SUMMARY OF APPLICATION OF THE FIRE: *GRAZING INTERACTION TO RESTORE A SHIFTING MOSAIC ON TALL GRASS PRAIRIE*

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SUMMARY

1. Management of rangelands has long operated under the paradigm of minimizing spatially discrete disturbances, often under the objective of reducing inherent heterogeneity within managed ecosystems. Management of grazing animals has focused on uniform distribution of disturbance, so that no areas are heavily disturbed or undisturbed (i.e. management to the "middle").

2. A model of the fire-grazing interaction argues that grazing and fire interact through a series of positive and negative feedbacks to cause a shifting mosaic of vegetation pattern across the landscape. This interaction was important to the evolution of species in North American Great Plains grasslands. This approach has potential to serve as an ecologically based model for management of grasslands with a long evolutionary history of grazing.

3. We compared a heterogeneity-based approach, in which fire is applied to discrete patches, with typical homogeneity-based land management in the North American Great Plains, to determine if patch burning followed by focal grazing creates a shifting mosaic pattern of vegetation structure and composition.

4. Our data suggest that spatially discrete fires promote focal grazing, where grazing animals devote 75 percent of grazing time within the one-third of the area that is burned within the past year. These focal disturbances cause local changes in the plant community and increased patch-level heterogeneity across landscapes. As the focal disturbance is shifted to other patches over time, successional processes lead to changes in local plant communities and the patchwork landscape can be described as a shifting mosaic.

5. A patch dynamic approach can be accomplished in the tallgrass prairie through applying spatially discrete fires and allowing animals free access to a diversity of landscape elements that vary in time since focal disturbance. This increases heterogeneity across the landscape, a variable that has been shown to be critical to some wildlife species as well as the structure and function of grassland ecosystems.

6. *Synthesis and applications*: Our study demonstrates that the fire-grazing model may be useful for generating heterogeneity in grassland management. Discrete fires applied to patches and patchy grazing by herbivores promotes a shifting vegetation mosaic across the landscape. Furthermore, application of the model has the potential of increasing the area of rangelands under management for conservation purposes

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because livestock production is maintained at a level similar to traditional management. So, by managing transient focal patches that move through the landscape, heterogeneity has the potential to be a central paradigm for managing landscapes for multiple objectives, such as biodiversity and agricultural productivity.

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Ranching for both cattle and sheep has been and continues to be a primary land use within the planning landscape of the TBGPEA. *Photo: J. Haufler 2005*