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Patch burn grazing in a semi-arid grassland: consequences for pronghorn, plains pricklypear, and wind erosion

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INTRODUCTION

Fire and grazing interact. Patch burn grazing management is prescribed burning and grazing practice that allows livestock and wildlife to select a diet from both burned and unburned vegetation. Differences in forage quality between the burned and unburned areas can affect where animals graze. While the benefits of prescribed fire on forage quality are well understood for tallgrass prairie, less is known about how fire affects semi-arid shortgrass prairie. While croplands with bare soils adjacent to shortgrass rangelands are well-known to be susceptible to wind erosion, much less is known about the potential for erosion on burned shortgrass prairie that has been also grazed.

LOCATION

The study was conducted at the Central Plains Experimental Range in northeast Colorado. Buffalograss (*Bouteloua dactyloides*) and blue grama (*Bouteloua gracilis*) produce more than 70% of the forage on this sandy loam site. Plains pricklypear (*Opuntia polycantha*) is abundant and produces another 2-5% of the vegetation. Pronghorn (*Antilocapra Americana*) are native grazers who don't migrate but do move around in response to forage availability and weather.

TREATMENTS

Six 160-acre pastures were grazed with yearling cattle from May to October at a moderate stocking rate, leaving about 60% of the vegetation at the end of the grazing season. Three of the pastures were patch-burned, and three of the pastures were left unburned. About ¼ of each patch-burned pasture was burned in October-November after the end of the growing season, with a different patch burned within the pasture each successive year. During the course of the 4-year study, all 4 quarters of the patch-burned pastures were burned. Pronghorn were counted 2-3 times per week in all 6 pastures. The number and condition of plains pricklypear plants was noted in the burned areas and in an equivalentsize area in the unburned pastures each August. Two dust-collection samplers were installed

Figure 1. Pronghorns grazing on patch-burned areas.

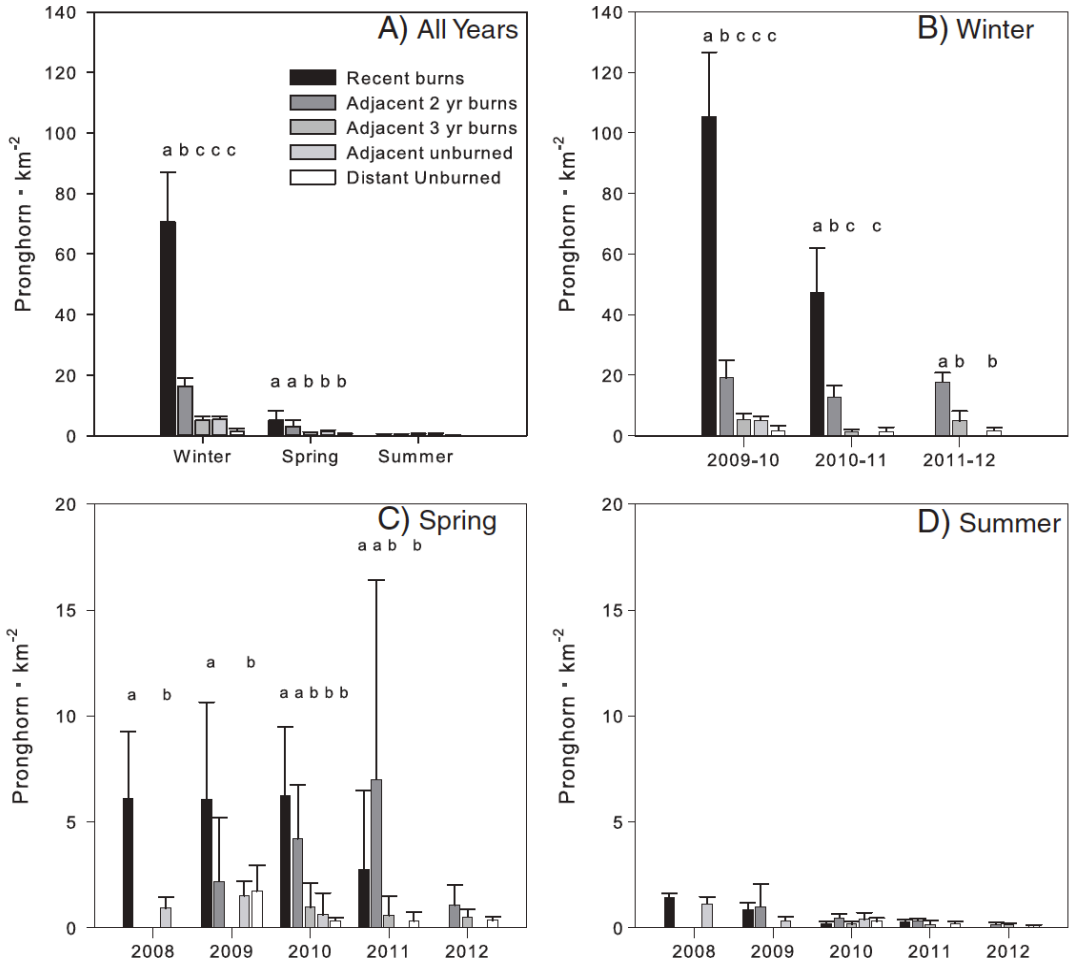

Figure 2. Seasonal densities of pronghorn in relation patch burn treatments in the shortgrass steppe of northeastern Colorado. Recent burns refer to sites that were burned in October or November and then surveyed for pronghorn in the subsequent winter, spring and summer.

about 8 inches above the soil surface in the burned part of each patch-burned pasture and in the center of unburned pastures in October-November. Dust samples were collected several times a year and weighed.

RESULTS

Pronghorn density (animals/unit area) varied by season with 26 times greater densities on the burned areas as compared to the unburned pastures during the winter. Areas that had been burned 12-14 months earlier still had 6 times greater density during the winter. During the summer, there was no difference in pronghorn densities between the burned and unburned pastures. Burning reduced plains pricklypear density whenever burning occurred, and densities remained lower for up to 6 years after the burn, while density in unburned pastures remained unchanged. Soil erosion was slightly greater on burn areas as compared with unburned areas.

MANAGEMENT IMPLICATIONS

Burning in the fall removed the spines from the plains pricklypear and provided a highly digestible forage for pronghorn when the grasses were dormant. Pronghorn both uprooted and bit about 2-8 times more cactus pads and roots on the burned areas as compared to the unburned pastures. This feeding activity resulted in increased cacti mortality. Although there was soil erosion on both the burned and unburned pastures, the amount of soil loss was very small compared to cropland wind erosion soil losses. There was no evidence of blowouts, drifting soil, or soil blown away from between plants. Erosion rates were similar between the growing season and the dormant season as grass crowns remaining after being burnt continued to hold the soil. The optimal fire return interval for prescribed burning for this semi-arid region is not known, but may be 10 years or longer.

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