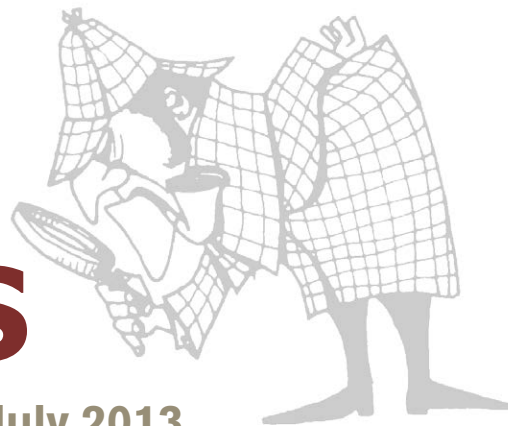


# HIGHLIGHTS

*Rangeland Ecology & Management*, July 2013



## **Reduced Sheep Grazing and Biodiversity: A Novel Approach to Selecting and Measuring Biodiversity Indicators**

M. L. Pollock, J. P. Holland, C. Morgan-Davies,  
J. Morgan-Davies, and Tony A. Waterhouse

Traditional upland livestock grazing is declining worldwide, leading to concerns about possible impacts on biodiversity. We sought stakeholder knowledge, used it to develop biodiversity indicators, and then tracked these indicators in a field study in the Highlands of Scotland. We found that reduced sheep grazing was correlated with an increase in red deer abundance, dwarf shrub cover, and vegetation height, but a decrease in rough grass cover and amount of dead material; other indicators did not show significant differences. The participatory methods presented and some of the indicators tracked are cost effective and could be used to assess any rangeland habitat.

## **Grazing and Songbird Nest Survival in Southwestern Saskatchewan**

Jennifer Suzanne Lusk and Nicola Koper

Livestock management practices in native prairies may be contributing to grassland songbird population declines. We examined the effects of cattle grazing and vegetative cover at nest sites for five species of ground-nesting songbirds in native mixed-grass prairie in southwestern Saskatchewan, Canada. There was no significant effect of grazing on any of the five species. All species used denser vegetation than was generally available. The nest survival of two species was negatively correlated with increased cover at the nest. Our results suggest that low-moderate intensity grazing is consistent with the conservation needs of ground-nesting songbirds in mixed-grass prairies of southwestern Saskatchewan.

## **Using Range Condition Assessment to Optimize Wildlife Stocking in Tindress Wildlife Sanctuary, Nakuru District, Kenya**

Shadrack M. Muya, Abel M. Kamweya, Anne W. T. Muigai,  
Apollo Kariuki, and Shadrack M. Ngene

In Kenya the majority of wildlife is found on privately owned rangelands. Developing management plans for these properties is very challenging because of a lack of acceptable methods for determining optimum number of diverse wildlife species that a property can accommodate. We demonstrated how to use range condition-based models to estimate the optimum stocking level of diverse wildlife species. Range conditions varied from poor to good (20–69%) with a recommended stocking density of 158.9 grazer units and 201.4 browser units divided among the various herbivore species. These estimates are best-case scenarios to be improved through active adaptive management.

## **Winter Resource Selection by Mule Deer on the Wyoming–Colorado Border Prior to Wind Energy Development**

Stephen L. Webb, Matthew R. Dzialak, Karl L. Kosciuch,  
and Jeffrey B. Winstead

Rangelands provide important seasonal habitat for mule deer (*Odocoileus hemionus*), especially during winter, but are experiencing increased development for energy. We used high-resolution GPS and remotely sensed data to describe important resources for mule deer during winter and estimate a resource selection function to help guide conservation of rangelands. Female mule deer selected areas comprising rocky terrain, shrub-dominated habitats, and average values of slope, but tended to avoid roads and open habitats such as grassland. We developed spatially explicit maps for daytime and nighttime occurrence of mule deer that will help guide manage-

ment of mule deer, conserve important seasonal rangelands, and guide future development.

### **Seasonal Variation in Habitat Selection by Free-Ranging Feral Horses Within Alberta's Forest Reserve**

Tisa L. Girard, Edward W. Bork, Scott E. Nielsen, and Mike J. Alexander

Management of free-ranging feral horses on public land requires information on seasonal habitat use. We used GPS collars to track horse use across complex montane landscapes of southwestern Alberta over a two-year period, and we related observed use to vegetation type, topography, thermal characteristics, water availability, and disturbance features. Horses consistently selected lowland grasslands, but also selected shrublands in spring and summer and conifer cut-blocks in winter. Outside of vegetation type, other landscape features had a minor influence on use. These results identify critical habitat for feral horses, including areas where land uses overlap, with implications for feral horse management.

### **Temperature and Precipitation Affect Steer Weight Gains Differentially by Stocking Rate in Northern Mixed-Grass Prairie**

Justin L. Reeves, Justin D. Derner, Matt A. Sanderson, Mark K. Petersen, Lance T. Vermeire, John R. Hendrickson, and Scott L. Kronberg

Seasonal weather effects on rangeland cattle beef production are poorly understood. Using 30 years of yearling steer weight gain data, we examined the effects of spring (April–June) and summer (July–September) temperature and precipitation, as well as prior fall/winter (October–March) and prior growing season (April–September) precipitation on beef production in northern mixed-grass prairie under light, moderate, and heavy stocking rates. Heavier stocking rates showed higher weather sensitivity, with cool, wet springs and warm, wet summers increasing beef production. Our results can be used in decision support tools to help ranchers reduce enterprise risk based on seasonal weather forecasts.

### **Soil Morphologic Properties and Cattle Stocking Rate Affect Dynamic Soil Properties**

Heidi J. Schmalz, Robert V. Taylor, Tracey N. Johnson, Patricia L. Kennedy, Sandra J. DeBano, Beth A. Newingham, and Paul A. McDaniel

Livestock effects on soil contribute to ecological change, but they are challenging to evaluate in heterogeneous landscapes.

We measured the response of soil stability, compaction, litter cover, and bare ground to three intensities of cattle stocking rate. Incorporation of a categorical variable describing inherent soil morphologic properties accounted for heterogeneity. After two seasons of grazing, higher stocking rates resulted in greater compaction and less litter cover, but the response of litter cover also depended on inherent soil properties. Efforts to improve sustainability of grazing could benefit from soil monitoring with careful consideration of heterogeneous conditions.

### **Grazing-Exclusion Effects on Aboveground Biomass and Water-Use Efficiency of Alpine Grasslands on the Northern Tibetan Plateau**

Jianshuang Wu, Xianzhou Zhang, Zhenxi Shen, Peili Shi, Xingliang Xu, and Xiaojia Li

Effects of grazing exclusion on alpine grasslands are unclear on the Northern Tibetan Plateau. Aboveground biomass and intrinsic water use efficiency of nine grazed and nongrazed pastures were measured in the summer of 2010. Short-term grazing exclusion had no significant influences on soil properties or intrinsic water use efficiency. Nongrazed pastures had a slight increase in aboveground biomass and cover at both the community and species levels. Grazing exclusion may affect alpine grasslands in response to climate change due to the compositional variations in species diversity and plant functional traits at the community level.

### **Managing High-Elevation Sagebrush Steppe: Do Conifer Encroachment and Prescribed Fire Affect Habitat for Pygmy Rabbits?**

Bonnie A. Woods, Janet L. Rachlow, Stephen C. Bunting, Timothy R. Johnson, and Kelly Bocking

Spring burning to curtail conifer encroachment can affect the structure and composition of mountain big sagebrush (*Artemisia tridentata vaseyana*) steppe, changing habitat for pygmy rabbits (*Brachylagus idahoensis*). We compared pygmy rabbit habitat in areas with conifer encroachment or spring burns to habitat in unburned sagebrush steppe without conifer encroachment. Cover and forage species were lower in areas of >30% conifer canopy cover than in encroached sagebrush steppe. Burned areas required 13–27 years to resemble unburned sagebrush steppe. The information from this study can contribute to habitat management plans for high-elevation, mountain big sagebrush sites where conifer encroachment is altering habitat for sagebrush-dependent wildlife species.

## Restoring the Sagebrush Component in Crested Wheatgrass–Dominated Communities

Kirk W. Davies, Chad S. Boyd, and Aleta M. Nafus

Crested wheatgrass (*Agropyron cristatum* and *Agropyron desertorum*) communities have limited diversity and are of limited value to wildlife until sagebrush (*Artemisia tridentata*) establishes. Sagebrush establishment is slow because crested wheatgrass is competitive with sagebrush seedlings and seed sources may be limited. We evaluated broadcast seeding and planting of sagebrush seedlings with varying levels of crested wheatgrass control with glyphosate. About 70% of the planted seedlings survived, even without crested wheatgrass control, but sagebrush largely failed to establish from broadcasted seed. Sagebrush plants grew larger with greater crested wheatgrass control. Planting sagebrush seedlings increases the diversity of crested wheatgrass communities and improves wildlife habitat.

## Optimal Placement of Off-Stream Water Sources for Ephemeral Stream Recovery

Matthew Rigge, Alexander Smart, and Bruce Wylie

Placement of off-stream water sources is a key consideration in rangeland management plans. We used high-resolution satellite imagery to track changes in riparian and upland vegetation through time, associated with the implementation of off-stream water sources in western South Dakota rangelands. Riparian vegetation increased within 1,250 m

(4,100 feet) of the water sources following their implementation, while upland vegetation was reduced within 200 m (655 feet) of the water sources. This suggests 200 to 1,250 m from streams as the optimal placement for water sources in our study area, to reduce riparian use and minimize negative impacts of livestock.

## Marmot Disturbance Drives Trait Variations Among Five Dominant Grasses in a Mongolian Grassland

Takehiro Sasaki, Kaoru Kakinuma, and Yu Yoshihara

Plant species traits respond differently to marmot disturbances, but the range of plant traits displayed was generally increased by this disturbance. Plant roots were longer in marmot-disturbed than undisturbed areas. Leaf height and area were smaller but with a larger range in marmot-disturbed areas. This is probably due to the spatial heterogeneity of marmot foraging patterns and soil properties created by marmot disturbance. The heterogeneity created by marmot activity might provide an additional range of niche opportunities for grassland species. Quantification of trait distributions among plant species may help to understand the different plant adaptive mechanisms in relation to external drivers such as marmot disturbance.

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