

HIGHLIGHTS



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Effects of Nitrogen Deposition on an Arid Grassland in the Colorado Plateau Cold Desert

Susanne Schwinning, Benjamin I. Starr, Nathan J. Wojcik, Mark E. Miller, James E. Ehleringer, and Robert L. Sanford Jr.

Rising atmospheric N deposition will impact ecosystems worldwide. This study investigated the effects of spring and summer NH_4^+ and NO_3^- inputs on 2 rangeland grasses (C3 and C4) on the Colorado Plateau. Both grasses took up N derived from NH_4^+ or NO_3^- in spring, but only the C3 grass increased in cover, while a summer-active annual invader had the greatest growth response overall to summer-applied NO_3^- . Simultaneously declining N inputs from biological crusts in spring and increasing atmospheric N deposition at any time of year may weaken the resilience of this ecosystem to change and promote invasion by weedy summer annuals.

Resilience of Willow Stems After Release From Intense Elk Browsing

Bruce W. Baker, H. Raul Peinetti, and Michael B. Coughenour

The resilience of willow stems released from intense elk browsing was quantified with a retrospective study that compared biomass, number, and length of stem segments located inside and outside elk exclosures. Segment biomass increased by about 3–12 g/y on browsed stems and 10–27 g/y on protected stems. Protected stems had more long segments and fewer short segments than browsed stems for the first 3 years but then increased their number of short segments as stems became tall and bushy. Short-hedged willow stems are highly resilient and can rapidly recover height and vigor after protection from intense elk browsing.

Classification of Willow Species Using Large-Scale Aerial Photography

Steven L. Petersen, Tamzen K. Stringham, and Andrea S. Laliberte

Accurately identifying and mapping willow distribution for multiple species over large areas is generally impractical in

the field. We utilized high-resolution color and color-infrared aerial photography and geospatial classification and analysis (using GIS) to accurately classify and map all 3 willow species located in a riparian ecosystem in southeast Oregon. Of the classification methods examined, a supervised classification with spectral signatures developed from a polygon delineation technique was most effective in reducing classification error associated with other image features (82% accuracy). These methods make it possible to gather precise data over greater spatial and temporal extents, reducing the time and cost required to obtain similar results in the field.

Quantifying Vegetation Change by Point Sampling Landscape Photography Time Series

Patrick E. Clark and Stuart P. Hardegree

Quantitative assessment of vegetation change using repeated oblique or landscape photography has not been possible. The purpose of this study was to develop sampling and analysis techniques for using a time series of digitized landscape photography to quantify vegetation change on rangeland landscapes. Digital images created from black-and-white landscape photographs (1917, 1962, and 2000) were spatially registered to each other using control points and a polynomial transformation algorithm. Changes in image cover of each cover type and direction of cover-type conversions were successfully determined for each intervening time period.

Detection-Threshold Calibration and Other Factors Influencing Digital Measurements of Ground Cover

D. Terrance Booth, Samuel E. Cox, and Douglas E. Johnson

Measuring bare ground from nadir rangeland photographs at hundreds per minute may reduce the time and costs of rangeland ecological assessments if human errors and inconsistencies in setting detection thresholds can be reduced. We developed a calibration procedure that makes threshold adjustment less subjective, and we tested our calibration by

comparing manual and automated measurements. In 3 tests, measurements by calibrated software did not differ from manual measurements by more than 7%—compared to a 10%–26% difference without calibration—suggesting the potential for computers to significantly reduce the cost of ecological monitoring.

Infiltration and Sediment Rates Following Creosotebush Control With Tebuthiuron

Steven R. Perkins and Kirk C. McDaniel

Although the use of herbicides to control creosotebush is a common management practice, little is known about the long-term effects of herbicide treatments on rangeland hydrology. We conducted rainfall simulations in areas treated with the herbicide tebuthiuron 5–9 years ago, 15–18 years ago, and untreated areas. We found that infiltration rates were highest in areas treated 5–9 years ago, intermediate in untreated areas, and lowest in areas treated 15–18 years ago. Sediment yield was not significantly different among treated or untreated areas. Results from the study will assist land managers in understanding long-term effects of chemical creosotebush control on rangeland hydrology.

Hydrologic Response of a Central Nevada Pinyon-Juniper Woodland to Prescribed Fire

Benjamin M. Rau, Jeanne C. Chambers, Robert R. Blank, and Wally W. Miller

This study was conducted to determine the effect of prescribed fire on surface hydrology in Great Basin pinyon-juniper woodlands. Before burning, the infiltration and saturated hydraulic conductivity rates on interspace and shrub canopy microsites were less than on tree canopy microsites at the midelevation sites. Following burning, the microsites with intermediate tree cover had greater infiltration rates than interspace microsites, and all other microsites were similar to each other. Burning increased water repellency of surface soils (0–3 cm) for all cover types. Spring burning in pinyon-juniper woodlands may produce a hydrologic response depending on surface soil texture and vegetation cover.

Water Quality at Wildlife Water Sources in the Sonoran Desert, United States

Steven S. Rosenstock, Vernon C. Bleich, Michael J. Rabe, and Carlos Reggiardo

Does poor water quality pose a risk to animals utilizing artificial and modified natural water sources developed for desert wildlife? Water quality parameters were sampled at guzzlers, tinajas (natural rock basins), wells, and developed springs in the Sonoran Desert of Arizona and California. Three of 21 measured chemical parameters (pH, alkalinity, and fluoride) occasionally exceeded recommended guidelines

by relatively small margins. Pathogenic organisms (*Trichomonas gallinae*) and blue-green algal toxins were not found. Water quality at all sites was deemed suitable for animal use and unlikely to cause health problems alleged by critics of wildlife water development programs.

Conditioning Sheep to Graze Duncesap Larkspur (*Delphinium occidentale*)

Michael H. Ralphs

Sheep are more resistant than cattle to larkspur poisoning and thus may be used as a biological tool to graze larkspur to prevent cattle poisoning. Ewes were fed larkspur plants, then dosed with glucose to provide a positive nutritional response. The positive conditioning enhanced larkspur consumption in the pen, but ewes preferred other forages in the field until late in the grazing season, when larkspur matured and other forages were depleted. Even though the positive-conditioned sheep grazed more larkspur than the untreated control group, the amount consumed and the timing of consumption were not sufficient to potentially prevent cattle poisoning.

Effect of Ruminal Incubation on Perennial Pepperweed Germination

Michael F. Carpinelli, Christopher S. Schauer, David W. Bohnert, Stuart P. Hardegree, Stephanie J. Falck, and Tony J. Svejcar

Grazing may be used to control perennial pepperweed where chemical and mechanical methods are inappropriate because of proximity to water; however, grazing animals may introduce perennial pepperweed to uninfested areas via fecal pats. We studied how digestion by cattle affects perennial pepperweed germination. Germination of seeds that were digested by cattle greatly increased compared to seeds that were not digested by cattle. These results suggest that livestock that have grazed seed-bearing perennial pepperweed plants should be held on weed-free forage for about 1 week prior to being moved to uninfested areas, or, preferably, grazing should occur prior to seed set.

Long-Term Grazing Effects on Genetic Variability in Mountain Rough Fescue

Yong-Bi Fu, Don Thompson, Walter Willms, and Mairi Mackay

Mountain rough fescue (*Festuca campestris* Rydb) is a dominant grass species in the montane grasslands of western Canada, but little is known about its genetic diversity and the effects of long-term grazing on population genetics. Genetic diversity of fescue plants in adjacent grazed and protected areas for 3 populations was evaluated. Comparisons between grazing and nongrazing samples revealed variable and relatively small impacts of the long-term grazing on the genetic diversity of the grazed populations. If developing diverse

germplasm for rangeland seedings is desired, one should sample across geographic space rather than combining materials with and without historical grazing pressure.

Herbage and Seed From Texan Native Perennial Herbaceous Legumes

James P. Muir, Judy Taylor, and Sindy M. Interrante

There are few native herbaceous legume species commercially available for planting in the southern Great Plains. This study collected seed of 15 herbaceous legumes in north-central Texas and evaluated them for herbage yield, nutritive value, and, in the case of 8 species, their seed production potential in small plots. Herbage yields ranged over 100 g/plant/y, seed reached over 20 g/plant/y, NDF values ranged below 35%, while CP values exceeded 20%, in some cases. A promising range of native herbaceous legume germplasm exists in the southern Great Plains that needs to be commercially developed for rangeland reseed-

ing, roadside planting, pastures, wildlife feed, and ornamental horticultural.

Research Note: Use of Felled Junipers to Protect Streamside Willows From Browsing

Casey A. Matney, Chad S. Boyd, and Tamzen K. Stringham

Browsing by livestock and wildlife species can negatively impact willow size and abundance. We examined the use of felled western juniper trees (*Juniperus occidentalis* Hook) as cover to protect streamside willow shrubs. In August 2003, 1-year posttreatment, the average growth of willows in covered treatments was 25 cm (480%) greater than in noncovered treatments, and by October 2003 (posttreatment), more shrubs were browsed in noncovered (84%) compared to covered (39%) treatments. Our data suggest that covering small willow shrubs with felled western juniper is an effective deterrent to browsing and may provide a useful alternative to fencing. ♦

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