Highlights

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Effects of Grazing Pressure on Efficiency of Grazing on North American Great Plains Rangelands

A. J. Smart, J. D. Derner, J. R. Hendrickson, R. L. Gillen, B. H. Dunn, E. M. Mousel, P. S. Johnson, R. N. Gates, K. K. Sedivec, K. R. Harmon, J. D. Volesky, and K. C. Olson

Harvest efficiencies (proportion of forage consumed over forage produced) and grazing efficiencies (proportion of forage consumed over total forage disappearance) were compared to a grazing pressure index (animal unit days divided by forage weight) on six long-term grazing studies in the Great Plains. Both harvest and grazing efficiencies increased linearly with increased grazing pressure. Use of a grazing pressure index to define stocking rates across rangeland ecosystems should improve communication among scientists, resource managers, and the public to achieve both production and conservation goals on these lands.

Economically Optimal Stocking Rates: A Bioeconomic Grazing Model

John P. Ritten, Christopher T. Bastian, and W. Marshall Frasier

This dynamic bioeconomic model focuses on economically optimal stocking decisions while taking into account changes in the forage resource. The model is parameterized for a stocker operation in central Wyoming. Regardless of the scenario analyzed, the general rule of 50% utilization is determined to be an economically sound management strategy. Forage growth rates and the Michaelis constant most heavily influence economically optimal stocking rate decisions. Both grain and cattle prices impact financial returns yet do not directly impact optimal stocking decisions by cattle producers. However, variations in either forage productivity or animal efficiency can have drastic impacts on optimal stocking decisions.

Economics of Flexible Versus Conservative Stocking Strategies to Manage Climate Variability Risk

L. Allen Torell, Subramanian Murugan, and Octavio A. Ramirez

Maintaining a conservative stocking rate and grazing flexibility, and leaving a significant amount of herbaceous production at the end of the grazing season, are common recommendations for drought management. We evaluated the economics of maintaining grazing flexibility and conservative vs. flexible grazing strategies where stock numbers are adjusted to match forage conditions. Maintaining grazing flexibility with yearling cattle was very important for managing forage variability between years, adding 14% to annual net returns when rangelands are conservatively stocked. Herd expansion beyond a conservative level should occur with yearlings rather than adult cows, even if forage conditions are known with certainty.

An Assessment of Nonequilibrium Dynamics in Rangelands of the Aru Basin, Northwest Tibet, China

Tsechoe Dorji, Joseph L. Fox, Camille Richard, and Kelsang Dhondup

An assessment of rangeland dynamics was conducted in the Aru Basin, in the northwest part of Chang Tang Nature Reserve, Tibet, China. Plant community characteristics did not differ with grazing intensity, which indicates a dominance of nonequilibrium conditions in the basin. Stochastic variation, therefore, plays a significant role in the rangeland dynamics. Opportunistic livestock management strategies may be better adapted to variable annual vegetation production than are rigid stocking rates that assume a stable carrying capacity. This is probably the best approach for managing livestock to accommodate both animal production and wildlife conservation goals in this region.

Plant Community and Target Species Affect Responses to Restoration Strategies

John R. Hendrickson and Corie Lund

Kentucky bluegrass and smooth brome have been increasing on northern Great Plains rangelands, but there is limited information on appropriate restoration strategies. We implemented five different restoration treatments and a control on five different community categories on an invaded rangeland. Burning followed by an herbicide treatment reduced Kentucky bluegrass the most, whereas smooth brome was reduced by mowing followed by raking. Since target species, community category, and time all affected our results, an adaptive management strategy may be the most effective approach to dealing with these invasive species.

Seedling Interference and Niche Differentiation Between Crested Wheatgrass and Contrasting Native Great Basin Species

Kevin L. Gunnell, Thomas A. Monaco, Christopher A. Call, and Corey V. Ransom

Interference from crested wheatgrass can compromise the establishment of native species in mixed-species rangeland seedings and when diversifying historically established crested wheatgrass pastures. Seedlings of crested wheatgrass and four native species were grown under mixed densities in replicated greenhouse experiments to generate competition coefficients. These coefficients revealed that native grasses more readily establish in synchrony with crested wheatgrass than native shrubs, but that once established, native shrubs are more likely to coexist and persist with crested wheatgrass. Minimizing interference from crested wheatgrass seedlings emerging from seed banks appears to be necessary to enhance native species establishment.

Crested Wheatgrass Control and Native Plant Establishment in Utah

April Hulet, Bruce A. Roundy, and Brad Jessop

Establishment of native species in crested wheatgrass stands requires effective control of the wheatgrass dominants. We mechanically (single- or double-pass disking) and chemically (1.1 L/ha or 3.2 L/ha Roundup Original Max) treated two crested wheatgrass stands in Utah followed by seeding native species in 2005 and 2006. Double-pass disking best initially controlled wheatgrass; however, crested wheatgrass recovered to similar cover percentages as untreated plots 2–3 years after wheatgrass-reduction treatments. Effective wheatgrass control may require secondary treatments to reduce the seed bank and open stands to support dominance by seeded native species.

Vegetation Characteristics of Mountain and Wyoming Big Sagebrush Plant Communities in the Northern Great Basin

Kirk W. Davies and Jon D. Bates

Wildlife and land management guidelines frequently do not differentiate between mountain and Wyoming big sagebrush plant communities, because information detailing differences in their vegetation characteristics is lacking. We quantified vegetation characteristic differences between mountain and Wyoming big sagebrush plant communities in the northern Great Basin. In general, mountain big sagebrush plant communities were more diverse and had greater vegetation cover, density, and biomass production than Wyoming big sagebrush plant communities. The results of this study suggest that management guidelines for grazing, wildlife habitat, and other uses should differentiate between mountain and Wyoming big sagebrush plant communities.

Hydrologic Response to Mechanical Shredding in a Juniper Woodland

Nathan L. Cline, Bruce A. Roundy, Fredrick B. Pierson, Patrick Kormos, and C. Jason Williams

We investigated the effects of tree residue and vehicle compaction from shredding Utah juniper on infiltration. Tractor activity compacted soils in plant interspaces and near grasses and shrubs, but only reduced infiltration on soils associated with grasses. Tree residue from shredding increased infiltration rates on soils between plants that were bare prior to shredding. Despite some soil compaction, shredding protected soils from runoff and erosion by covering previously exposed bare ground with scattered tree residue. Shredding trees when the soil is dry and scattering residue as much as possible should maximize benefits from shredding.

Lesser Prairie-Chicken Hen and Brood Habitat Use on Sand Shinnery Oak

Luke A. Bell, Samuel D. Fuhlendorf, Michael A. Patten, Donald H. Wolfe, and Steve K. Sherrod

Many shrublands within the southern Great Plains are being eradicated to increase grass production for domestic livestock. Multiple wildlife species depend on the structural attributes of shrublands for thermal refuge or to escape cover from predators. We evaluated habitat use of lesser prairie-chicken broods on shinnery oak-dominated rangelands to determine the effects of tebuthiuron on brood habitat. Our results indicate that tebuthiuron can permanently remove shinnery oak and reduce desired habitat characteristics for brood rearing. If management practices such as using

herbicides to permanently reduce shinnery oak continue, then lesser prairie-chickens may continue to decline.

Growth Regulator Herbicides Prevent Invasive Annual Grass Seed Production Under Field Conditions

Matthew J. Rinella, Robert A. Masters, and Susan E. Bellows

Exotic annual grasses are negatively impacting millions of acres of grassland in the western United States. In a previous greenhouse study we found growth regulator herbicides reduced seed production of the invasive annual grass Japanese brome. In this study we tested whether growth regulators have this same effect on seed production of Japanese brome in the field. Typical use rates of growth regulator herbicides dramatically reduced invasive Japanese brome

seed production in the field. Growth regulator herbicides could effectively help control invasive annual grasses.

Limitations to Postfire Seedling Establishment: The Role of Seeding Technology, Water Availability, and Invasive Plant Abundance

Jeremy J. James and Tony Svejcar

Postfire reseeding efforts on arid rangeland often fail. We evaluated the degree to which seed drill technology, water availability, and weeds limit seedling establishment across four burned areas. Seed drill technology was a major limitation to seedling establishment in three of the four areas. Small improvements in seeding technology may yield large increases in revegetation successes.