Title: "Post fire plant succession and biodiversity in the Gibson Desert of Western Australia"

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Abstract

A site in the Gibson Desert was selected to test if a shift in the burning regime from one of small human caused fires to broad scale lightning fires has had a detrimental effect on the plant communities. There are a number of recognized landform units in the Gibson Desert but three dominant units were utilized to test vegetation performance in this study. One in a mulga (Acacia aneura) wooded belt, another in Triodia basedowii spinifex complex and a third in Triodia schinzii spinifex association. Measurements of species richness, cover and abundance were taken before and for 5 years after fire.

Species richness increased from an average of 21 species preburn to 54 species in the first year post fire declining to 33 species 2 years after burning. The mulga community had almost double the species richness (76) of either spinifex complex, which were similar (44). Landform units were well separated in ordination space before burning, which separated into burnt and unburnt clusters the year after. These clusters began to coalesce by year four. Species composition of the three landforms is compared over time and with each other.

As a key species the mulga populations are central to sustaining both ecosystem biodiversity and ecosystem function. Mulga can be self-replacing in a fire environment if given sufficient time to establish a soil seed bank [3 & 4]. In this study the mulga sites had a fire return interval of 16 years and > 45years and in both cases high levels of mulga regeneration occur (888 and 1392 seedlings per hectare respectively) suggesting that fire free interval of at least 15years may be required [6].

Soft grasses and ephemeral herbs increased in both abundance and ground cover forming a more continuous fuel once cured. This has the potential to make the country vulnerable to re-ignition in the early post fire period (1-2 years), which presents a significant challenge for management [1 &2]. Additional fire at this time would have damaging results on emerging seedlings and re-sprouting plants. Fires in such close succession would in all probability deplete the seed bank and cause a localized reduction or loss of some species.

The fire utilised in this study killed all above ground parts of living plants except for small patches that were not burnt, however, four years after fire the abundance of woody plants were either higher or had maintained their pre-burn levels. The exception was T. shinzii where two resprouter species (*Rulingia lutieflora and Dicrastylis tomentosa)* has not yet recovered from fire. The Gibson Desert vegetation appears to be quite resilient and recovery from fire is rapid although speed of recovery is most likely rainfall dependent [5].

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