Grazing to maintain perennial bunchgrasses and reduce nonnative annuals

A webinar presented on April 11, 2018, by Kirk Davies, Lead Rangeland Scientist, USDA-ARS, Burns, OR. Summary by Corey Gucker, Outreach Coordinator, GBFSE.

Access original webinar - https://youtu.be/-pkp6nyA4Mw

Summary

- **Proper grazing can alter fuels in a way that reduces fire risk**
- **Proper grazing can increase site resiliency through lower fire temperature and greater unburned area**
- **Proper grazing can improve fire suppression efforts through slowed fire progression and lower flame lengths**

Importance of Perennial Bunchgrasses

In native sagebrush communities, perennial grasses are the dominant understory functional group. They are critical habitat, providing hiding cover and forage to many sagebrush ecosystem species. They also provide the majority of forage for livestock. As the dominant herbaceous ecosystem component, perennial grasses play an important role in tying up the majority of available resources and keeping them from invasive species, particularly nonnative annual grasses.

Problems Associated with Nonnative Annual Grasses

Invasions of native sagebrush communities by nonnative annual grasses result in decreased biodiversity, less reliable livestock forage production, a more continuous fuel bed, and increased fire risk. Annual grasses are much more responsive to annual climate variations than perennial grasses. In wet years, annual grass production explodes but in dry years, production decreases dramatically.

Managing for Perennial Bunchgrasses

There are two important ecosystem factors, grazing and fire, that can be managed or controlled in ways that favor the growth and persistence of perennial grasses in sagebrush communities. While neither factor is necessarily good or bad, both can have negative consequences under certain conditions and there are interactive effects when these processes co-occur. Timing and intensity of grazing are the most important factors to proper management. Perennial grasses are most sensitive to heavy defoliation early in the spring, and are especially susceptible to mortality when early spring grazing is repeated year after year. The distribution of grazing at a site directly affects grazing intensity. Proper grazing timing and intensity guidelines include: rotating season of use, incorporating periods of complete rest, and light to moderate utilization (removal of only up to 50% of available forage).

Grazing Effects on Fuels

Abundance, height, and continuity of fuels impact fire behavior and effects. Proper grazing can reduce the abundance of living and dead fuels and the height and continuity of fuels. In looking at an individual bunchgrass, fuel content (living and dead) of an ungrazed plant can be three times that of a grazed plant. Ungrazed grasses often have large dead centers that form as dead stems build up and limit growth within the center of the plant. Grasses with these pockets of accumulated dead fuels often burn hotter than those lacking center dead fuel pockets.

Grazing can also impact fuel moisture by reducing the abundance of dead fuels on a site (Fig 1). When the fuel moisture content of a winter-grazed and an ungrazed native sagebrush community were compared, the winter-grazed site was not considered dry enough to burn until August, 1.5 months later than when the ungrazed site was likely dry enough to burn.

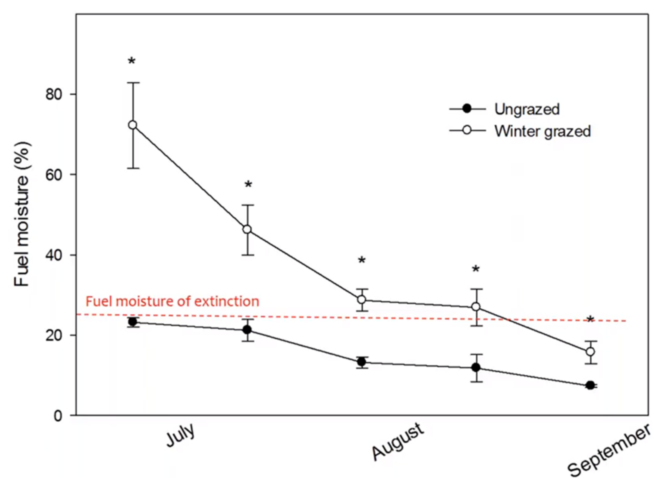

Figure 1. *Fuel moisture of ungrazed (solid circles) and winter-grazed (open circles) sites within a Wyoming big sagebrush community (4,500 ft). Fuel moistures below the red fuel moisture of extinction line would readily burn and those above the line would not (Davies et al. 2016).*

Grazing Effects on Fire Ignition, Propagation, and Behavior

Davies et al. (2017) tested the probability of ignition and fire spread at five sites that were fall-grazed, spring-grazed, or ungrazed before a fire. Ignitions were tested in July and August. Both the probability of ignition and probability of fire spread were lower at the fall- and spring-grazed than ungrazed sites (Fig. 2). When fires did occur, maximum fire temperature in the interspaces between sagebrush plants and beneath sagebrush canopies were nearly 100° C lower in grazed than ungrazed sites. Flame depth, flame height, and rate of fire spread were significantly lower on grazed than ungrazed sites as was total area burned, which averaged about 22% on grazed and 60% on ungrazed sites. There were more unburned patches in the grazed than in the ungrazed areas following the fire, largely due to the greater abundance and continuity of fuels at the ungrazed sites.

Grazing Effects on Post-Fire Vegetation

Grazing prior to burning impacts post-fire regeneration in sagebrush ecosystems (Fig. 3). Davies et al. (2017) compared grazed and ungrazed sites 15 years following fire and found that biomass production of perennial grasses and native forbs was significantly greater on sites that were grazed prior to burning. Biomass production of cheatgrass and annual forbs (primarily nonnative species), was greater on ungrazed burned than grazed burned sites. These findings were likely the result of a more severe fire on ungrazed sites, which caused greater mortality of perennials, opening the site to invasion by nonnative annuals.

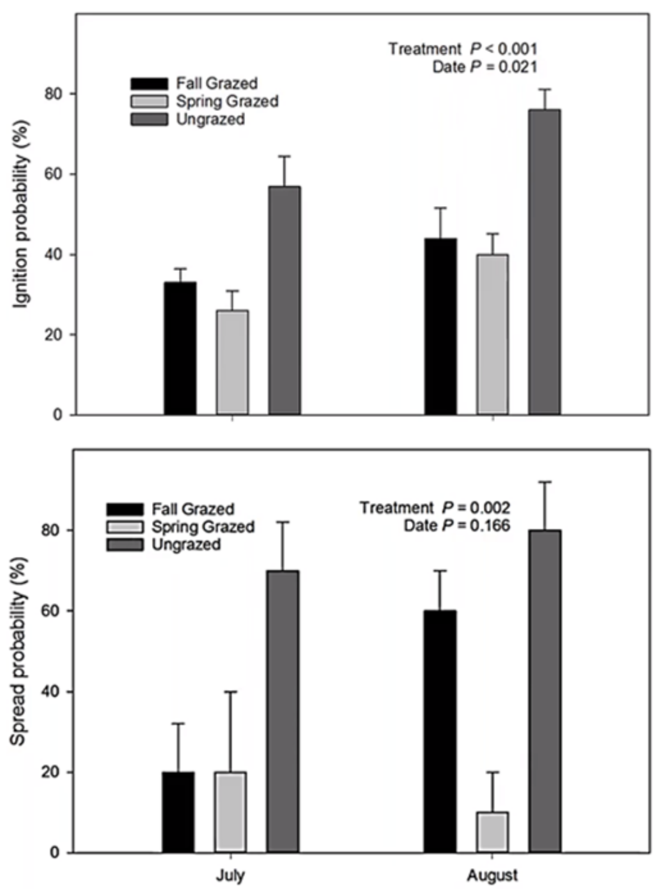

Figure 2. *Results from a study testing probability of ignition (top) and probability of fire spread (bottom) in sites that were fall-grazed (black bars), spring-grazed, and ungrazed prior to burning (Davies et al. 2017).*

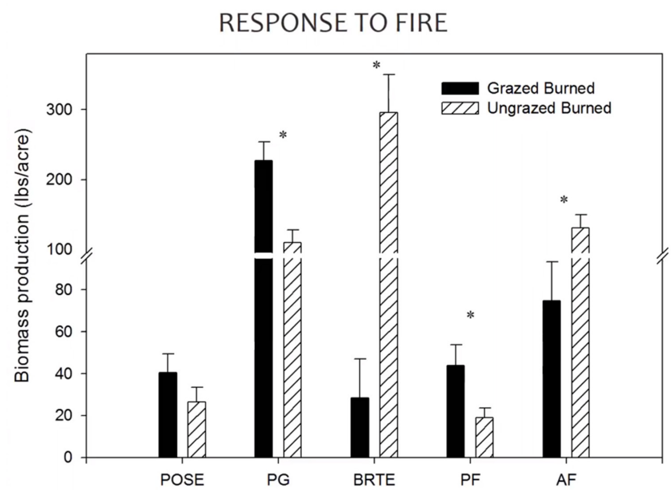

Figure 3. *Vegetation response of grazed (solid bars) and ungrazed (hash-lined bars) to a September prescribed fire. Biomass production was assessed 15 years after fire. POSE (Sandberg bluegrass), PG (perennial bunchgrasses), BRTE (cheatgrass), PF (native perennial forbs), AF (annual forbs, mostly nonnative).*

Conclusions

Proper grazing can be successful in reducing fire risk and fire severity.

- Grazing can alter fuels in a way that reduces fire risk.
- Grazing can increase a site's resilience to fire though a reduction in fire temperature and increasing the abundance of unburned patches.
- Grazing can improve fire suppression efforts through slowed fire progression, lowering flame lengths, and allowing more opportunities for direct attack.

Benefits from grazing require careful, strategic, and flexible management of cattle. Grazing management questions must extend beyond adding or decreasing the degree of utilization. If not managed appropriately, grazing can cause the same negative effects that a severe fire can.

References

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