

Can Grazing be Used to Increase Fire Suppression Effectiveness?

By: Christian Boyd
Pacific Northwest Section
Society for Range Management
January 10, 2017

Introduction

This paper will be overviewing wildfire in sagebrush ecosystems and how we might pre-emptively bolster fire suppression efforts using livestock grazing. Sagebrush ecosystems cover over 100 million acres in the western United States and include the mixed sagebrush and grass sagebrush steppe to the north and the drier Great Basin sagebrush ecosystems to the south (Davies et al. 2011).

In this paper, I will look at the effects of wildfire on sagebrush plant communities. Next I will discuss fire suppression effectiveness and the role of pre-fire fuel reduction programs. And I'll conclude by looking at the viability of livestock grazing as a tool for pre-emptively increasing fire suppression effectiveness.

Wildfire Effects

Fire is a natural disturbance process in sagebrush ecosystems. However, in the last 100 years there has been a dramatic increase in the presence of fire on in sagebrush plant communities of the western United States. For example, a recent publication stated that in the last 20 years, seven of 11 western states have experienced their largest wildfire in recorded history (Boyd et al 2015). Much of this increase in wildfire is because of exotic annual grasses that can increase fuel continuity, which allows wildfire to move more quickly across large landscapes. There are nearly 60 million acres of sagebrush plant communities impacted by annual grasses in the western United States (Davies et al. 2011). That is a lot of grass but more importantly a lot of fuel. Although wildfire is a natural part of sagebrush ecosystems, native plant communities have not evolved to be adapted to frequent fire. The increased amount of fire on western landscapes has resulted in loss of native plant communities with exotic annual grasses filling the void left by this loss. Wildfire is also associated with loss of livestock forage which is detrimental for ranchers who depend on the forage for their livelihood. Fire can also decrease wildlife habitat which harms the species that depend on the habitat for food and survival. One species in particular is the greater sage-grouse, a species that will be considered for listing under the Endangered Species Act due to loss of habitat (USFWS 2015). The sage-grouse is losing its habitat to invasive annual grasses and fire. The more annual grasses the more fire. One of the things sage grouse have to have for survival is sagebrush. Fire kills most

species of sagebrush. No sagebrush = no sage-grouse. Thus, land managers and scientists are actively looking for solutions to this fire epidemic.

Fire Suppression Effectiveness

Wildfire Suppression is one way to combat the wildfire problem. There is up to \$1 Billion spent annually on Suppression efforts in the United States. However, current suppression efforts have not been effective enough to eradicate large wildfires. This has led to strong interest in pre-fire fuel reduction in an effort to increase fire suppression effectiveness when plant communities do burn. Most of these efforts have taken the form of mechanical reduction of fuels. Mechanical methods such as mowing and brush removal are effective fuel reduction techniques. However, they are difficult to apply at large scales needed on western landscapes and are very expensive. Another fuel reduction option is livestock grazing. Livestock grazing is very cost effective on a large scale but the effectiveness as a fuel reduction tool has not been rigorously evaluated.

Livestock Grazing as a Fuels Reduction Tool

Can Livestock Grazing be used as a fuels reduction tool to reduce fire behavior and make wildfires easier to suppress? To answer this question, I looked at research from the Eastern Oregon Agricultural Research Center in Burns Oregon (Davies et al. 2016). This research was conducted in sagebrush/bunchgrass plant communities in southeast Oregon. It involved five, five acre grazing exclosures set within a 5,000-acre pasture that was grazed annually during the dormant season by cattle over a five-year period at moderate levels of utilization. At the end of this five year period the exclosures and adjacent five acre grazed plots were prescribed burned with a prescription of humidity greater than 15%, wind less than 10 mph and air temperature less than 80 degrees Fahrenheit. All measures of fire behavior were less in grazed plots indicating that fire in grazed plots would be more easily suppressed. Measures of fire behavior included: Rate of spread, percent of plot burned, and flame height. So why was fire behavior less intense in grazed plots? In sagebrush fires, most of the heat energy is from the combustion of shrubs. This is because shrubs are a very energy dense fuel. In this research grazing decreased the continuity of grass fuels. So picture this: sage brush is a fire energy bomb and the grasses that surround it are fuses to the bomb. When the fuses ignite, they transport fire to shrubs causing the sagebrush to “explode” (Boyd et al 2015). In this research the grazing cattle

acted like a pair of scissors and “cut” the fuses to those bombs. At the end of the burns the ungrazed plot burned completely, meaning that all fuels were consumed which results in maximum heat output. These types of fires are difficult to suppress due to the amount of heat released during the fire (Hulet et al. 2015). Compare this to a grazed plot. In the grazed plot, burning was not complete and unburned grass and shrub fuels can be seen after the fire. This means that only a portion of the potential heat energy of the fuels was released in the fire, which makes for a less intense and easier to suppress fire relative to the ungrazed plot.

Conclusion

Wildfire on sagebrush rangelands is out of control. Current suppression efforts are not sufficient to combat this problem...Is grazing the solution? The results of recent research indicate that grazing can indirectly decrease fire behavior by reducing grass fuels, decreasing shrub combustion, and decreasing fire behavior. This should make fire suppression more effective. In conclusion, grazing can reduce fire behavior in sagebrush communities and this should make wildfires easier to suppress.

Literature Cited

Boyd, C.S., Davies, K.W., Hulet, A. 2015. Predicting fire-based perennial bunchgrass mortality in big sagebrush plant communities. *International Journal of Wildland Fire*
<http://dx.doi.org/10.1071/WF14132>

Davies, K.W., Boyd, C.S., Bates, J.D., Hulet, A. 2016. Winter Grazing can reduce wildfire size, intensity, and behavior in a shrub-grassland. *International Journal of Wildland Fire* 25:191-199.

Davies, K.W., Boyd, C.S., Beck, J.L., Bates, J.D., Svejcar, T.J., Gregg, M.A. 2011. Saving the sagebrush sea: an ecosystem conservation plan for big sagebrush plant communities. *Biological Conservation* 144:2573-2584.

Hulet, A.H., Boyd, C.S., Davies, K.W., Svejcar, T.J. 2015. Prefire (Preemptive) Management to Decrease Fire-Induced Bunchgrass Mortality and Reduce Reliance on Postfire Seeding. *Rangeland Ecology & Management* 68:437-444.

US Fish and Wildlife Service. 2015. Endangered and threatened wildlife and plants; 12-month finding on a petition to list greater sage-grouse (*Centrocercus urophasianus*) as an endangered or threatened species. *Federal Register* 10.02.2015,
<https://www.federalregister.gov/articles/2015/10/02/2015-24292/endangered-and-threatened-wildlife-and-plants-12-month-finding-on-a-petition-to-list-greater>. Accessed 1.17.2017.