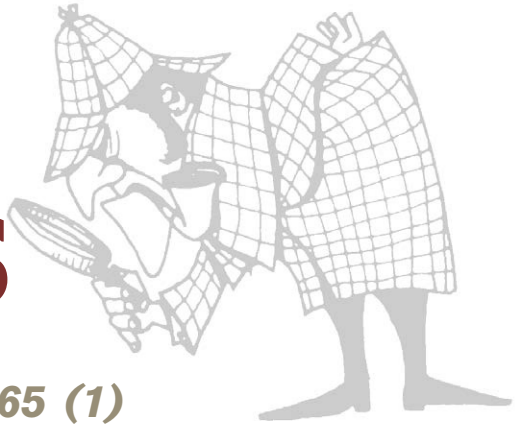

HIGHLIGHTS

Rangelands Highlights January 2017 65 (1)

Targeted Woodland Removal to Recover At-Risk Grouse and Their Sagebrush-Steppe and Prairie Ecosystems

Richard Miller, David Naugle, Jeremy Maestas, Christian Hagen, and Galon Hall

We summarize the key findings reported in this special issue of *Rangeland Ecology and Management* examining socio-ecological aspects of woodland expansion and management actions to address this threat in sagebrush and prairie ecosystems. Rallying conservation around flagship species, in this case sage-grouse *(Centrocercus urophasianus)* and lesser prairie-chickens *(Tympanuchus pallidicinctus*), can help sustain broader ecosystem functions and values, such as maintenance of native plant communities; conservation of non-target sagebrush obligate wildlife; and improved water capture, storage, and release. Reducing top-down threats by partnering within local communities to identify shared goals and collaborative conservation plans are key ingredients to scaling up effective voluntary proactive restoration.

A Hierarchical Perspective to Woody Plant Encroachment for Conservation of Prairie-Chickens

Samuel D. Fuhlendorf, Torre J. Hovick, R. D. Elmore, Ashley M. Tanner, David M. Engle, and Craig A. Davis

The Great Plains grasslands are experiencing many factors that influence ecosystem function, including fire suppression, grazing, and land use conversion. Hierarchy theory is a useful tool to prioritize factors by scale to determine which local factors are constrained by larger-scale processes. From a grouse management perspective, local management focused on grazing and fire has minimal impact on grouse populations unless they are within a broad scale landscape that is relatively unfragmented. The recent primary threats causing rangeland fragmentation are woody plant encroachment and anthropogenic development, which contribute to nearly irreversible fragmentation of the Great Plains and failure to maintain populations of rangeland endemic wildlife.

Mapping Tree Canopy Cover in Support of Proactive Prairie Grouse Conservation in Western North America

Michael J. Falkowski, Jeffrey S. Evans, Dave E. Naugle, Christian A. Hagen, Scott A. Carleton, Jeremy D. Maestas, Azad Henareh Khalyani, Aaron J. Poznanovic, and Andrew J. Lawrence

Invasive woody plant expansion is a primary threat driving fragmentation and loss of sagebrush (*Artemisia* spp.) and prairie habitats across the central and western United States and ultimately has negative effects on grouse populations. To guide successful conservation programs, we developed high-resolution maps of invasive woody plants across an 11-state region for the purpose of evaluating landscape level impacts, targeting restoration actions, and monitoring restoration outcomes. The maps of conifer and mesquite (*Prosopis glandulosa*) cover resulting from this study provide the first and most geographically complete, high-resolution assessment of woody plant cover as a top-down threat to western sage-steppe and prairie ecosystems.

Sage-Grouse Groceries: Forb Response to Piñon-Juniper Treatments

Jonathan David Bates, Kirk W. Davies, April Hulet, Richard F. Miller, and Bruce Roundy

A major objective of piñon-juniper (*Pinus* spp., *Juniperus* spp.) removal is to restore or maintain sagebrush (*Artemisia* spp.) habitat for sage-grouse (*Centrocercus*

urophasianus) and other species. Data sets from previous and ongoing studies were analyzed for cover response of perennial and annual forbs—typically consumed by sage-grouse—to mechanical, prescribed fire, and fuel reduction treatments. Site potential was a major determinant for increasing perennial forbs regardless of the method used to remove conifers, while annual forbs favored by sage-grouse benefitted most from prescribed fire. Mechanical and low severity fuel reduction conifer treatments, however, are superior to prescribed fire for maintaining essential habitat characteristics of sagebrush steppe for sage-grouse.

Ecosystem Water Availability in Juniper versus Sagebrush Snow-Dominated Rangelands

Patrick R. Kormos, Danny Marks, Frederick B. Pierson, Christopher J. Williams, Stuart P. Hardegree, Scott Havens, Andrew Hedrick, Jon D. Bates, and Anthony J. Svejcar

This 6-year study explores differences in the snow distribution, streamflow, and water balances between juniper-dominated (*Juniperus* spp.) and sagebrush-dominated (*Artemisia* spp.) catchments. Juniper-dominated catchments collect more snow, which melts earlier, and produces less streamflow compared to sagebrush-dominated catchments. Larger snow drifts form in sagebrush-dominated catchments because near-surface wind speeds are faster in the absence of large junipers. These drifts release water slowly, which prolongs streamflow and elevated soil moisture conditions important for sage-grouse (*Centrocercus urophasianus*) habitat needs, such as forb production. Control of juniper and retention of historical drifting patterns in snow-dominated rangelands is critical for sagebrush-steppe management as the climate warms.

Conserving the Greater Sage-Grouse: A Social-Ecological Systems Case Study from the California-Nevada Region

Ali Duvall, Peter S. Coates, and Alexander L. Metcalf

The Endangered Species Act (ESA) continues to serve as one of the most powerful and contested federal legislative mandates for conservation. Researchers, policy-makers, and conservation practitioners champion cooperative approaches to address complex ecosystem challenges. In this case study of greater sage-grouse (*Centrocercus urophasianus*) conservation efforts in California and Nevada, three themes emerged: 1) ESA action was transformed into opportunity for system-wide conservation; 2) a diverse, locally based partnership anchored collaboration and engagement across multiple levels; and 3) best-available science combined with local knowledge led to effectiveness and implementation. Integrating policy, management, and learning led to proactive conservation measures and precluded the need to list the bi-state population of greater sage-grouse.

The Sage-Grouse Habitat Mortgage: Effective Conifer Management in Space and Time

Chad S. Boyd, Jay D. Kerby, Tony J. Svejcar, Jon D. Bates, Dustin D. Johnson, and Kirk W. Davies

Presence of conifers greater than 3 feet tall within sage-grouse (*Centrocercus urophasianus*) habitat dramatically reduces habitat quality for this species and necessitates conifer control to maintain habitat value. Efforts to control conifers using cutting may have a short treatment lifetime and are relatively expensive compared to fire-based control, which is comparatively inexpensive and may have a longer treatment lifetime, but has the disadvantage of temporarily reducing or eliminating sagebrush, and consequently, sage-grouse habitat. We suggest that using a combination of fire and cutting treatments is most financially and ecologically sustainable over the long time horizons (100 years) involved in managing conifer-prone sage-grouse habitat.

Bird Responses to Removal of Western Juniper in Sagebrush-Steppe

Aaron Holmes and Jeremy Maestas

We investigated bird abundance in response to western juniper (*Juniperus occidentalis*) tree removal from stands in the middle stages of juniper encroachment. In the 3rd year following tree removal nesting pairs per 250 acres of Brewer's sparrow (*Spizella breweri*), green-tailed towhee (*Pipilo chlorurus*), and Vesper sparrow (*Poocetes gramineus*) were 23.6, 4.5, and 6.5, respectively, higher than in locations that had not been treated. Gray flycatcher (*Empidonax wrighti*) density was lower in cut areas. Conifer removal projects that are designed to retain shrub cover and structure can have benefits to multiple species of ground and shrub nesting birds, including several species of conservation concern.

Extending Conifer Removal and Landscape Protection from Sage-Grouse to Songbirds, a Range Wide Assessment

J. Patrick Donnelly, Jason D. Tack, Kevin E. Doherty, David E. Naugle, Brady W. Allre, and Victoria J. Dreitz

Recent and unprecedented scale of greater sage-grouse (*Centrocercus urophasianus*) conservation in the American West enables assessment of community-level benefits afforded to other sagebrush-obligate species, including Brewer's sparrow (*Spizella breweri*), sagebrush sparrow (*Artemisiospiza nevadensis*), and sage thrasher (*Oreoscoptes montanus*). There is an apparent 40% threshold in sagebrush land-cover over which songbird abundances nearly doubled. Range-wide, landscapes supporting greater than 50% of males on leks also harbored 13% to 19% greater densities of songbirds compared to range-wide mean densities. Spatially targeted conifer removal and conservation actions focused on reducing the threat of wildfire and invasive plants increase