



PROGRAM B



Assessing the effects of contrasting fire intervals on biodiversity at a landscape scale

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Assessing the effects of contr



→ Aims of Project B1.1

1. To develop an extensive database on the fire regimes of forested landscapes in sw Aust.;
2. To determine the impact of contrasting fire regimes on attributes of the biota (flora, fauna, invertebrates, fungi, cryptogams);
3. To develop decision-based models to assist fire managers in planning fire regimes that promote the conservation of biodiversity.



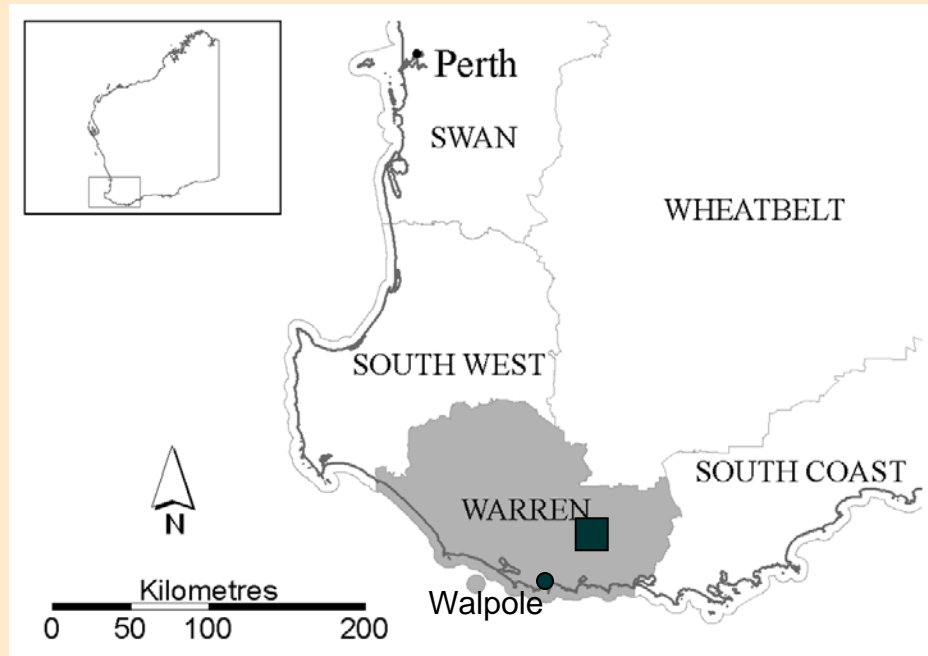
Experimental design

- Three fire interval patterns:
 1. Successive short intervals (≤ 5 years)
 2. Successive long intervals (≥ 10 year)
 3. Mixed interval regime

Short-short
Long-long
Mixed

- Two vegetation types:
 1. Jarrah forest
 2. Heathland
(low heath/sedgeland)

All sites have the same fuel age



Experimental design - Vegetation types



Heath



Forest



Experimental design

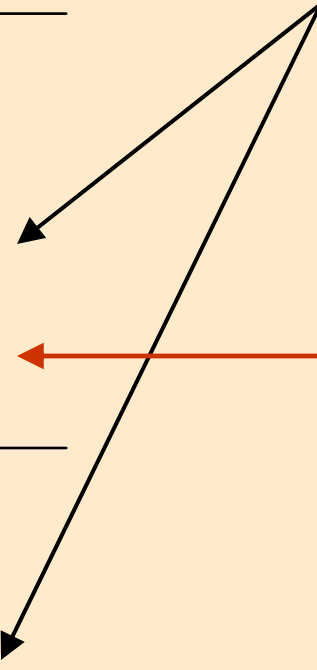


Number of sites within each Vegetation type/fire interval pattern

Vegetation type	Fire interval pattern	No. sites
Jarrah forest	Short-short	4
	Mixed regime	7
	Long-long	3
	Long (30 y interval)	2
Heathland / sedgeland	Short-short	4
	Mixed regime	7
	Long-long	3
TOTAL		30

Few sites with Long-long regime

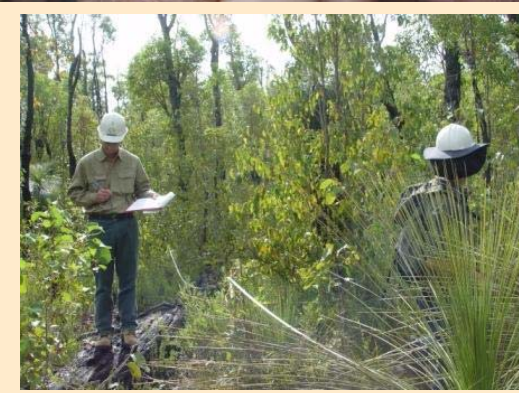
Two areas with a 30 year interval between fires. "Opportunistic" sampling



Assessing the effects of contrasting fire intervals on biodiversity



- Field surveys
- Twice yearly for most organisms
- Two years of data





Results

- Floristics (forest only)
- Vertebrates (forest only)
- Fungi (forest only)
- Beetles (forest & heath)
- Ants (forest & heath)



Photo: Roy Wittkuhn



Photo: Janet Farr



Photo: Richard Robinson



Photo: Roy Wittkuhn

Moaning frog
Heleioporus eyrei



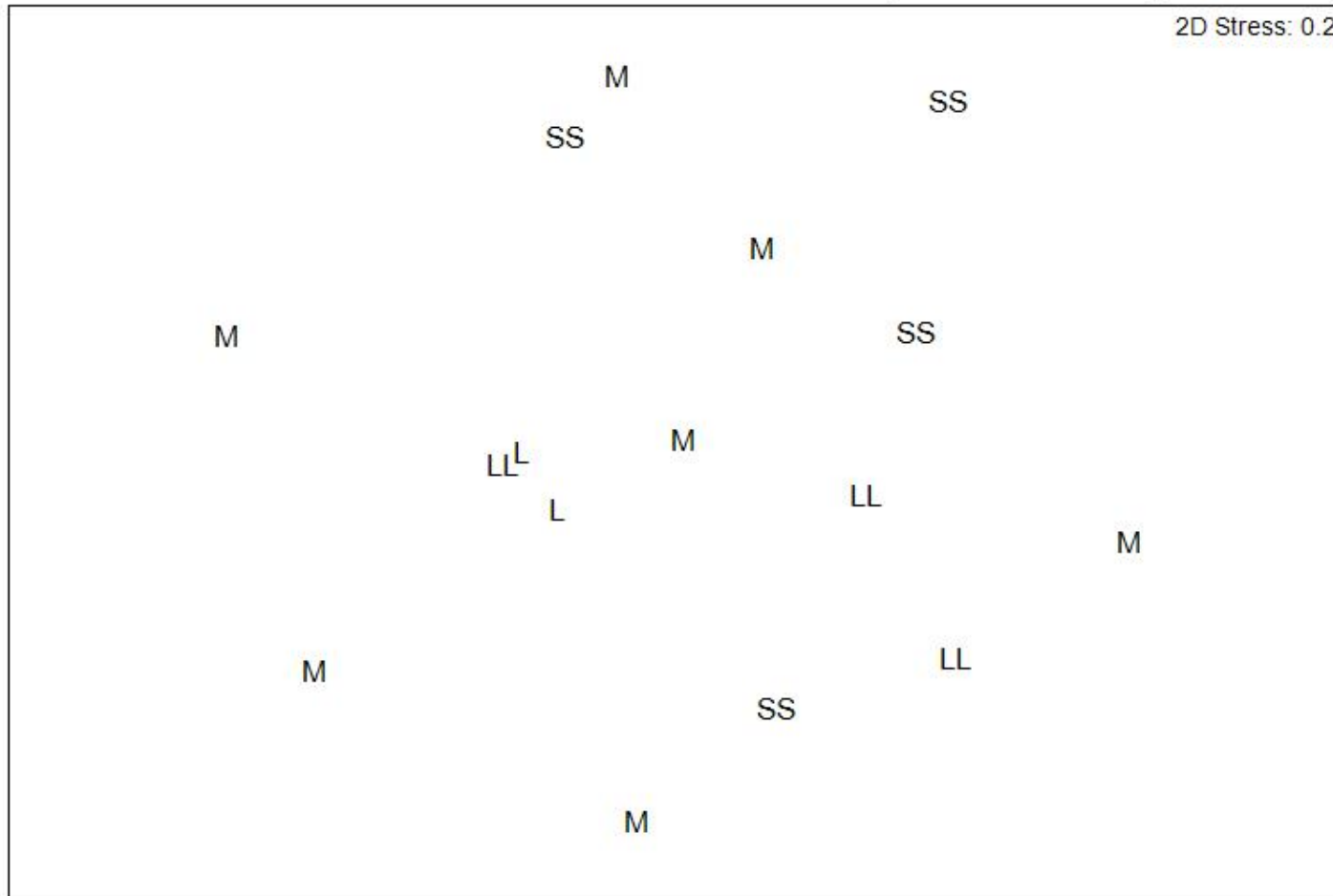
Photo: Alan Andersen

Floristics - jarrah forest



Transform: Presence/absence
 Resemblance: S17 Bray Curtis similarity

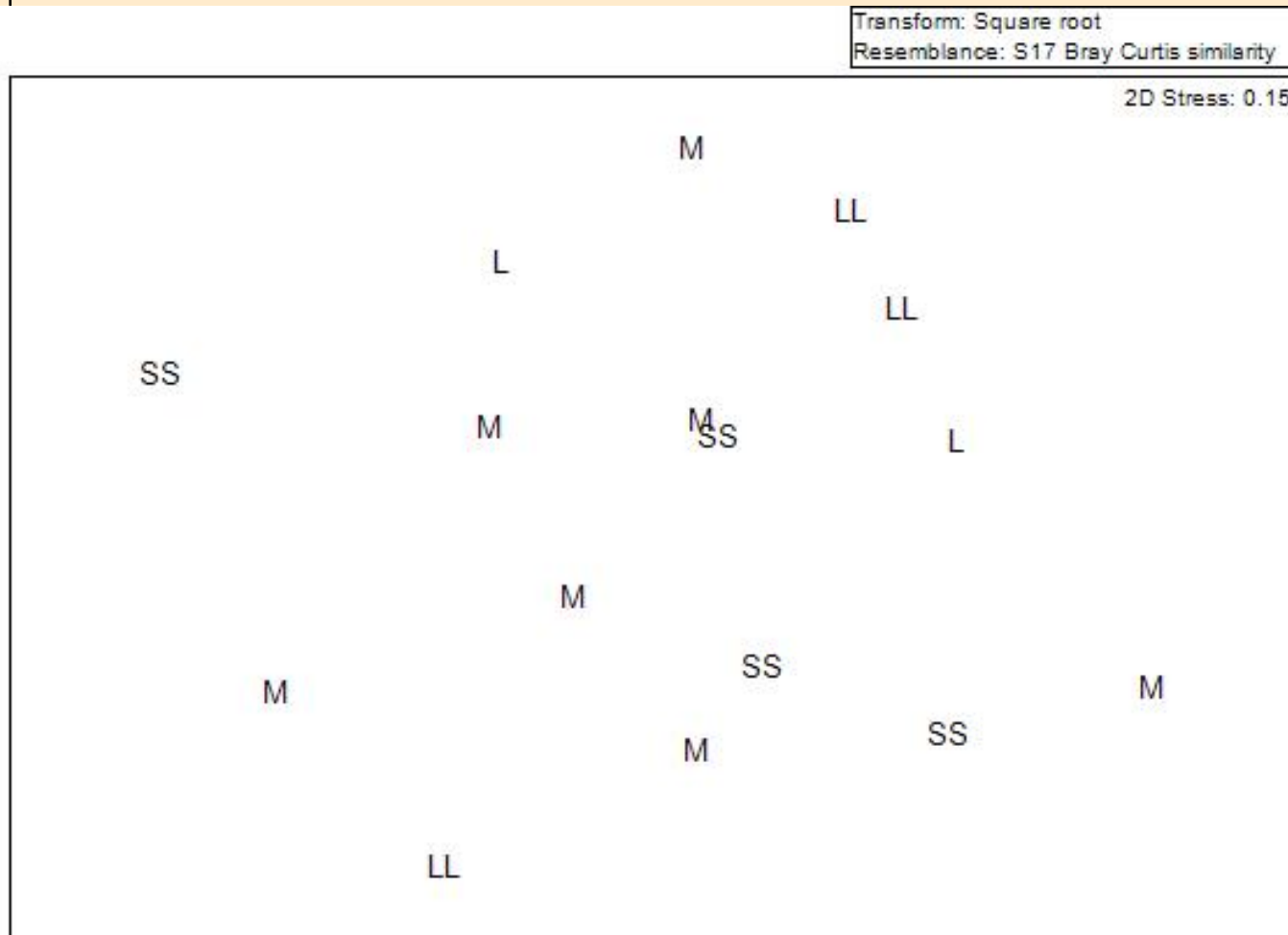
2D Stress: 0.2



SS = short-short
 M = mixed
 LL = long-long
 L = long (30 y)

ANOSIM results
 Global R = -0.177
 P = 0.918

Vertebrate fauna - jarrah forest

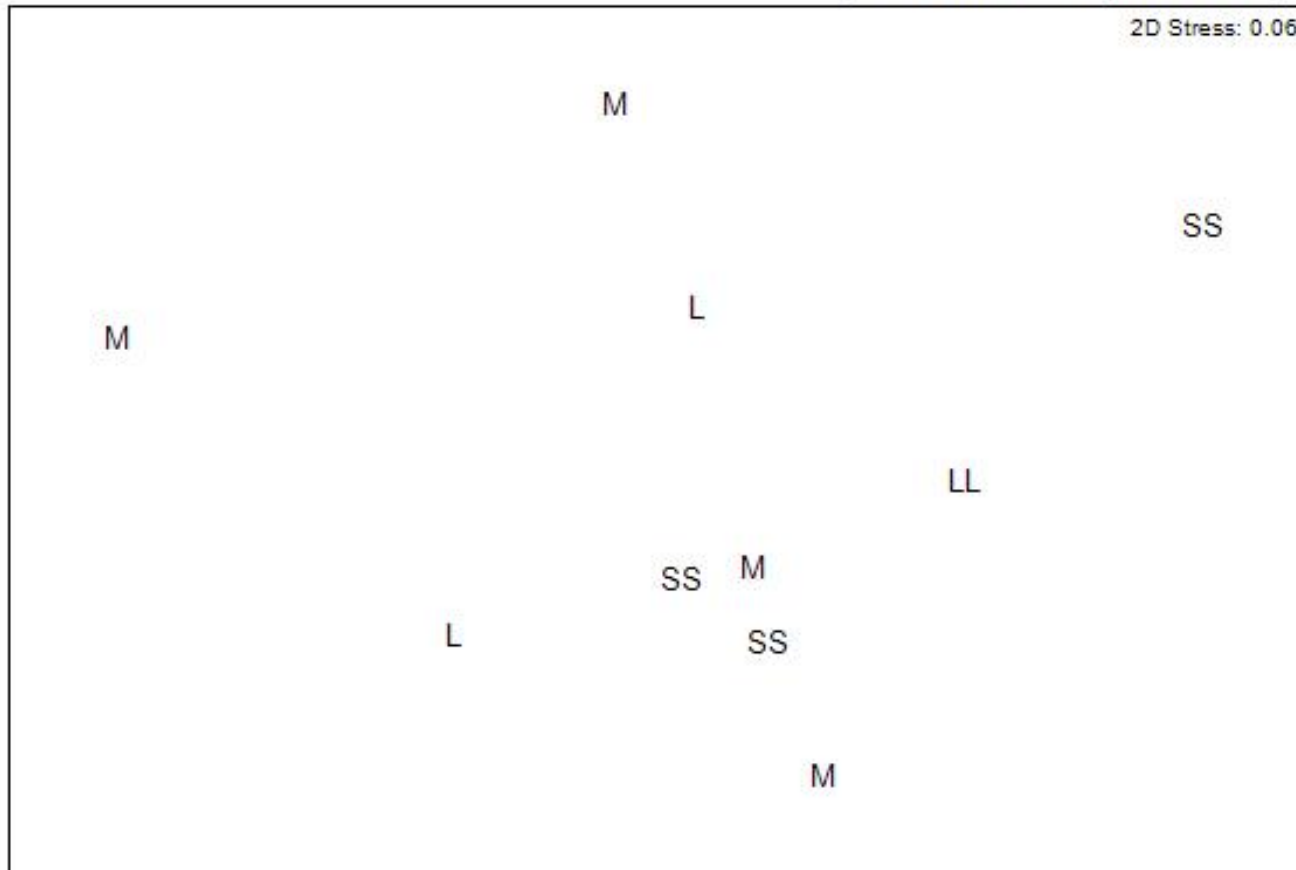


Fungi - jarrah forest



Transform: Square root
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.06



SS = short-short

M = mixed

LL = long-long

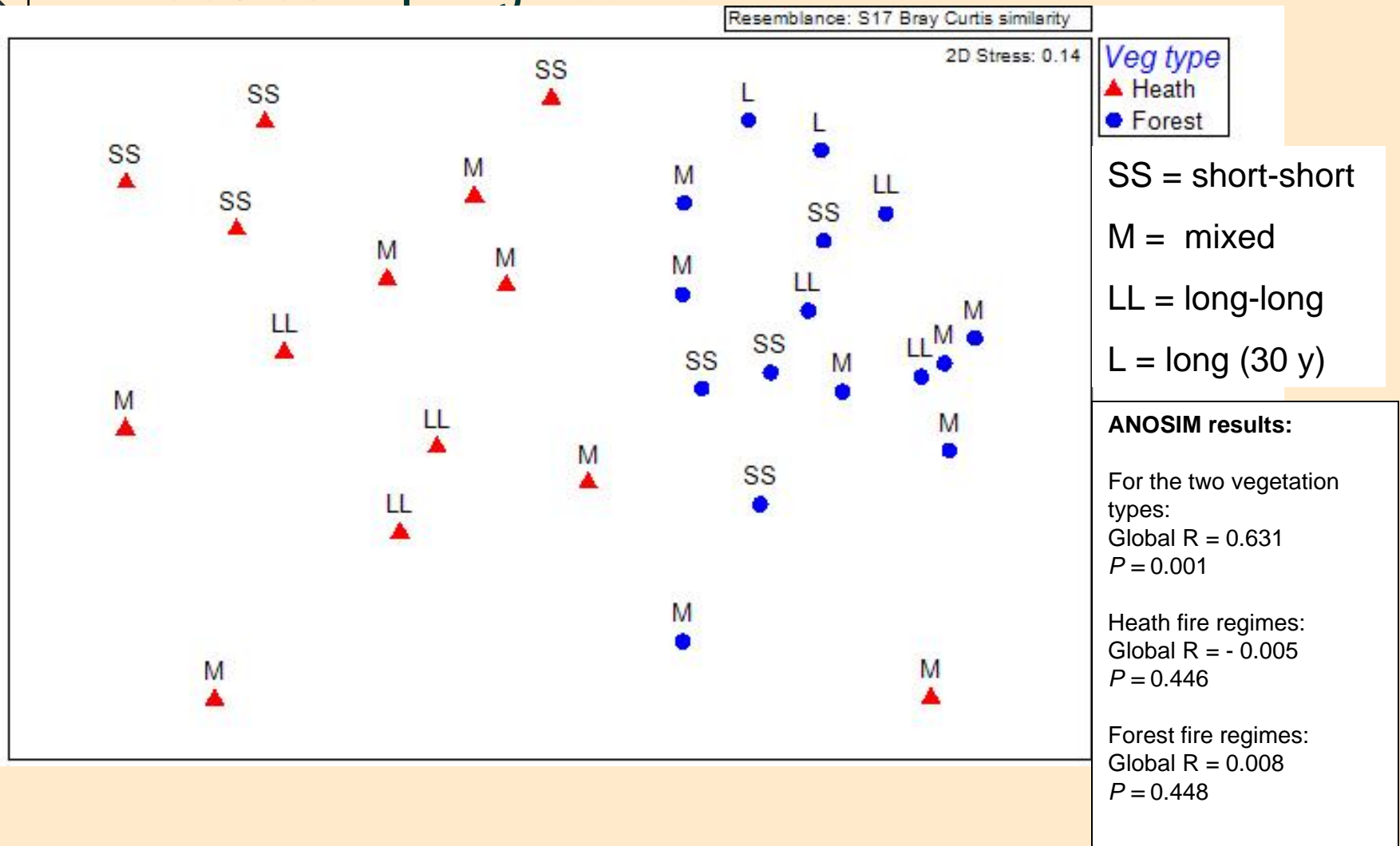
L = long (30 y)

ANOSIM results:

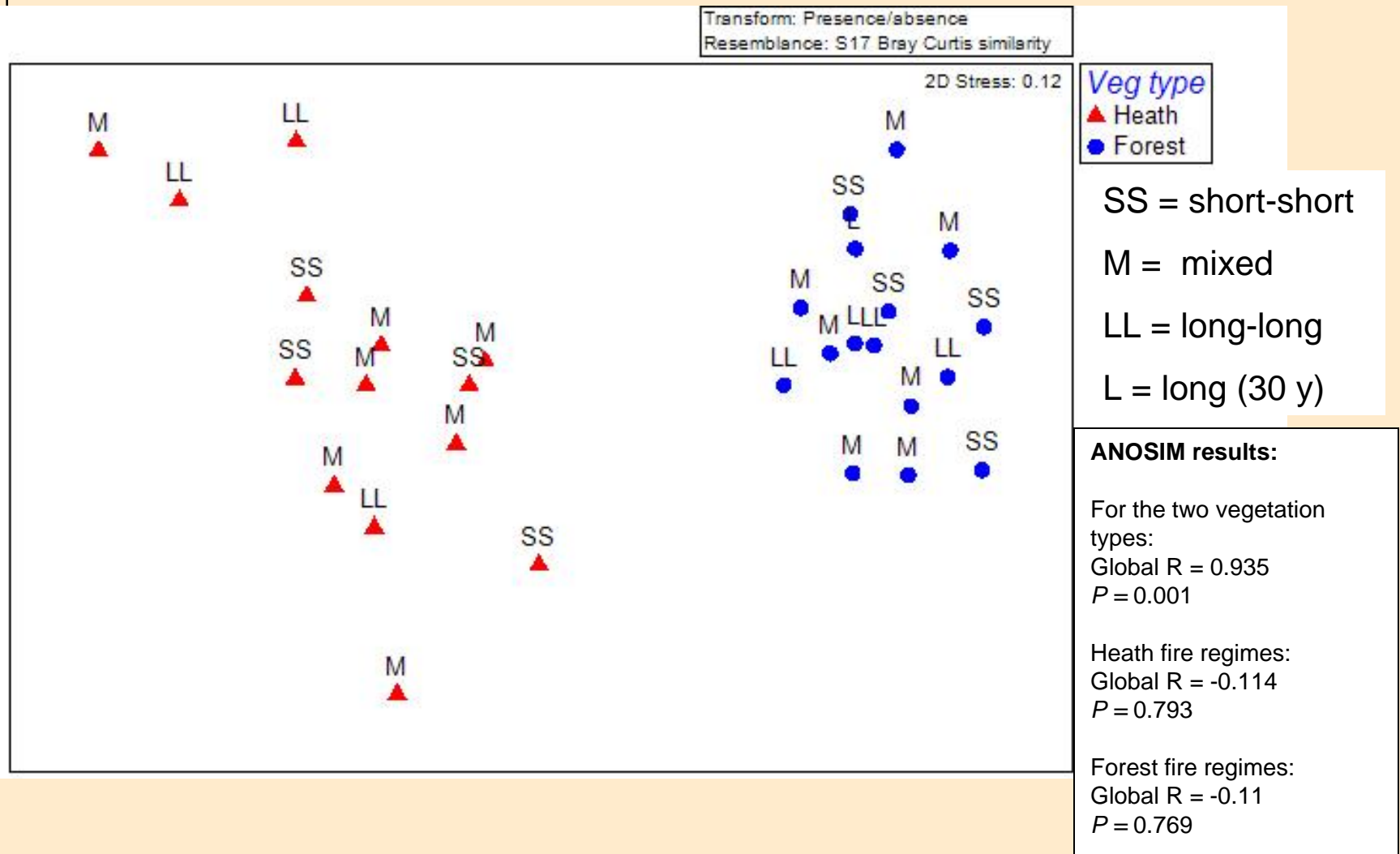
Global R = -0.314

P = 0.967

Beetles - spring 2006 data



Ants - spring 2006 + autumn 2007 combined





No fire effect?

- Ordinations suggest no effect of fire interval sequence on species composition.
- Other factors have a stronger influence?





Four possible explanations for no fire effect

1. Fire interval sequences may play a subsidiary role influencing species composition;
2. Influence of the most recent fire (common to all sites) may be stronger than the historical sequence of fire intervals;
3. Differences between sites may be due to the high proportion of uncommon species (sampling artifact);
4. Sites may not be well matched within and between treatment groups.



Further analyses

- Fire response of each species (e.g. sprouters vs seeders);
- Close investigations of taxa that are fire-regime-specific (e.g. serotinous obligate seeders);
- Functional groups (e.g. *fungi*: decomposers, mycorrhizal);
- Environmental data - covariates in the analysis;
- Investigations of rare/threatened species, where they occur in the area, and what the fire history has been.



Application to fire management

- Results show that across the landscape there is significant ecological variation within a vegetation type;
- Sequence of fire intervals may be less important than other factors (at least at the range studied here);
- No significant changes to communities if they burn with successive short- or long fire intervals.
- (But we don't know about three or more in succession)



Application to fire management *cont...*

- Niche habitat and rare or threatened species require a fine-grained management approach within the envelope of the landscape approach;
- Hence, we can devise fire plans within the landscape that protect rare or threatened biota from inappropriate fire regimes.

Setonix brachyurus
Quokka



Eriochilus dilatatus
subsp. *dilatatus*
White Bunny orchid



Conclusions

- Fire interval sequence shows no effect on species composition;
- Overall, the communities appear highly resilient to variations in fire interval.
- BUT need to scrutinise data more closely with regard to individual species, fire response and functional groups.

- There is inherent variation across the landscape, and fire planning must occur at this scale to maintain diversity.
- Fire planning for rare/threatened species or habitat can occur with minimal change to community composition.
- CAVEAT: looking only at relatively recent fire history. Long-term regimes are likely to produce stronger fire effects



Is this an Olympic event?

Questions?

Photo credit: G Phelan