Grazing Can Help Western Rangelands Recover From Fire

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Introduction

Much of the approximately 153 million acres of sagebrush rangeland in the western United States is at risk of invasion by non-native annual grass invasion. These non-native annual grasses, such as cheatgrass and medusahead, decrease livestock forage production, degrade wildlife habitat, and promote more frequent wildfires. Livestock use of rangelands is commonly cited as a factor contributing to the spread of non-native annual grasses. However, non-native annual grasses have been found in areas never grazed by domestic livestock (Svejcar and Tausch 1991, Davies et al. 2006). Some have even argued that because livestock grazing is not part of the historical disturbance regime in sagebrush rangelands in the Intermountain West (Mack and Thompson 1982), it should be removed (Fleischner 1994, Noss 1994). The general assumption is that because sagebrush plant communities did not evolve with high grazing pressure, they will not be able to tolerate domestic livestock use. However, the impacts of livestock grazing (or not grazing) prior to fire on native plant communities are relatively unknown, which contributes to considerable controversy over the use of both livestock grazing and fire on sagebrush rangelands.

Understanding the impacts of grazing prior to fire in sagebrush plant communities is important because most of these plant communities are grazed by domestic livestock, are at risk of burning, and provide valuable habitat for wildlife. Many wildlife species require sagebrush rangelands to survive including sage-grouse and pygmy rabbits, which are either currently being considered or have been considered for listing under the Threaten and Endangered Species Act. Thus, understanding how livestock grazing affects the recovery of sagebrush rangeland from fire is important to properly manage and protect critical wildlife habitat and an important forage base for livestock production.

Experimental Procedures

To investigate the influence of grazing on post-fire recovery of rangeland, we compared how vegetation on grazed and ungrazed Wyoming big sagebrush rangeland recovered from fire. The study was conducted on the Northern Great Basin Experimental Range (NGBER) in southeastern Oregon about 56 km west of Burns, Oregon. Climate is typical of the northern Great Basin with cool, wet winters and hot, dry summers. Treatments were: 1) ungrazed unburned, 2) ungrazed burned, 3) grazed unburned, and 4) grazed burned. Ungrazed treatments were implemented by building 4.9-acre domestic livestock grazing exclosures in 1936. Wildlife had access to the vegetation inside the exclosures. The grazed treatments were areas adjacent to the exclosures and had moderate livestock grazing (30-40 percent of available forage used) until 1990. In the fall of 1993, prescribed burns were applied to both the grazed and ungrazed treatments. The long-term grazing treatment removed much of the potential litter build-up on perennial grasses on an annual basis, whereas the ungrazed sites had approximately twice as much litter as the grazed sites. Other than the difference in litter, vegetation characteristics between the grazed and ungrazed sites were similar before burning in 1993. Vegetation characteristics were sampled in 2005, 2006, and 2007 (12, 13, and 14 years post-burning).

The Consequences of Grazing vs. Not Grazing Rangelands Prior to Fire

In general, protection from grazing prior to fire led to a decrease in large perennial bunchgrasses and an increase in cheatgrass. Large perennial bunchgrass density was lowest in areas protected from grazing prior to fire and highest in areas grazed prior to fire with an approximately 1.9-fold difference between the two treatments (Fig. 1). Burning decreased

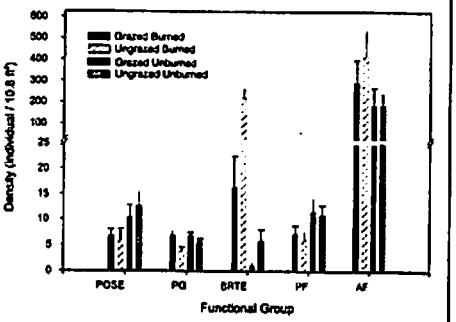

Figure 1. Plant functional group density (mean + S.E.) of the treatments averaged over 2005, 2006, and 2007 at the Northern Great Basin Experimental Range. POSE = Sandberg bluegrass PG = tall perennial bunchgrass, BRTE = cheatgrass, PF = perennial forb, and AF = annual forb (largely composed of non-natives). Ungrazed = livestock excluded since 1936, Grazed = moderately grazed by livestock until 1990, Burned = prescribed fall burned in 1993, and Unburned = no prescribed burning. Note the Density Axis increases from increments of 5 to increments of 100 after 25.

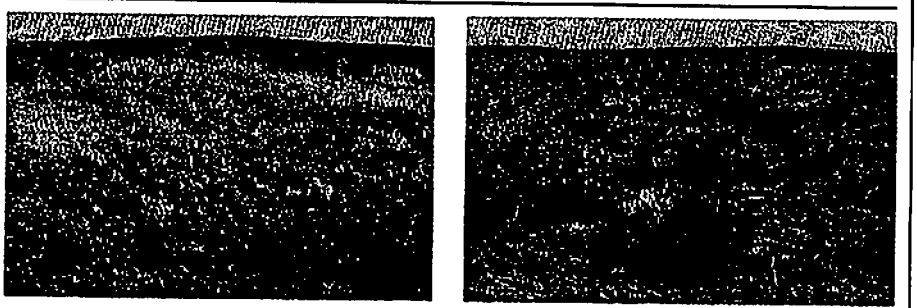

Photo 1. Photograph of a rangeland moderately grazed by livestock prior to fire on the left and a rangeland protected from livestock grazing on the right 14 years post-fire. Treatments are adjacent to each other, note common ridge in background of photograph. Native perennial bunchgrasses dominate the rangeland grazed prior to fire, whereas cheatgrass dominates the rangeland protected from gazing prior to fire.

perennial bunchgrass density in the ungrazed areas but did not influence bunchgrass density in the grazed areas. Cheatgrass density was 15-fold greater in the areas protected from grazing and then burned compared to any of the other treatments. Perennial forb density was decreased by burning (Fig. 1), but was not influenced by grazing.

Large perennial bunchgrass production generally increased with burning (Fig. 2). However, bunchgrass production increased more after burning in grazed areas compared to the ungrazed areas. Burning the grazed areas increased perennial bunchgrass production 1.6-fold. Cheatgrass biomass production was 49-fold higher in areas that had been protected from grazing and then burned compared to areas grazed and burned (Fig. 2). Biomass production of annual forbs, consisting mostly of exotics, increased with burning. However, annual forb production was lowest in the ungrazed unburned treatment and highest in the ungrazed burned treatment. In the areas protected from grazing and then burned, cheatgrass produced more biomass than all the perennial herbaceous (grasses and forbs) vegetation combined.

Moderately grazing sagebrush plant communities with livestock increased the ability of the native herbaceous plant community to recover from fire and thus, prevented cheatgrass invasion (Photo 1). Fire in rangeland protected from grazing resulted in significant invasion by cheatgrass. The post-fire cheatgrass invasion of the ungrazed areas will probably increase the frequency of wildfire. Cheatgrass invasion often increases fire frequency due to an increase in the amount and continuity of fine fuels (Whisenant 1990). The invasion of cheatgrass and, subsequently, the increased fire frequency will negatively impact sage-grouse, pygmy rabbits, and other sagebrush-obligate wildlife species as well as reduce forage production by perennial bunchgrasses.

Moderate livestock grazing probably mediated the effects of fire by preventing the accumulation of plant litter. Less litter, especially around perennial bunchgrasses, probably increased the survival of native herbaceous perennial vegetation. The accumulation of litter on perennial grasses has been demonstrated to increase mortality from burning (Odion and Davis 2000). Mortality of perennial bunchgrasses would potentially open the plant community to cheatgrass invasion, because perennial bunchgrasses were the most critical plant functional group for preventing exotic annual grass invasions (Davies 2008).

Although domestic livestock grazing was not part of the historical disturbance regime of sagebrush rangelands, grazing may now be needed because of new

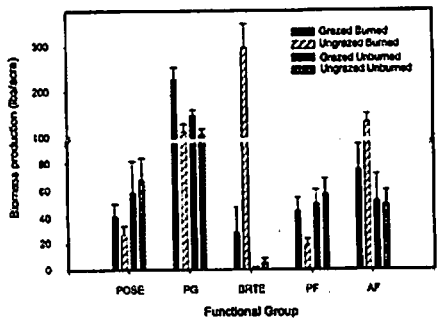

Figure 2. Plant functional group biomass production (mean + S.E.) of the treatments averaged over 2005, 2006, and 2007 at the Northern Great Basin Experimental Range. POSE = Sandberg bluegrass, PG = tall perennial bunchgrass, BRTE = cheatgrass, PF = perennial forb, and AF = annual forb (largely composed of non-natives). Ungrazed = livestock excluded since 1936, Grazed = moderately grazed by livestock until 1990, Burned = prescribed fall burned in 1993, and Unburned = no prescribed burning. Note the Biomass Production Axis increases from increments of 20 to increments of 100 after 100.

pressures from invasive plants and climate change. However, individual circumstances will determine the value of mimicking historical disturbance regimes for maintaining native plant communities. In our specific example, the historical disturbance regime of Wyoming big sagebrush plant communities is estimated to have consisted of 50- to greater than 100-year fire-return intervals (Wright and Bailey 1982, Mensing et al. 2006) and lacked large herbivore grazing pressure (Mack and Thompson 1982). Mimicking this disturbance regime for sagebrush plant communities did not produce the expected effect of shifting the dominance from shrubs to native forbs and perennial grasses. Long-term protection from livestock grazing followed by fire resulted in substantial cheatgrass invasion and a large increase in non-native forbs.

Management Implications

Long-term protection from livestock grazing in sagebrush plant communities weakened the ability of the perennial bunchgrasses to tolerate fire. Moderate livestock grazing appears to be beneficial to the long-term sustainability of sagebrush plant communities. Choosing to exclude livestock grazing may in fact contribute to the demise sagebrush plant communities and accelerate the decline of sagebrush obligate-wildlife species. However, these results should not be misinterpreted to suggest that all grazing is beneficial. Heavy and/or improper grazing (over-grazing) would be detrimental to these plant communities; thus, the level and timing of grazing is critical. This research also suggests that objectives for land management probably need to focus on specific measurable goals that society has determined are valuable (soil stability, biodiversity, wildlife habitat, livestock forage production, etc) instead of trying to mimic historical disturbance regimes and conditions.

If you would like to discuss this article or obtain a copy of the scientific journal article reporting these results, do not hesitate to contact Kirk Davies at 541-573-4074 (kirk.davies@oregonstate.edu).

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A Message from the OCA President
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growing world. They know the amount of protein needed in the next 40 years cannot be met with a strictly plant based diet. If we can survive the next few years I do believe the worm will turn and we will again be respected for ALL the contributions we make to society. In the mean time, we'll tighten our belts a little more and continue to enjoy our freedoms and our families and our capitalistic lifestyles, because, I think this is really what the liberal socialists are jealous about.

One other thought. If you're not involved in your state and national trade organizations, join and get involved. You may not agree with every thing they do, but they are working for you on a daily basis on so many issues, that you cannot imagine the time and scope spent defending your way of life They are looking out for your interests so you can stay home and look after your business.

Oregon Cattlemen's Association (OCA) members who recruit at least one member will receive an exclusive OCA hat. To receive credit, the recruiters name must be on the membership form.

The county that recruits the most associate and producer members between July 1st and November 30th will win a new saddle donated by Ag Insurance. The winner will be announced during the Annual Convention.

Members joining now will be valid through December 2010.

As of October 13, 2009 the county recruitment numbers are as follows:

Baker - 4	Clackamas - 1
Deschutes - 1	Douglas - 2
Grant - 1	Harney - 3
Jackson - 1	Lake - 2
Lane - 1	Linn - 1
Malheur - 9	Marion - 1
Morrow - 3	Union - 1
Wallowa - 2	Washington - 1