

EFFECTS OF DORMANT-SEASON FIRE AT THREE DIFFERENT FIRE FREQUENCIES IN SHORTGRASS STEPPE OF THE SOUTHERN GREAT PLAINS

Paulette L. Ford

USDA Forest Service, Rocky Mountain Research Station, 333 Broadway Street, Suite 115, Albuquerque, NM 87102, USA

Carleton S. White

University of New Mexico, Department of Biology, Albuquerque, NM 87131, USA

ABSTRACT

Prior to proceeding with large-scale fire reintroduction as a grassland management option, appropriate fire frequencies need to be determined. This research experimentally tested the effects of dormant-season fire on ground cover and on plant and soil nutrient cycling in shortgrass steppe at three different fire frequencies. The objective was to determine if fire return interval had detrimental effects on soil fertility and perennial grass cover relative to untreated grassland. This study is part of a long-term, 18-y study examining the effects of fire at return intervals of 3, 6, and 9 y. The study is located in the southern Great Plains of northeastern New Mexico (lat 36°31'20"N, long 103°3'30"W). The 160-ha site has mostly native vegetation, with the sod-forming *Buchloe dactyloides* and the bunchgrass *Bouteloua gracilis* being the dominant plant cover. The experimental design was completely randomized with four treatments and five replicate 2-ha plots per treatment. Treatments were fire return intervals of 3 y (3D) burned three times, 6 y (6D) burned twice, 9 y (9D) burned once, and unburned (U) plots. Treatments were applied in April 1997, 2000, and 2004. Vegetation and soil samples and ground-cover measurements were taken in October 2004. Response variables included percent litter, bare ground and live perennial grass cover, soil organic matter content and potentially mineralizable nitrogen, and *Bouteloua gracilis* nutrient content. Six months after fire treatments, there were no significant differences in perennial grass cover among treatments. However, litter cover was significantly reduced by increased burn frequencies ($P = 0.05$) from highest to lowest, as follows: U, 9D, 6D, and 3D. Conversely, bare ground increased with increased burn frequencies ($P = 0.05$) from lowest to highest, as follows: U, 9D, 6D, and 3D. Burn frequency had no significant effect on soil organic matter and nutrient availability. There were no significant differences in *Bouteloua gracilis* nutrient content, but there was a trend toward a higher percentage of nitrogen with more frequent burns. All fire frequencies produced minimal changes in grass cover and nutrient content and soil fertility. However, shorter fire return intervals may increase bare soil and erosion potential.

Citation: Ford, P.L., and C.S. White. 2007. Effects of dormant-season fire at three different fire frequencies in shortgrass steppe of the southern Great Plains [abstract]. Page 71 in R.E. Masters and K.E.M. Galley (eds.). Proceedings of the 23rd Tall Timbers Fire Ecology Conference: Fire in Grassland and Shrubland Ecosystems. Tall Timbers Research Station, Tallahassee, Florida, USA.