Planning fire intervals for biodiversity conservation

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Aim

➢ **To evaluate the impact of contrasting fire interval sequences on:**

- ❖**Floristics**
- ❖**Ants**
- ❖**Beetles**
- ❖**Vertebrate fauna**
- ❖**Macrofungi.**

A *fire interval sequence* is the temporal order of fire intervals for a given point in space, with actual sequences simplified into ecologically-meaningful groups (e.g. short, moderate, or long fire intervals)

➢**To develop guidelines on appropriate fire interval regimes for an area with high conservation values.**

Study area

➢ **The fire-prone southern jarrah forest mosaic of southwestern Australia, ~ 40 km northeast of Walpole.**

Experimental design

➢ **A fire history database spanning 1972–2004 was used to identify plots in two major vegetation types (seasonally-inundated shrubland and jarrah forest; Fig. 1) that had the following contrasting fire regimes:**

SS = successive short (≤ 5 year) intervals

LL = successive long (≥ 10 year) intervals

VL = occurrence of a 30 y fire interval (forest only)

M = mixed/moderate interval regime (range of fire intervals).

➢ **In each of these regimes, we surveyed flora, ground-dwelling invertebrates, fungi and vertebrate fauna on an integrated sampling grid over the period Dec 2006 – Nov 2008. All plots were last burnt in 2002/03; hence they were the same time-since-last-fire when sampled.**

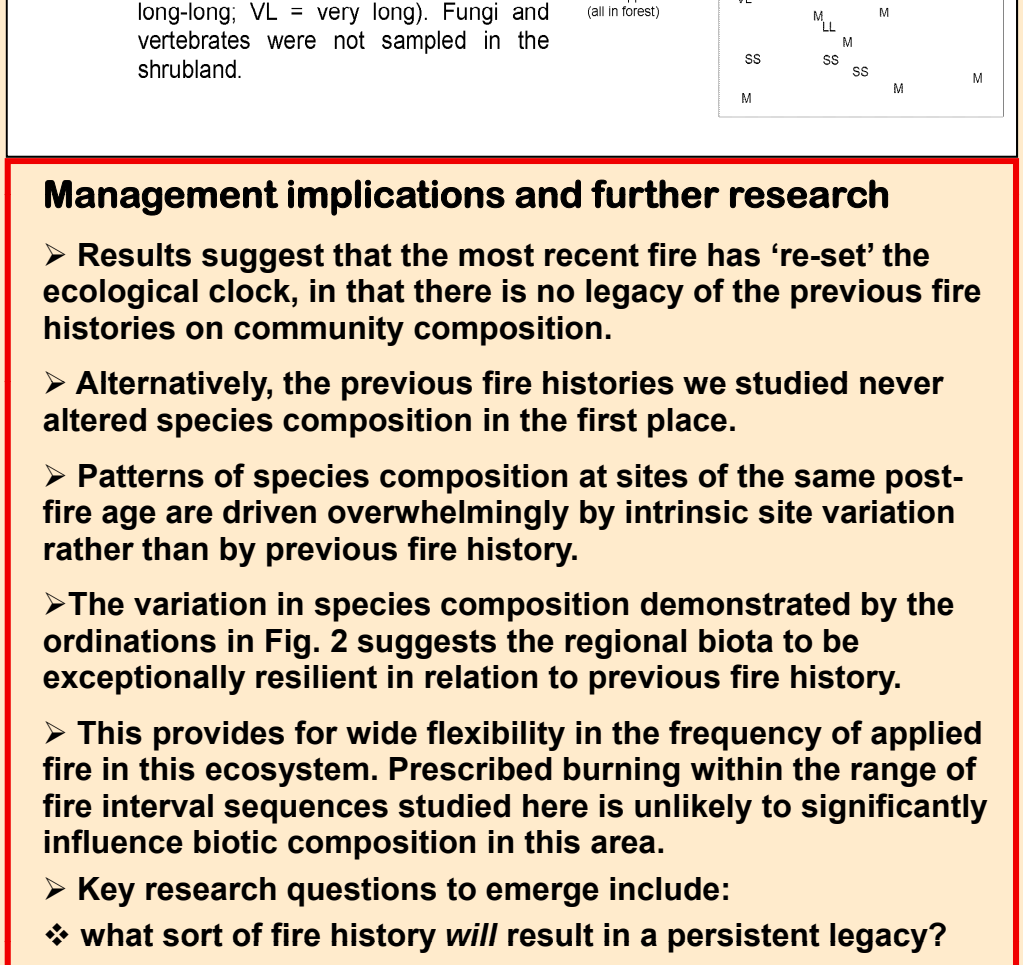

Fig. 2.

Non-metric multidimensional scaling plots showing the similarity of species composition for all sites (left column), shrubland sites (centre) and forest sites (right) for vascular flora (1st row), ants (2nd row), beetles (3rd row), fungi and vertebrate fauna. Each site is plotted by its vegetation type (S = shrubland; F = forest) or fire interval sequence (M = mixed/moderate; SS = short-short; LL = long-long; VL = very long). Fungi and vertebrates were not sampled in the shrubland.

Fig. 1. Vegetation types

Results

➢ **The composition of flora, ants and beetles was significantly different between the forest and shrubland communities (Fig. 2).**

➢ **Community composition was not significantly different between plots with contrasting fire interval sequences.**

➢ **This lack of pattern was evident in shrublands and forests and for all groups of organisms studied.**

➢ **There was greater variation in flora, ant and beetle species composition in shrublands than forests, suggesting a more heterogeneous ecosystem.**

Management implications and further research

➢ **Results suggest that the most recent fire has 're-set' the ecological clock, in that there is no legacy of the previous fire histories on community composition.**

➢ **Alternatively, the previous fire histories we studied never altered species composition in the first place.**

➢ **Patterns of species composition at sites of the same post-fire age are driven overwhelmingly by intrinsic site variation rather than by previous fire history.**

➢**The variation in species composition demonstrated by the ordinations in Fig. 2 suggests the regional biota to be exceptionally resilient in relation to previous fire history.**

➢ **This provides for wide flexibility in the frequency of applied fire in this ecosystem. Prescribed burning within the range of fire interval sequences studied here is unlikely to significantly influence biotic composition in this area.**

➢ **Key research questions to emerge include:**

❖ **what sort of fire history *will* result in a persistent legacy?**

❖ **is time-since-fire a stronger driver than fire interval for determining community composition?**

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