

HIGHLIGHTS



Rangeland Ecology & Management, November 2007

Chukar Watering Patterns and Water Site Selection

Randy T. Larsen, Jerran T. Flinders, Dean L. Mitchell, Ernest R. Perkins, and David G. Whiting

Many water developments (guzzlers) built to benefit chukars (*Alectoris chukar*) are not used by them. To address this problem, we documented watering patterns with remote cameras and measured habitat variables surrounding both used and unused water sources. Chukars only visited water sources with $\geq 11\%$ shrub canopy cover in likely response to predation risk from avian predators. This research is important in management of chukars, but also demonstrates a behavioral constraint on the use of water sources based on security cover; similar constraints are likely to be present for other species.

Initial Effects of Brush Cutting and Shoot Removal on Willow Browse Quality

Roy V. Rea and Michael P. Gillingham

Management of forest stands often involves brush-cutting deciduous shrubs, which are important winter forage for ungulates. We investigated the initial influence of brush-cutting on the nutritive quality of Scouler's willow. In winter, the current annual shoots of willows that had been brush-cut were larger in mass and lower in digestible protein than shoots of uncut willows for at least 4 years after cutting. Shoots of brush-cut willows were also lower in tannin and digestible energy than shoots of uncut plants for 2 winters after cutting. Our results varied among sites, and long-term studies need to capture site-specific variation in willow response.

The Potential for Horses to Disperse Alien Plants Along Recreational Trails

Floye H. Wells and William K. Lauenroth

Plant invasions are rapidly becoming an important threat to the conservation of wildlands. Our objective was to characterize the potential for long-distance transport of plant species in the digestive tract of horses along recreational trails.

We found 20 species and 564 seedlings transported in horse dung. The species were evenly divided between native and alien, but 85% of the seedlings were alien. Our results make it clear that horses, and very likely all pack stock used on recreational trails, represent a potentially important dispersal vector for alien plants into western wildlands.

Effects of Weaning Date and Prepartum Protein Supplementation on Cow Performance and Calf Growth

L. Aaron Stalker, Lane A. Ciminski, Don C. Adams, Terry J. Klopfenstein, and Richard T. Clark

Little information exists on the influence of weaning date, winter protein supplementation, and their effect on profitability of extended-grazing, beef production systems in extensive rangeland settings. Effects of 2 weaning dates, 2 levels of winter protein supplement on productivity of the entire production system were examined. Weaning earlier in the year improved cow body condition at calving but did not improve pregnancy rate, and feeding supplement to the dam increased carcass weight of her calf. These results demonstrate weaning date is an effective tool to manage cow body condition, and nutrient status during gestation influences calf performance.

Effects of Supplementation on Juniper Intake by Goats

Erika S. Campbell, Charles A. Taylor, John W. Walker, Christopher J. Lupton, Dan F. Waldron, and S. Y. Landau

The potential for winter supplementation to increase juniper intake by goats on Texas rangelands was assessed in two experiments. In the first study, juniper intake increased for goats supplemented with alfalfa and cottonseed meal, but not for those supplemented with corn. Boer \times Spanish goats did not differ in levels of consumption of the other breeds. In the second study, juniper intake was higher for free-ranging goats supplemented with soybean meal than for unsupplemented goats. This research indicates that the

effectiveness of goats for biological control of juniper can be improved with a high-protein, low-starch supplement.

Effects of Fire and Neighboring Trees on Ashe Juniper

Jill M. Noel and Norma L. Fowler

Woody-plant encroachment on the eastern Edwards Plateau of Texas occurs primarily by Ashe juniper. Fire-survival rates of Ashe juniper were lower among smaller plants, but high-survival rates of all size classes indicated that prescribed fires as presently used in this region will probably not control encroachment. Small junipers were significantly more likely to be growing under the canopy of a tree than in the open, and survival rates were higher there, suggesting facilitation of small junipers by neighboring trees. There was, however, no significant effect of neighboring trees on fire-survival rates of juniper.

Establishment of Native Species in Soils from Russian Knapweed (*Acroptilon repens*) Invasions

Sarah J. Tyrer, Ann L. Hild, Brian A. Meador, and Larry C. Munn

Russian knapweed has invaded many native ecosystems in western North America. In a greenhouse experiment, we monitored the establishment of Indian blanketflower, purple prairie clover, winterfat, and Wyoming big sagebrush in soils obtained from Russian-knapweed-invaded and uninvaded areas. All species established in invaded soil and seedlings were larger in invaded than in uninvaded soils. Invaded soils had greater organic matter and lower pH. Zinc concentrations in invaded soils were not high enough to limit plant growth. Our data do not indicate that Russian knapweed is a hyperaccumulator of Zn. Previously invaded soils may not limit native seedlings.

Prediction of Cheatgrass Field Germination Potential Using Wet Thermal Accumulation

Bruce A. Roundy, Stuart P. Hardegree, Jeanne C. Chambers, and Alison Whittaker

Strategies to prevent cheatgrass from dominating rangelands across the west require an understanding of what leads to that dominance. We used soil moisture and temperature measurements from 9 big sagebrush sites to determine the relative effects of disturbance and annual weather on potential cheatgrass germination, using a wet thermal accumulation model. Cheatgrass had high potential germination during fall or spring in all years tested and did not need disturbance to potentially germinate. This high potential for germination underscores the importance of maintaining perennial herbaceous species to reduce cheatgrass growth and seed production to limit its invasion and dominance.

Influence of Grassland Gap on Seedling Establishment of *Leymus chinensis* (Trin.) Tzvel.

G. X. Liu and J. G. Han

Seedling establishment of *Leymus chinensis* in natural vegetation has not been evaluated. Seeds of *L. chinensis* were added to artificially created gaps in a degraded steppe in North China, and seedling emergence, survival, and growth rates were recorded. Seedling emergence and survivorship was greater in gaps than in control areas, but growth performance was higher only in larger gaps (20-cm and 40-cm diameter) with neighboring roots present and in all gaps without neighboring roots. Our results suggest that in order to maximize restoration success of degraded grassland by reintroducing *L. chinensis*, large light gaps and low below-ground competition should be provided.

The Effects of Forest Residual Debris Disposal on Perennial Grass Emergence, Growth, and Survival in a Ponderosa Pine Ecotone

Darin J. Law and Peter F. Kolb

Removing conifer thickets from historically open savannah rangelands creates woody debris that must be managed. Six commonly used woody debris disposal practices and their effects on grass emergence, growth, and survival were tested. Woody debris can be disposed of in a variety of ways ranging from hand piling to "lop and scatter" followed with a broadcast burn without adversely affecting important abiotic factors such as soil moisture and soil temperature. Scattered woody debris that is broadcast burned is the best mechanism for disposing woody debris, increasing grass emergence and survival, and preventing ponderosa pine recruitment and exotic invasion.

Nutrient Availability in Rangeland Soils: Influence of Prescribed Burning, Herbaceous Vegetation Removal, Overseeding with *Bromus tectorum*, Season, and Elevation

R. R. Blank, J. Chambers, B. Roundy, and A. Whittaker

There is a need to understand the effect of land management decisions on soil nutrient availability in the Great Basin. We quantified the effects of herbaceous vegetation removal and prescribed burning on soil nutrient availability, gauged using resin capsules, along elevational transects in the Shoshone range of central Nevada and the east Tintic range of western Utah. Herbaceous vegetation removal increased availability of nitrate for both states. Availability of K and ortho-P (both states) and nitrate (Nevada only) was greater on prescribed burned plots. Resin capsules are

an effective tool to integrate soil nutrient availability as affected by landscape treatments.

Effects of Grazing Intensity, Precipitation, and Temperature on Forage Production

Bob D. Patton, Xuejun Dong, Paul E. Nyren, and Anne Nyren

Questions have been raised about whether herbaceous productivity declines linearly with increased grazing or if low levels of grazing increase productivity. The response of forage production to cattle grazing at 5 intensities was sampled throughout the growing season on a mixed-grass prairie dominated by Kentucky bluegrass (*Poa pratensis* L.) in south-central North Dakota from 1989 to 2005, with precipitation and sod temperature as covariates. In this region, moderate grazing can maintain a higher level of herbage production as compared to complete rest or overgrazing. This reinforces the importance of proper stocking to maintain rangeland productivity.

Hydrologic Impacts of Mechanical Seeding Treatments on Sagebrush Rangelands

Frederick B. Pierson, Wilbert H. Blackburn, and Steven S. Van Vactor

Rainfall simulations were conducted on a cheatgrass-dominated site to investigate hydrologic and erosion impacts caused by mechanical shrub-steppe restoration seeding treatments. Treatment-induced hydrologic and erosion impacts were poorly correlated with surface soil properties while hydrologic recovery was strongly correlated with litter dynamics. The initial goal to enhance native grass recovery failed, but cheatgrass production provided sufficient biomass to rapidly replenish litter cover for site hydrologic stability. The relationship between hydrologic recovery and

vegetation dynamics suggests that revegetation projects should be evaluated for efficiency in obtaining the desired plant community balanced against consequences of short-term elevated runoff and erosion risks.

Salt-Lick Induced Soil Disturbance in the Teton Wilderness, USA

D. K. Walters and T. H. DeLuca

This study examined the change in soil physical and chemical properties caused by approximately 10–60 years of salt application on public lands throughout the Rocky Mountain west. Salt treated sites were found to have elevated EC, bulk density, pH, SAR, and Na⁺ concentration, and decreased OM contents and Ca²⁺ and Mg²⁺ concentrations. Soil compaction appears to have had a greater impact on plant establishment than the actual presence of NaCl. Salt licks established in wilderness areas habituate animals to localized zones causing extensive soil trampling and consumption of surface soils by grazing ungulates.

Livestock Grazing Impacts on Desert Vegetation, Khirthar National Park, Pakistan

Neal J. Enright and Ben P. Miller

The impact of livestock grazing on desert vegetation in Khirthar National Park, Pakistan was investigated by comparing dry and wet season plant-species richness and cover outside (“open”) and inside (“exclosed”) native-mammal breeding enclosures that had excluded livestock for 6 years. Plant-species richness and cover were higher in exclosures during the dry season due to the greater presence of grasses and herbs, but were no different after the wet season. While some species were adversely affected by livestock, results suggest strong ecosystem resilience to grazing, with levels no different after seasonal rains regardless of grazing level.