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# Rangeland Ecology & Management Highlights

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Written and compiled by Alexander Smart

## Practical post-fire sagebrush shrub restoration techniques

Madeline N. Grant-Hoffman and Heidi L. Plank

This study was conducted to examine sagebrush restoration planting techniques. The investigators found that transplanting sagebrush seedlings along with using herbicides, excluding herbivory, and making small microsites to protect seedlings from wind damage out of remaining scar-damaged burned sagebrush found at the site, had the best survival. These methods may be labor and time intensive but can facilitate faster sagebrush recovery.

## Prospects for stakeholder cooperation in effective implementation of enhanced rangeland restoration techniques in Southern Tunisia

Mondher Fetoui, Aymen Fria, Boubaker Dhehibi, Mariem Sghaier, and Mongi Sghaier

Restoration recovery techniques using rest for 2–4 years called "Gdel" helps overgrazed rangeland in Tunisia. Implementing Gdel on collectively managed land is much more difficult than on privately owned land. The investigators held focus groups to understand the dynamics involved in the collective decision-making process. Improving the stakeholder cooperation and empowerment regarding land stewardship decisions are needed in collectively owned rangelands in Tunisia.

## Compatibility of dual enterprises for cattle and deer in North America: A quantitative review

Stacy L. Hine, Timothy E. Fulbright, Alfonso J. Ortega-S, Stephen L. Webb, David G. Hewitt, and Thomas W. Boutton

Understanding cattle-deer compatibility is important for wildlife managers and dual enterprise operations in North America. The authors reviewed the published literature to quantify their effect. Research shows cattle have little influence on deer diet overlap in grassland dominated ecosystems whereas livestock compete with deer in forested dominated rangelands, owing to cattle selecting

more forbs and shrubs and thereby reducing deer cover and food. High stocking rate (>0.12 AU/ha) negatively impacted deer habitat variables on grassland dominated rangeland.

## How cattle and wild ungulate use of riparian areas effect measures of streambank disturbance

Brett B. Roper and W. Carl Saunders

Riparian areas are sensitive to ungulate use causing a variety of decreased ecosystem services. The authors used time-lapsed cameras on 39 western streams to evaluate daytime cattle and wild ungulate use. Stubble height and riparian use were successful variables used to explain streambank alteration. These methods increase flexibility for western rangeland managers to manage sensitive areas.

## Foraging behavior of heritage vs. commercial rangeland beef cows in relation to dam-offspring contact patterns

Shelemia Nyamuryekung'e, Andres F. Cibils, Richard E. Estell, Matthew McIntosh, Dawn VanLeeuwen, Caitriana Steele, Alfredo L. González, Sheri Spiegel, and F. Guadalupe Continanza

Heritage cattle breeds are potentially better adapted to arid environments than traditional European breeds where selection pressure has been used to adapt to desert environments. The authors used global position system fitted collars on heritage Raramuri Criollo and desert-adapted commercial Angus Hereford crossbred beef cattle. Raramuri Criollo cows explored three times more area than Angus Hereford crossbred cows. Calves of Raramuri Criollo tended to follow their mothers when grazing which is a hypothesized reason for their ability to explore more grazing area than Angus Hereford crossbred cows.

## Ranchers use of drought contingency plans in protective action decision-making

Tonya Haigh, Michael Hayes, Jolene Smyth, Linda Prokopy, Charles Francis, and Mark Burbach

Drought planning is important for ranchers to weather the economic and environmental impacts droughts cause. The authors evaluated the impact of ranchers with drought plans and those without drought plans to make protective action decisions. Ranchers with drought plans were more able to manage through drought and communicate risk and early warning information than those that did not have drought plans.

### **Holistic vs continuous grazing in Patagonia: a station-scale case study of plant and animal production**

Gabriel Oliva, Daniela Ferrante, Carla Cepeda, Gervasio Humano, and Silvina Puig

Holistic grazing management was compared with continuous grazing management in Patagonia (southern Argentina) in an arid environment at a commercial ranch scale (33,600 acres for each system tested) using sheep. The researchers found that holistic grazing management was no better at improving pasture vegetation parameters and resulted in lower animal performance. The pastures under holistic grazing management received less rainfall than their counterparts and the study was also conducted during a drought. The authors speculated that positive benefits of rest should provide long-term results, especially under wetter conditions.

### **Multi-decadal directional shift in shortgrass stocking rates**

Edward J. Raynor, Justin D. Derner, Tevyn Baldwin, John P. Ritten, and David J. Augustine

Long-term stocking rate research can provide valuable insight to our management of rangelands. The authors compared the optimal stocking rate from two time periods (1940-1963) and (2000-2018) in the shortgrass steppe of Great Plains. They discovered the optimal stocking rate increased by 72% and was due to increased pasture productivity from cool-season grasses and likely increased genetic efficiencies in average daily gain from cattle used in these experiments since 1940.

### **Soil and plant factors affecting changes in forage production patterns on mined land 28 years after reclamation**

Stephen D. Merrill, John R. Hendrickson, Abbey F. Wick, and Mark A. Liebig

Reclamation of surface mined rangelands require adequate soil and vegetation quality to be successful. The authors revisited an earlier land reclamation project in western North Dakota to evaluate the changes in soil and vegetation community after 28 years. The researchers found that soil quality improved with more diverse plant communities. It was noted that deep rooted forbs might have resulted in better leaching of saline/sodic mine spoils through better macroporosity in the diverse plant communities than in the grass dominated plant communities.

### **Using different preconditioning procedures and protein supplementation to increase redberry juniper intake by goats**

Christopher S. Miller and Cody B. Scott

Preconditioning is an important step in preparing goats to consume juniper tree species in a targeted grazing program. The authors compared individually pen fed vs group fed weaned goats with or without a protein supplement. They found that pen fed goats ate just as much juniper as individually fed goats. Protein supplement did not increase juniper intake. These results should make it easier to train goats via pen feeding to consume juniper.

### **Sire influence on redberry juniper consumption by kid goats**

Kendall W. Tidwell and Cody B. Scott

Selecting for juniper consumption by goats might be a useful way to increase juniper consumption if it is a heritable trait. The authors compared juniper consumption from goats sired by male goats selected for juniper consumption and male goats selected for other production characteristics. Goat offspring did not differ in their juniper consumption between the two sire types. It may be better to select for juniper consumption in both the sire and the dam simultaneously.

### **An abundance estimate of free-roaming horses on the Navajo Nation**

Zach P. Wallace, Ryan M. Nielson, Dale W. Stahlecker, Guy. T. DiDonato, Megan B. Ruehmann, and J. Cole

Free-roaming horses in the western United States is a contentious issue and population levels are dictated by federal law on land managed by the Bureau of Land Management (BLM) and the Forest Service. However, no such law exists on tribal lands or other federally owned land. The authors conducted the first ever population estimate of free-roaming horses on the Navajo Nation in a study area of over 67,000 sq. km. They determined population estimates to be 0.57 horses per sq. km, 23% higher than on land managed by the BLM.

### **Water use by mature and sapling western juniper (*Juniperus occidentalis*) trees**

Ricardo Mata-González, Mohamed A.B. Abdallah, and Carlos G. Ochoa

Western juniper (*Juniperus occidentalis*) trees have been invading western U.S. rangelands and are known to consume large amounts of water. The authors measured water usage by mature western juniper trees and saplings from a cleared area 14 years earlier. Mature trees used 60 times more water than saplings and demonstrated potential water savings from cleared rangeland even after 10 years.

### **Monitoring for spatial regimes in rangelands**

Caleb P. Roberts, Victoria M. Donovan, Craig R. Allen, David G. Angeler, Chris Helzer, David Wedin, and Dirac Twidwell.

Spatial regimes are defined as the spatial extent and boundaries of an ecological state. The authors examined species occurrence data collected across four ecological states and compared with historical records to detect changes in spatial movement (expansion or contraction) of ecological states at a 10-m resolution. Spatial regimes monitoring was successful in detecting state shifts due to wildfire in the Ponderosa pine woodland ecological site. The authors noted that further research should focus on different scales in homogeneous and heterogeneous rangeland.

### **Is the visual survey method effective for measuring fruit production in *Prosopis* tree species?**

Felipe S. Carevic, Elena Alarcón, and Aliro Villacorta

Successful monitoring techniques of tree fruit production in arid grasslands, where trees provide supplemental fruit used by livestock, is important in setting sustainable livestock harvest rates. The authors set out to compare an indirect visual assessment of fruit production compared with the traditional direct drop cloth method from two Mesquite species (*Prosopis* sp.) in the Atacama Desert of Northern Chile. The indirect visual assessment worked well for *Prosopis alba*, but the traditional method was better for *Prosopis tamarugo*.

### **Factors influencing use of multipurpose trees and shrubs in arid and semi-arid lands of Kenya**

Patrick D. Kisangau, Jacinta M. Kimiti, Mary W.K. Mburu, and Denyse J. Snelder

Woody species use by humans for multiple purposes in semi-arid ecosystems is important in sustaining agriculture and human livelihood. Researchers wanted to understand the drivers of tree and shrub use in three ecoregions of Kenya. Women used more species than men, and less formally educated people used more species than people with higher formal education. Safeguarding indigenous knowledge of plant species and how they are used by different genders is important for development of sustainable management strategies.

### **Assessing variation in range health across grazed northern temperate grasslands**

Kristine M. Dahl, Edward W. Bork, John R. Parkins, and Kate Sherren

Rangeland health assessment is a useful tool to understand the impacts disturbance has on ecological function of rangelands. The authors used outcomes of rangeland health assessment on native, tame, and forested pasture and different grazing practices in Alberta, Canada. Forested pastures had the highest rangeland health scores and was very sensitive to utilization levels. Tame pasture rangeland health declined with decreasing moisture. Native pastures were affected by longer grazing periods. More comparative studies like this one are needed to assess the impacts grazing management has on rangeland health assessment.

### **Molecular evidence for impoverished mycorrhizal communities of *Agropyron cristatum* compared to nine other plant species in the Northern Great Plains**

Kurt O. Reinhart, and Matthew J. Rinella

Mycorrhizal fungi provide benefits to native plants. The authors theorized that introduced species like crested wheatgrass (*Agropyron cristatum*) might not form these mutualistic associations with mycorrhizal fungi. The authors found that crested wheatgrass roots were without mycorrhizal fungi compared to native species. Invaded native rangeland might be depleted of naturally occurring mycorrhizal fungi and make it difficult to restore native species.

### **Collective action and invasive species governance in southern Arizona**

Aaron M. Lien, Elizabeth Baldwin, and Kim Franklin

Managing invasive weeds on private and public land influenced by multiple governmental agencies is problematic. The authors surveyed personnel from various levels of involvement to identify the barriers of enacting sound invasive species management. They identified several obstacles: laws and policies, cultural traditions and goals, money and labor, knowledge of invasive species consequences, and knowledge of effective management techniques. The authors developed a list of actions to help institutions overcome these barriers and improve their resolve to manage invasive species.