Impacts of variation in fire interval sequences on species richness and composition

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We examined the influence that past fire interval sequences have had on biota of the southern jarrah forest and shrubland mosaic in the extensive landscape north of Walpole, Western Australia [1]. We compared species richness and composition of plants, ants, beetles, vertebrates and macrofungi among sites with consecutive short (≤ 5 yr) fire intervals (SS-regime), consecutive long (≥ 11 yr) fire intervals (LL-regime), moderate (6–9 yr) or mixed fire intervals (M-regime) or very long (30 yr) intervals (VL-regime). We hypothesised that sites with predominantly shorter (SS) and longer (LL and VL) fire interval regimes would be least similar in their species composition.

Sites were not clustered according to their corresponding fire regime groups for either forest or shrubland when data for all taxonomic groups were analysed by non-metric multidimensional scaling (nMDS). However, PERMANOVA results for macrofungi suggested a different species composition due to fire regimes ($P = 0.039$), and results for plants ($P = 0.039$), ants ($P = 0.085$) and beetles ($P = 0.089$) suggested a different species composition between SS sites and LL/VL sites, providing some support for our hypothesis. Canonical analysis of principal co-ordinates (CAP) suggested the strongest difference between SS and LL/VL sites was found for beetle taxa (Fig. 1).

Our results suggest that the biota of SWA demonstrates a high degree of resilience to a range of fire interval sequences in both shrubland and open eucalypt forest. However, the maintenance of short or long fire interval regimes has the potential to alter species composition, whereas a mixed or moderate fire interval regime appears to maintain a composition of species that can persist when subject to a range of fire intervals. This lends support to the intermediate disturbance hypothesis [2] and the importance of a variable fire interval regime for biodiversity conservation [3]. We suggest that the variability in fire intervals that has occurred in our sites makes an important contribution to observed resilience, whereas the maintenance of an invariant short or long interval regime over the longer term would likely lead to substantial ecological change.

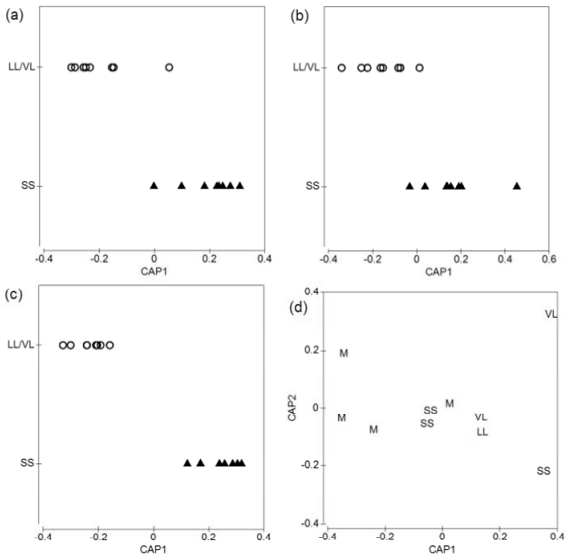

Fig. 1. CAP analysis of sites based on the composition and transformed abundance of (a) plants, (b) ants, (c) beetles, and (d) macrofungi in sites with contrasting fire interval sequences. The compositions of plants, ants and beetles were compared between sites with short-short (SS) fire interval sequences and the combination of sites with long-long (LL) and very long (VL) sequences. The composition of macrofungi was compared between SS, mixed/moderate (M) and a combined LL and VL group.

References

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