Highlights

Rangeland Ecology & Management, July 2011

Origin, Persistence, and Resolution of the Rotational Grazing Debate: Integrating Human Dimensions Into Rangeland Research

D. D. Briske, Nathan F. Sayre, L. Huntsinger, M. Fernandez-Gimenez, B. Budd, and J. D. Derner

This forum examines the origin and persistence of the rotational grazing debate in an attempt to identify common ground for resolution. Scientific evidence refuting the ecological benefits of rotational grazing is robust, but also narrowly focused, because it derives from experiments that intentionally excluded human variables. Consequently, the profession has attempted to answer a broad, complex question—whether or not managers should adopt rotational grazing—with necessarily narrow experimental research focused exclusively on ecological processes. The debate has not been resolved because the rangeland profession lacks a management and research framework that incorporates both social and biophysical components of complex adaptive systems.

Public Perceptions of Sagebrush Ecosystem Management in the Great Basin

Bruce Shindler, Ryan Gordon, Mark W. Brunson, and Christine Olsen

Intact sagebrush communities in the Great Basin are rapidly disappearing due to invasion of nonnative plants, large wildfires, and encroachment of juniper woodlands. Using survey research techniques, this study examines urban and rural citizens' opinions about rangeland management in the region. Respondents perceive the environment as moderately healthy and recognize threats to sagebrush ecosystems. Public acceptance is relatively high for prescribed fire, grazing, and thinning practices; however, trust in land management agencies to implement these actions is low. Differences in urban and rural responses also suggest that managers consider different methods of interaction as they seek public support for long-term management plans.

Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success

Kevin E. Doherty, Jeffrey L. Beck, and David E. Naugle

Ecological site descriptions (ESDs) are increasingly used to base decisions about wildlife habitats. We evaluated whether ESDs were useful in predicting greater sage-grouse (*Centrocercus urophasianus*) nest occurrence and success by comparing ESD metrics to predictive local- and landscape-scale habitat variables from northeastern Wyoming. Our study results did not support the use of current ESDs to predict habitat use or base sage-grouse management decisions in the Powder River Basin, but in some instances the refutation was weak. Our findings highlight that USDA–NRCS ESD databases need refinement to include relevant habitat measurements before they accurately can predict sage-grouse nest occurrence and success.

Decreasing Precipitation Variability Does Not Elicit Aboveground Biomass or Plant Diversity Responses in Mesic Rangeland

Justin D. Derner, Karen R. Hickman, and H. Wayne Polley

One aspect of global change is the alteration of precipitation patterns (amount, timing) and the consequences on plant productivity and diversity. We used rainout shelters on southern tallgrass prairie to remove variability among years in total precipitation, and either removal of among-year variability in seasonal distribution or removal of all variability in precipitation. Reducing precipitation variability had limited effects on total aboveground biomass, grass and forb biomass, biomass of key species, species richness, diversity, and evenness. These findings indicate that this rangeland ecosystem is adaptable to changes in precipitation with relatively stable biomass production and plant diversity.

Immature Seedling Growth of Two North American Native Perennial Bunchgrasses and the Invasive Grass *Bromus tectorum*

Jayanti Ray-Mukherjee, Thomas A. Jones, Peter B. Adler, and Thomas A. Monaco

We compared seed germination and young-seedling morphological traits of two native grasses, bluebunch wheatgrass (*Pseudoroegneria spicata*) and Snake River wheatgrass (*Elymus wawawaiensis*), with the invasive annual cheatgrass (*Bromus tectorum*). Although cheatgrass was the earliest grass to germinate, bluebunch wheatgrass was the most productive. Surprisingly, Snake River wheatgrass displayed the least biomass but displayed the highest surface area-to-biomass ratios (specific leaf area and specific root length). In contrast, cheatgrass produced almost twice as much root length as the native grasses, a trait that greatly enhances the resource-acquisition capability of cheatgrass.

Is Hand Plucking an Accurate Method of Estimating Bite Mass and Instantaneous Intake of Grazing Herbivores?

Olivier Bonnet, Nicole Hagenah, Lisa Hebbelmann, Michel Meuret, and Adrian M. Shrader

Measuring the bite mass and instantaneous intake of grazing herbivores under field conditions remains a methodological challenge. In this study, we tested the accuracy and repeatability of hand plucking, a simple and noninvasive method of estimating bite mass. The experiment involved four observers and two herbivore species (i.e., cattle and goats). After 5 days of training, observers' estimates were repeatable with accuracies over 80% for bite mass and over 94% for instantaneous intake. These results have important implications for rangeland management, because hand plucking often is the only practicable method available for estimating instantaneous intake of free-ranging herbivores.

Vegetation Response to a One-Time Spent Drilling Mud Application to Semiarid, Mixed-Grass Prairie

Francis Zvomuya, Francis J. Larney, Walter D. Willms, Ryan K. Beck, and Andrew F. Olson

Water-based drilling muds (WBM) often are applied on native prairie as a disposal option in western Canada, but effects of this practice on native vegetation have not been examined scientifically. This study tested summer applications of WBM (0–42 cubic yards per acre) on native vegetation properties in a semiarid region of Alberta, Canada. Results from the study indicate that a single WBM application at rates of up to 10 cubic yards per acre is unlikely to adversely affect native prairie vegetation. These results might allow regulators in western Canada to relax some of the current restrictions on WBM application on native prairie.

Absence of a Grass/Fire Cycle in a Semiarid Grassland: Response to Prescribed Fire and Grazing

Christopher J. McDonald and Guy R. McPherson

Many invasive species, especially grasses, cause a fire cycle, in which fire benefits the invasive plant and harms most native plants. Examples of the grass/fire cycle are numerous, but occur in areas where the native plants are less tolerant of fire than the invasive species. We use a fire-prone ecosystem, a semiarid grassland, where both the invasive grass and native grasses experience frequent fire, to test the grass/fire cycle. The invasive Lehmann lovegrass (*Eragrostis lehmanniana*) does not form a grass/fire cycle and is reduced by fire, whereas native grasses increase. However, livestock grazing reduced native grasses and increased Lehmann lovegrass.

Aboveground Macroinvertebrate Diversity and Abundance in Sand Sagebrush Prairie Managed With the Use of Pyric Herbivory

Elizabeth D. Doxon, Craig A. Davis, Samuel D. Fuhlendorf, and Stephen L. Winter

The interaction of fire and grazing and its impact on biodiversity has received considerable attention in recent years; however, it rarely has been examined in shrubland prairie, let alone a fire-adapted shrubland such as sand sagebrush (*Artemisia filifolia*). We examined the response of the invertebrate community to patch-burn grazing and noted that the invertebrate community was very resilient to fire and grazing. Only spiders and beetles appeared to be negatively impacted. As attempts are made to restore or mimic natural disturbance regimes in grasslands, it is important to determine the impact on important biota of the grassland community.

Plains Prickly Pear Response to Fire: Effects of Fuel Load, Heat, Fire Weather, and Donor Site Soil

Lance T. Vermeire and Aaron D. Roth

A series of laboratory and field tests evaluated plains prickly pear mortality relative to fuel load, maximum fire temperature, and duration of heat. The best predictor of mortality was duration of heat greater than 140°F. Fire at any fuel load reduced plains prickly pear, but a threshold was identified between 1,335 pounds per acre and 2,670 pounds per acre with live mass decreasing sharply between these fuel loads. The lack of ambient temperature and relative humidity effects indicates prickly pear control can be achieved under broad fire prescriptions as long as the amount of combustible fuel is adequate.

Homogenization of the Soil Surface Following Fire in Semiarid Grasslands

Carleton S. White

Plant-induced accumulation of soil beneath plants in semiarid grasslands creates fine-scale variation in soil microtopographic relief that increases with shrub invasion and desertification. This article analyzes long-term measurements (up to 9 years) of soil microtopography at three semiarid grasslands to evaluate whether fire reduces variation in soil microtopographic relief. Four of five fires, including one wildfire, resulted in significantly lower soil microtopographic variation that persisted for up to 4 years. These results show that management with prescribed fire reduces biotic-driven variation in soil microtopographic relief that might help limit the transition to shrubland in semiarid grasslands.

Fire History of a Relict Oak Woodland in Northeast Texas

Michael C. Stambaugh, Jeff Sparks, Richard P. Guyette, and Gary Willson

Fire management of oak woodlands is improved by having information about the long-term fire history. We created a fire event chronology spanning the last three centuries at a remnant oak woodland in northeast Texas using fire scar injuries on post oaks (*Quercus stellata*). From 1690 to 1820 fires occurred in the dormant season every 2 to 14 years; however, since EuroAmerican settlement (around 1850), fires have decreased, with no fires since 1924. This fire history record helps with fire management and understanding past and future changes in vegetation, climate–fire interactions, and importance of human-caused fires.

Long-Term Livestock Exclusion in an Arid Grassland Alters Vegetation and Soil

Ginger R. H. Allington and Thomas J. Valone

We compared water infiltration rates, soil bulk density, and perennial grass cover inside and outside a livestock exclosure in a semiarid grassland in southeastern Arizona. Exclusion of livestock for 40 years was associated with lower bulk density and higher water infiltration into the soil. Total perennial grass cover was higher, and two native grasses, plains lovegrass (*Eragrostis intermedia*) and hairy grama (*Bouteloua hirsuta*), were significantly more common in the ungrazed area. These data support our previous research from a desertified site, and indicate long-term rest from livestock grazing can result in significant changes in soil physical properties, grass cover, and species composition.