A CONTRAST IN SIMILARITIES: FIRE AND PLANT DIVERSITY IN GRASSLANDS OF NORTH AMERICA AND WESTERN AUSTRALIA

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ABSTRACT

The tallgrass prairie (*Andropogon–Panicum*) of central North America and the spinifex (*Triodia*) grasslands of the Gibson Desert of central Western Australia differ substantially in many ways, including in their responses to fire, but are similar in that both confirm the importance of fire in maintaining ecosystem diversity. In tallgrass prairie, the historic fire return interval is estimated to have averaged 3–5 y, most likely dominated by large-scale dormant-season fires with more frequent but smaller growing-season fires. Fires were initiated by both Native Americans and lightning, with effects most likely heterogeneous due to factors such as patchy grazing of large grazers that altered fuel continuity. Fire in this ecosystem prevented extensive woody plant invasion and maintained a diverse plant community by invigorating the perennial prairie plants and by facilitating seedling germination and establishment. In the spinifex grassland of the Gibson Desert of central Western Australia, an ecosystem interspersed with bands of mulga (*Acacia aneura*), the frequency of historic fires is not as well known. Aboriginal and lightning-caused fires are reported to have maintained much of the landscape as a patchwork of different post-fire successional states presumably supporting a diverse flora and fauna. In contrast to the tallgrass prairie, grazers are not likely to have influenced fire heterogeneity because the dominant grass (*Triodia basedowii*), which is highly flammable even when green, appears unpalatable to any organism except termites. Further, in contrast to the post-fire resprouting of perennial plants of the tallgrass prairie, *T. basedowii* and most other plants of the spinifex grassland do not survive fire, instead regenerating from seeds dependent largely on post-fire rainfall. Thus, fuel accumulation and continuity in the spinifex grasslands, and consequently fire frequency, would have been dictated mostly by post-burn growing conditions. In addition, plant diversity in the spinifex grasslands results from the release of buried seed following fire-caused death of *T. basedowii* hummocks. The dramatic post-fire increase in plant diversity, which declines to pre-burn conditions within 5 y, is in sharp contrast to the maintenance of diversity afforded by fire in the tallgrass prairie. Thus, the means by which diversity is maintained in the tallgrass and spinifex grasslands differs substantially—maintenance versus cyclic replacement—but in both types of grasslands, fire is the central player. Not unexpectedly, the dynamics of both ecosystems are threatened by alteration of the historic fire regimes, with one consequence an apparent decline in plant (and perhaps animal) diversity.

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