


PROGRAM B

→ **The effects of fire on invertebrate biodiversity and ecosystem processes**

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PROGRAM B : Presentation Title

→ **Outline**


1. Effects of fire regime & invertebrates on decomposition of fine surface fuels in dry eucalypt forest
2. Effects of fire on food web structure in Tasmanian buttongrass moorlands
3. Mechanisms permitting *in situ* survival of invertebrates following fire

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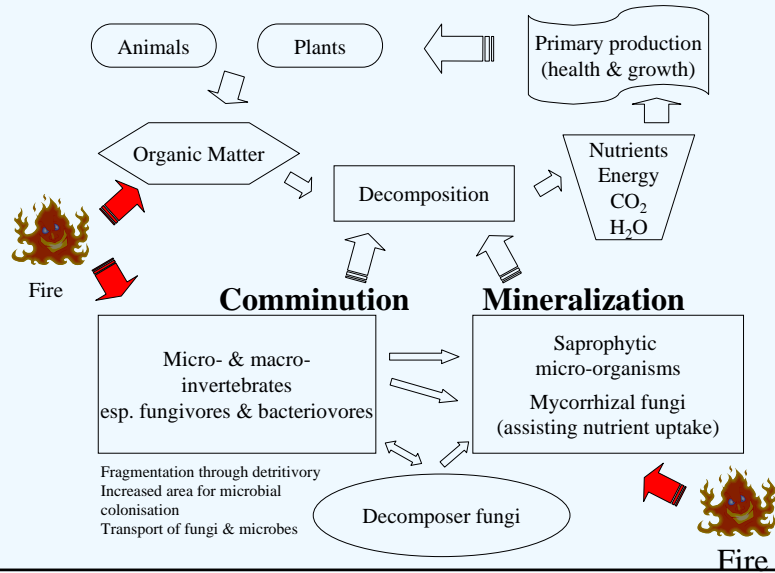
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Effects of fire regime & invertebrates on the decomposition of fine surface fuels in dry eucalypt forest

Karl Brennan, Fiona Christie, Alan York & Josie Lawrence (University of Melbourne)



**Aim: To determine to what extent invertebrates mediate leaf litter decomposition and is there an interaction with the fire regime?**



## Methods

- Bulls Ground SF, near Port Macquarie, NSW
- Three fire treatments
  - Long unburnt ( $21.6 \pm 7.5 \text{ tha}^{-1}$ )
  - Frequently burnt ( $9.4 \pm 3.8 \text{ tha}^{-1}$ )
  - Long unburnt  $\rightarrow$  Frequently burnt ( $11.4 \pm 4.8 \text{ tha}^{-1}$ )
- 10 g leaves in litter bags
- 20 bags per site, 6 sites (replicates) per fire treatment



## Leaf litter bags – May 2005



Entry by invertebrates  
permitted

Invertebrates excluded

→ Leaf litter bags - 26 June 2006



→ Leaf litter bags - 26 June 2006








# Effects of fire on food web structure in Tasmanian buttongrass moorlands

Karl Brennan, Fiona Christie, Alan York (University of Melbourne)

Michael Driessen (Tasmanian Dept. Primary Industries, Water & Environment)

Alastair Richardson & Peter Davies (University of Tasmania)

		
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→	<b>Aim</b>	
	1. How is the structure of invertebrate food webs altered by burning?	

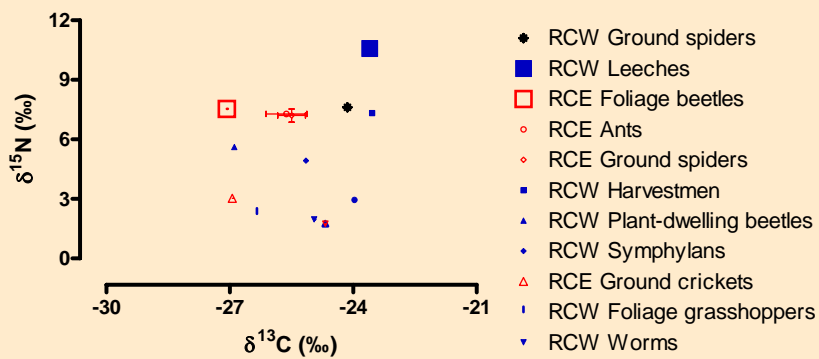


## Methods

- 23 sites four age classes since burning:
  - a) < 1 year (5 sites)
  - b) 3 to 5 years (5 sites)
  - c) 7 years (3 sites)
  - d) 17 to 19 years (5 sites)
  - e) 32 to 45 years (5 sites)
  
- Invertebrates, plants and plant litter sampled for stable isotopes of d15N and d13C



## Results



RCW = Rufous canal west = long unburnt  
 RCE = Rufous canal east = recently burnt





## Outline

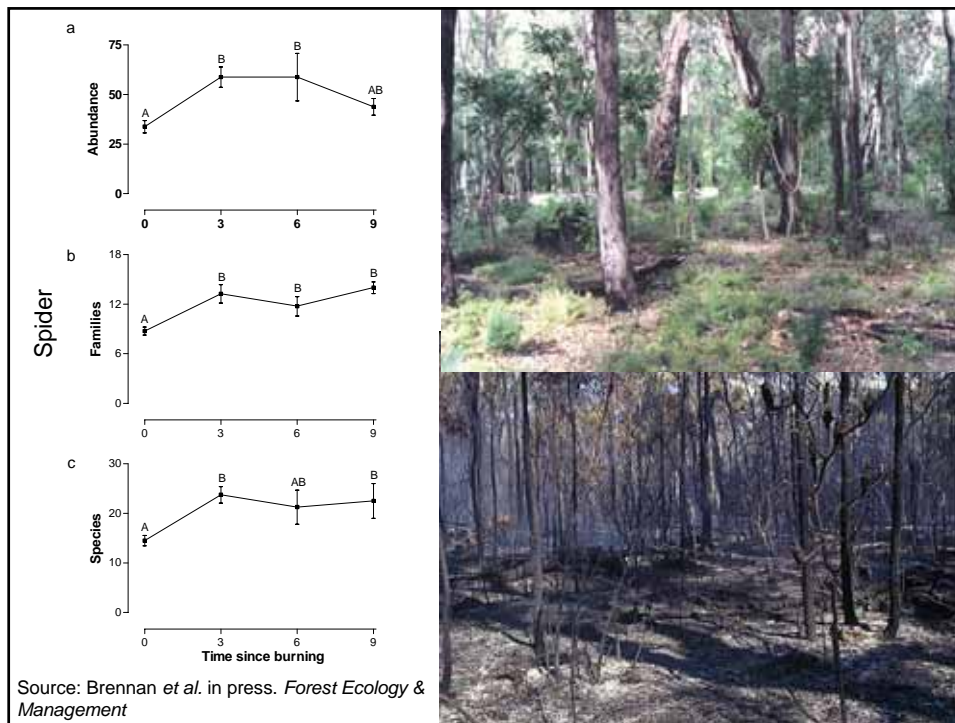
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### Fire refugia: The mechanism governing animal survivorship in a highly flammable understorey plant

Melinda Moir & Karl Brennan (University of Melbourne)

Roy Wittkuhn (Western Australian Dept. Conservation & Land Management)



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→ **Aims**

1. **Do grasstrees offer a refuge in which invertebrates can survive a fire?**
2. **If so, are some microhabitats within grasstrees more likely to facilitate the survival of invertebrates than others?**
3. Are some taxonomic assemblages, trophic groups and life-stages of invertebrates more likely to survive than others?
4. **Does the zone maximising survival coincide with lower temperatures?**
5. Do animals also emigrate to escape?



## Methods

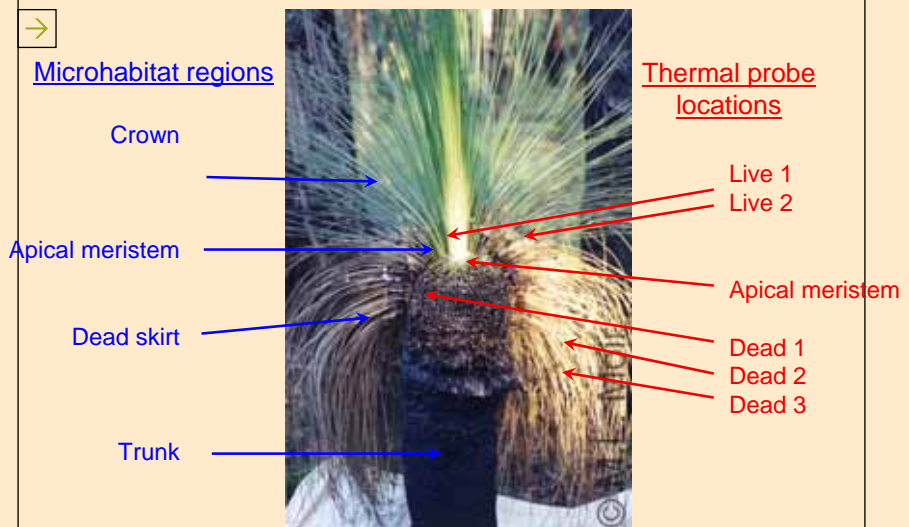
1. Study area: jarrah forest at Mundaring



## Methods

1. Study area: jarrah forest at Mundaring
2. Four unburnt grasstrees as controls
3. Five grasstrees experimentally burnt
4. Thermocouples measured flame temperature in different microhabitat regions within the grasstree







## Methods

1. Study area: jarrah forest at Mundaring
2. Four unburnt grasstrees as controls
3. Five grasstrees experimentally burnt
4. Thermocouples measured flame temperature in different microhabitat regions within the grasstree
5. Invertebrates sampled by hand



## Methods







		
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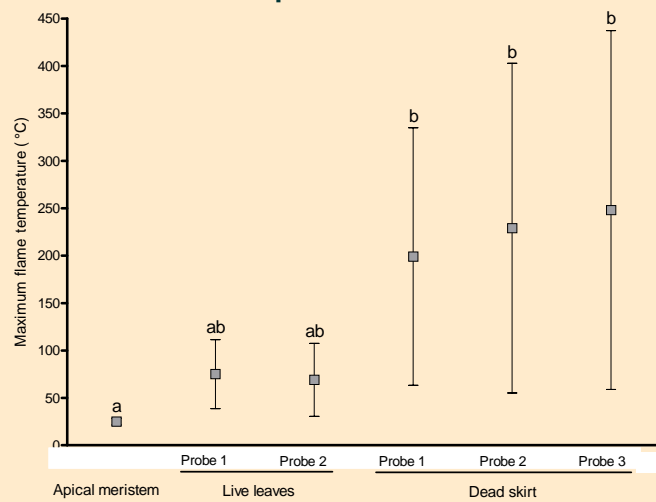
		
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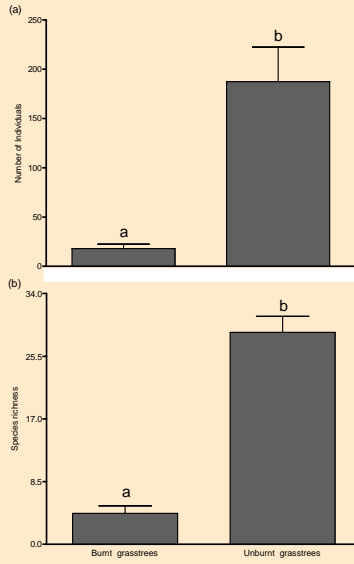






### Max flame temperatures





## Skirt

1. Blattodea 97% → 3.7%
2. Thysanura 95% → 0%
3. Pseudoscorp. 95% → 0%





## Crown

1. Beetles 39% → 25%
2. Slater 35% → 17%
3. True bugs 9% → 3%
4. Spiders 6% → 4%



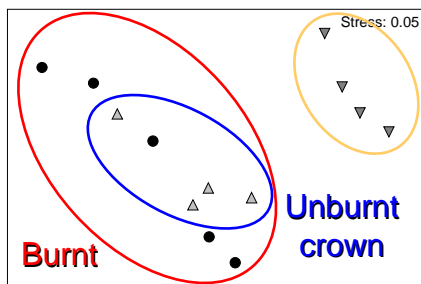
## Conclusion

1. Grass trees enable some invertebrates to survive fire *in situ*
2. Crown fauna more likely to survive
  - Fire selectively filters out skirt species - adults
3. Zone of lower temperature coincides with survivors
4. May enable more rapid recovery following burning
5. A global phenomena?



## Acknowledgements

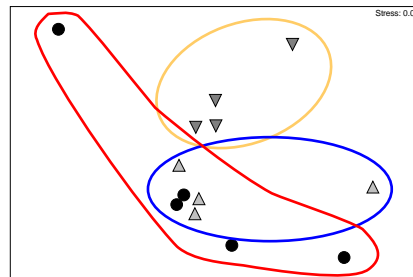
- T. Norris & I. Marmion *Tasmanian Parks & Wildlife Service*
- M.S. Harvey & J.M. Waldock *Western Australian Museum*
- A. Szito *Department of Agriculture, Western Australia*
- E.S. Volschenk *American Museum of Natural History*



Unburnt skirt

Similarity in invertebrate orders

Similarity in invertebrate species



- Survived
- △ Crown
- ▽ Skirt

