

RESTORING THE FIRE–GRAZING INTERACTION FOR GRASSLAND CONSERVATION AND MANAGEMENT

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ABSTRACT

It is well recognized that fire and grazing were common features of pre–European settlement grasslands and may be important in maintaining grassland structure and function. Most studies of grazing and fire focus on binary (yes or no; a few combining fire and grazing) treatment designs on relatively small uniform experimental units. This approach of uniform treatment application is incapable of explaining complex patterns that are central to the ecological interaction of fire and grazing within the context of a dynamic landscape. Our recent research at the Tallgrass Prairie Preserve suggests that fire and grazing are interactive and can lead to a shifting mosaic landscape that is regulated through a series of positive and negative feedbacks. Unburned prairie has a high probability of fire and a low probability of selection by grazing animals. When a fire occurs on a portion of the landscape, the probability of grazing increases on that portion and animals tend to congregate and graze the burned area heavily. This fire followed by focal grazing changes the community structure and lowers the probability of fires. Grazing animals will continue to use the burned area until a new burned area becomes available; they then switch to the new burned area, allowing the previously burned area to recover. The result is a shifting mosaic of patches across the landscape, driven by the interactive influence of fire and grazing. Thus, characteristics of patches are dictated by time since focal disturbance such that the landscape contains plant communities in patches that have been recently burned and focally grazed and also patches that have not been disturbed for several years. We developed this fire–grazing model into a management model capable of enhancing biodiversity while maintaining production of domestic livestock.

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