Volume 76 is a perfect example of the need to reevaluate common assumptions about the ecology and management of sagebrush and salt desert shrub systems in the Great Basin and Intermountain West. The most influential ecological claim of the past 40 years is based on ideas presented by Mack and Thompson (1982); that Great Basin and Intermountain West plant communities evolved with few or perhaps no large hooved-grazing animals. This claim was expounded on by others reaching the conclusion that virtually every undesirable change that has occurred in the region since European settlement was the result of introducing large domestic grazing animals into ecosystems not adapted to large herbivores. There is no question that major changes in plant communities are the result of European settlement. Legacy grazing practices over more than a century ago altered fire regimes that fostered downslope woody plant encroachment and proliferation of invasive species. Large segments of society have cited these effects as reasons for removing not only domestic animals from the region but removing all human induced disturbances in the hope that these ecosystems will return to what they were prior to European settlement. However, for semi-arid ecosystems, it is well documented that the removal of disturbances like grazing does not initiate a return to the original ecological state.

In this Editor's Choice article, Barry L. Perryman, Brad W. Schultz, and Paul J. Meiman set out to re-evaluate this ecological claim in light of current scientific knowledge and offer a new science-based vision for ecosystem management. They begin by

revisiting the archaeological and historical record of vegetation and large grazing animals. They also revisit interpretations of the rangeland plants and plant communities, forage quality and nutrition, and soil biotic crusts east and west of the Rocky Mountains adding the information necessary for a more comprehensive interpretation. They propose an alternative paradigm to guide management and conservation of sagebrush, and other ecosystems.

They believe their new management paradigm should replace the idea that the pre-European historical plant community should be considered the desired and target community of the future. Furthermore, they believe management should focus on repairing and maintaining ecological processes as plant community outcomes. These outcomes are necessary precursors to other activities and goals like the creation, fostering, and repair of seasonal wildlife habitats, and the reintroduction of desired perennial and annual plant species that support multiple societal values associated with rangeland resources. Outcome based management maintains our options for the future. To be successful, this management approach requires the flexibility to change inputs, schedules, and degrees or scales of use or intensities based on seasonal or annual opportunities identified by on-the-ground managers. Maintaining ecological processes as outcomes increases the probability of ensuring for future generations, the promotion of health, diversity, and productivity of public and private rangelands

Please look at this excellent paper in *Rangeland Ecology & Management* Volume 76. This paper provides a fresh method for managing complex rangeland processes using contemporary scientific understanding of the ecology of ecosystems to foster positive change for future generations.

Roger Sheley
Editor-in-Chief
Rangeland Ecology & Management

Rangelands 43(3): 125–126
doi: 10.1016/j.rala.2021.04.001