

# HIGHLIGHTS



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### **Multiscale Detection of Sulfur Cinquefoil Using Aerial Photography**

Bridgett J. Naylor, Bryan A. Endress, and Catherine G. Parks

Sulfur cinquefoil is an exotic perennial plant invading interior Pacific Northwest rangelands. Aerial photography was taken at 3 spatial scales to determine the effectiveness for detecting, monitoring, and mapping sulfur cinquefoil infestations. The accuracy of detecting infestations increased from small to large scale with nearly 77% of the cases correctly identified using 1:3,000 scale and nearly 60% at 1:12,000 scale. Although tree canopy can hinder detection, aerial photography is a valid tool for detecting infestation in open forests and rangelands.

### **Hyperspectral One-Meter-Resolution Remote Sensing in Yellowstone National Park, Wyoming: I. Forage Nutritional Values**

Mustafa Mirik, Jack E. Norland, Robert L. Crabtree, and Mario E. Biondini

This study evaluated the ability of 1-m-resolution, hyperspectral remote sensing to estimate nitrogen, phosphorus, and neutral detergent fiber values from grassland, sagebrush, and riparian areas in Yellowstone National Park. Useable relationships for all nutrient components were found on an area basis, whereas poor relationships were found on a percent dry matter basis. These useable relationships can be applied to provide nutritional estimates over the whole image, which can be important in rangeland research and management.

### **Hyperspectral One-Meter-Resolution Remote Sensing in Yellowstone National Park, Wyoming: II. Biomass**

Mustafa Mirik, Jack E. Norland, Robert L. Crabtree, and Mario E. Biondini

Hyperspectral remote sensing holds the promise to be an effective tool in estimating biomass on rangelands. This study evaluated the ability of 1-m-resolution, hyperspectral

imagery to estimate biomass from grassland, sagebrush, and riparian areas in Yellowstone National Park. Useable relationships between ground samples and the hyperspectral imagery were found for total biomass in all vegetation types and for willows, sedges, litter, and grasses found in dryer areas. Poor relationships were found for sagebrush and forb biomass. These useable relationships can be a tool for generating biomass estimates for the whole image, which could be useful in rangeland research and management.

### **Demography of Grazed Tussock Grass Populations in Patagonia**

Gabriel Oliva, Marta Collantes, and Gervasio Humano

Tussock grasslands of *Festuca gracillima* in the Magellanic region of south Patagonia are slowly being replaced by dwarf shrublands under continuous sheep grazing. Tussock were counted from photographic maps obtained over a decade, and demographic matrix models were calculated. Our results indicate that grazing modifies demographic processes in a slow and persistent way, changing the size structure of the population and patch structure of the grassland over a timescale of decades. These changes may not be perceptible for range managers until the population has been affected. Moderate stocking rates seem to be a management option to slow down, but not to stop, the process.

### **Poplar Afforestation Effects on Grassland Structure and Composition in the Flooding Pampas**

M. del Pilar Clavijo, Marisa Nordenstahl, Pedro E. Gundel, and Esteban G. Jobbágy

Planting winter deciduous trees for timber production on mixed (C3–C4) grasslands could benefit ranching systems in the Pampas if cold-season grasses were promoted. Yet, it can threaten biodiversity through local extinctions and invasions. These possible effects were evaluated using 9 poplar plantations and adjacent nonafforested grasslands. With almost half total herbaceous plant cover, afforested stands had a higher proportion of C3 grasses in their understory. Little evidence of local extinctions or invasions with afforestation

was found. Deciduous tree plantations in the study region host a good forage source in their understory that could complement nonafforested natural grasslands in quality and seasonality.

### **Creating Weed-Resistant Plant Communities Using Niche-Differentiated Nonnative Species**

R.L. Sheley and M.F. Carpinelli

Invasive plant management that continues may require creating and maintaining weed-resistant plant communities. We tested whether spotted knapweed invasion was limited as the richness of desired nonnative species increased on low- and high-producing sites. These species occupied different niches. Although less important on productive sites, increasing niche occupation by nonnative desired species may increase resource use and productivity, thus minimizing the establishment of unwanted weeds during rehabilitation of marginally productive rangeland.

### **Heifer Performance Under Two Stocking Rates on Fourwing Saltbush-Dominated Rangeland**

Justin D. Derner and Richard H. Hart

Use of rangeland dominated by fourwing saltbush (*Atriplex canescens*) during the winter season may be an alternative for livestock producers instead of providing supplemental feed-stuffs, but there is a lack of information concerning stocking rates and animal gains. Yearling heifers had a greater gain per head per day with light, compared with moderate, stocking rates when grazing in late fall or early spring, but gain per unit land area was similar for both stocking rates. Land managers with rangeland containing fourwing saltbush should consider using these pastures during the late fall or early spring using light stocking rates.

### **Heifer Production on Rangeland and Seeded Forages in the Northern Great Plains**

M.R. Haferkamp, M.D. MacNeil, E.E. Grings, and K.D. Klement

Pastures of perennial cool-season grasses can be used to reduce grazing pressure on native rangelands and to provide quality forage for livestock during selected seasons. We compared performance of yearling heifers grazing seeded forages in spring and autumn to those grazing native Northern Great Plains rangelands. Findings show seasonal gains may be better on seeded pastures than on native rangeland, but early spring gains may not be maintained when cattle are moved from seeded pastures to native rangeland for the summer grazing season. Livestock managers may need to modify their tactics to take full advantage of increased gains on seeded pastures.

### **Forage Production and Quality of a Mixed-Grass Rangeland Interseeded With *Medicago sativa* ssp. *falcata***

Matthew C. Mortenson, Gerald E. Schuman, Lachlan J. Ingram, Venerand Nayigihugu, and Bret W. Hess

Enhancing forage production and forage quality for livestock on rangelands has been a goal for decades. We examined the long-term effects of interseeding yellow-flowered alfalfa (*Medicago sativa* ssp. *falcata*) in a northern mixed-grass prairie on forage production and quality. Forage production increased by 82% with interseeding, and forage quality increased in many of the native species due to the nitrogen fixed by the alfalfa compared with the untreated native rangeland control sites. This research showed that interseeding yellow-flowered alfalfa into rangelands is sustainable over decades and will increase forage production and forage nutritive value on rangelands in the Northern Great Plains.

### **Evaluation of California's Rangeland Water Quality Education Program**

Stephanie Larson, Kelly Smith, David Lewis, John Harper, and Melvin George

The prospect of increased regulations to reduce nonpoint source pollution associated with rangelands and ranching prompted California's range livestock industry to implement a voluntary program of water quality assessment and pollution prevention. University of California Cooperative Extension and USDA Natural Resources Conservation Service implemented a ranch water quality-planning short course to help rangeland owners understand nonpoint pollution, identify potential sources, and develop water quality plans for their properties. A survey of short course participants demonstrated that a voluntary industry-initiated program can increase implementation of management practices addressing water quality and can be a successful alternative to state regulation.

### **Quantifying Declines in Livestock Due to Land Subdivision**

Randall B. Boone, Shauna B. BurnSilver, Philip K. Thornton, Jeffrey S. Worden, and Kathleen A. Galvin

Landscape subdivision is ongoing in group ranches of Kajiado district, Kenya, and limits movements of pastoral livestock. Livestock unable to access a variety of forage patches may not find sufficient food. We used ecosystem modeling to quantify changes in livestock populations under subdivision. In a group ranch of moderate productivity and habitat variability, subdivision down to 1-km<sup>2</sup> parcels led to a 25% decline in livestock supported. Declines did not occur as the most productive group ranch was subdivided. Responses to subdivision differ across group ranches, but in most areas, parcel owners should maintain open access to lands.

## Long-Term Successional Trends Following Western Juniper Cutting

Jon D. Bates, Richard F. Miller, and Tony Svejcar

Studies reporting understory response following pinyon-juniper control have been limited to early successional stages. This study assessed successional dynamics spanning 13 years following cutting in a western juniper woodland. Herbaceous standing crop and cover did not change after the 5th year posttreatment; however, significant compositional shifts occurred, highlighted by a continued increase in perennial grasses, whereas annual grasses decreased through the 13th year posttreatment. Shifts in herbaceous composition across years suggests that long-term monitoring is important for evaluating plant community response to juniper control and to develop appropriate posttreatment management strategies to promote continued site improvement.

## Economics of Western Juniper Control in Central Oregon

Gwendolyn A. Aldrich, John A. Tanaka, Richard M. Adams, and John C. Buckhouse

Distribution of western juniper (*Juniperus occidentalis*) is expanding with resulting management and environmental issues. We developed a model to evaluate the economically optimal juniper control methods for different sizes of ranches and under different conditions. We found that the type and mix of control methods used depend on site productivity and the ranching operation, and that factors like erosion and wildlife populations will be affected differently. As land managers decide on a course of action, and if other resource values are deemed important, this model is one tool for assisting in that decision.

## Research Note: Timing of Vegetation Sampling at Greater Sage-Grouse Nests

Doris Hausleitner, Kerry P. Reese, and Anthony D. Apa

Habitat management guidelines for greater sage-grouse (*Centrocercus urophasianus*) nest sites based on vegetation studies at the nests may not represent the conditions when the female initiates nesting because sampling occurs 30 days after nest initiation, which is after the eggs hatch. We investigated differences in 22 habitat variables at initiation and at hatch by sampling 30 randomly selected nests marked 1 year earlier. Results suggested some structural variables (sagebrush cover, visual obstruction, nest shrub height, and forb, bare ground, grass, and litter cover) can be measured throughout incubation to describe nest sites at initiation; however, grass cover and height should be assessed at nest initiation.

## Technical Note: A Laser Point Frame to Measure Cover

L.K. VanAmburg, D.T. Booth, M.A. Weltz, and M.J. Trlica

Collecting point data, such as ground cover, using a conventional point frame is tedious and time consuming. We tested a point frame using lasers in place of conventional metal pins and found data could be collected faster. Correlations between cover data from a conventional frame and the laser point frame (LPF) were acceptably high ( $r = 0.67\text{--}0.81$ ). We conclude that the use of the LPF has the potential to reduce the cost of data collection; however, we recommend further testing to confirm the apparent LPF advantage and to assess the relative accuracy of the LPF. ♦