



# 2009 Victorian Bushfires Royal Commission: Implications for Biodiversity Conservation in Victoria

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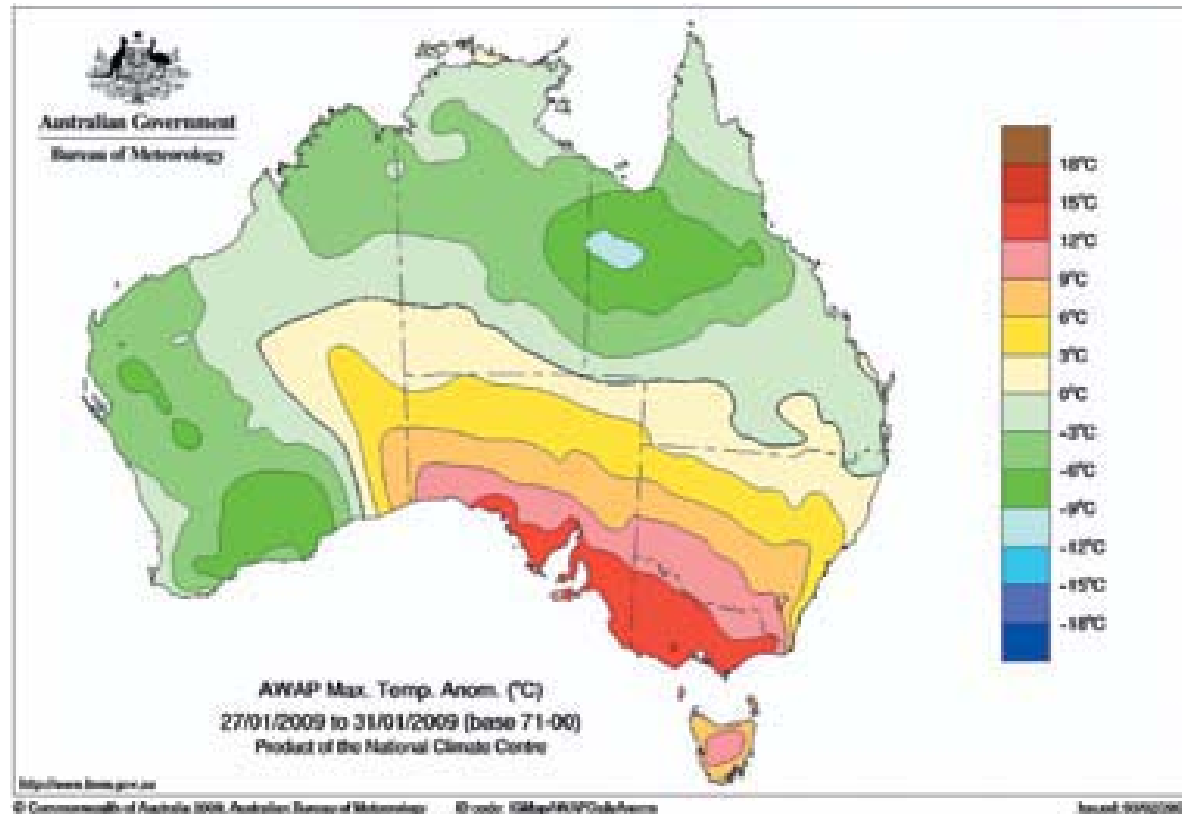
<http://www.forestscience.unimelb.edu.au/research/bushfire/index.html>



3rd November 2011  
SEQ Fire and Biodiversity Spring Forum  
University of the Sunshine Coast

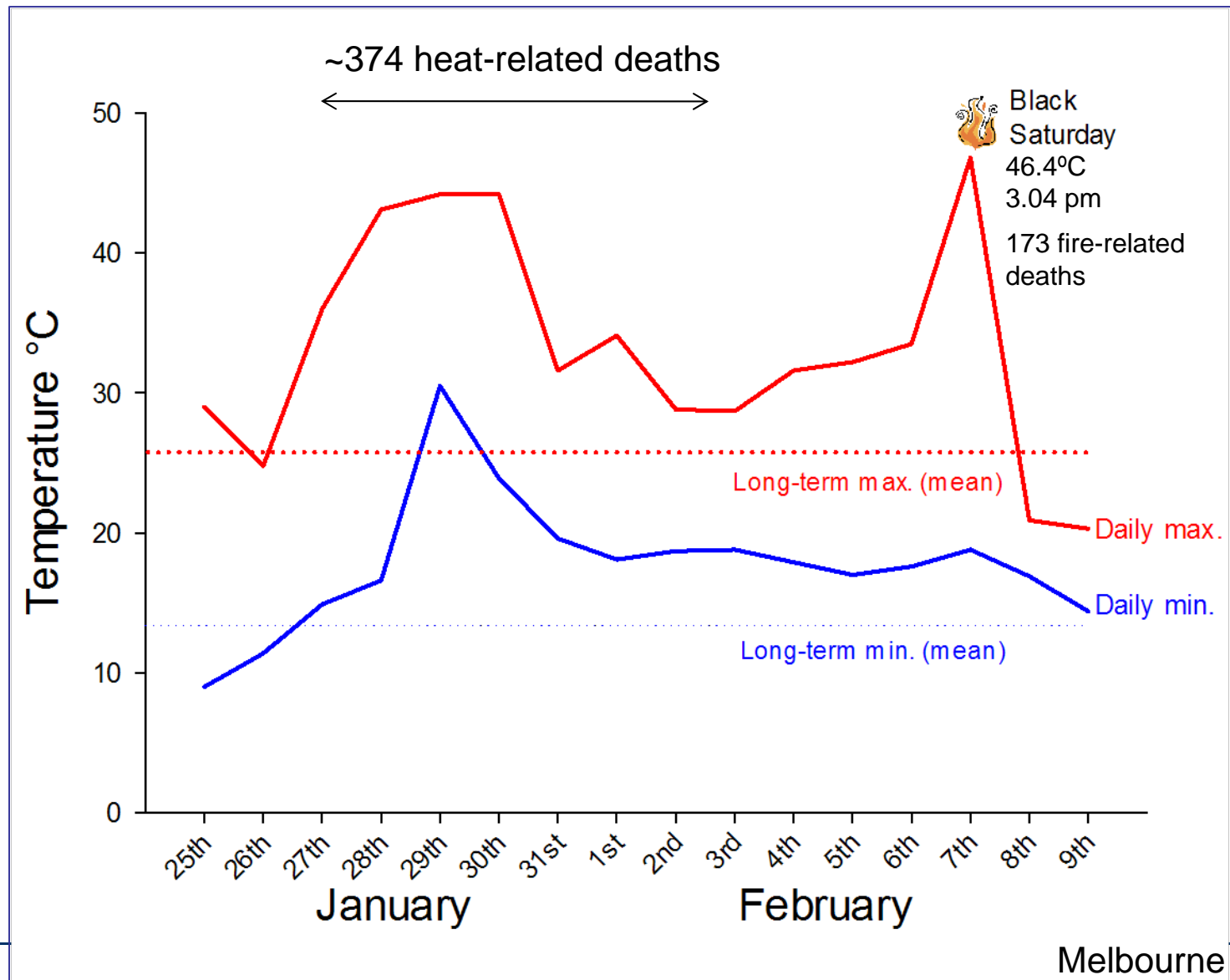
## APPENDIX

Maximum temperature anomalies for the period 27–31 January 2009

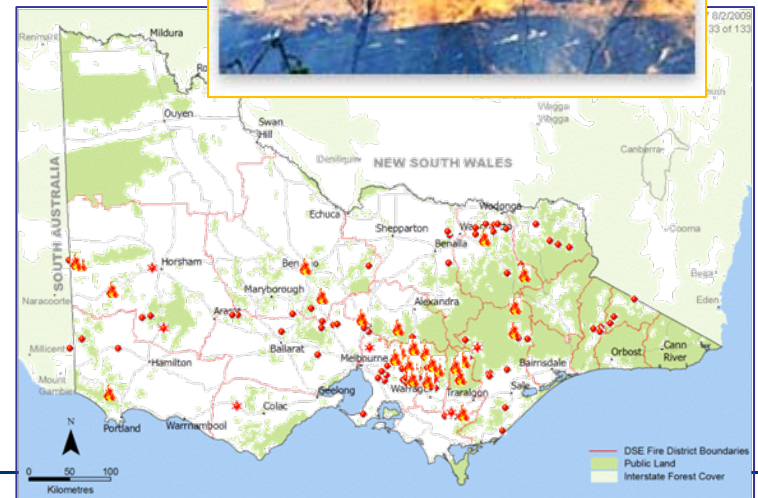




## 2009 South-eastern Australian heat-wave



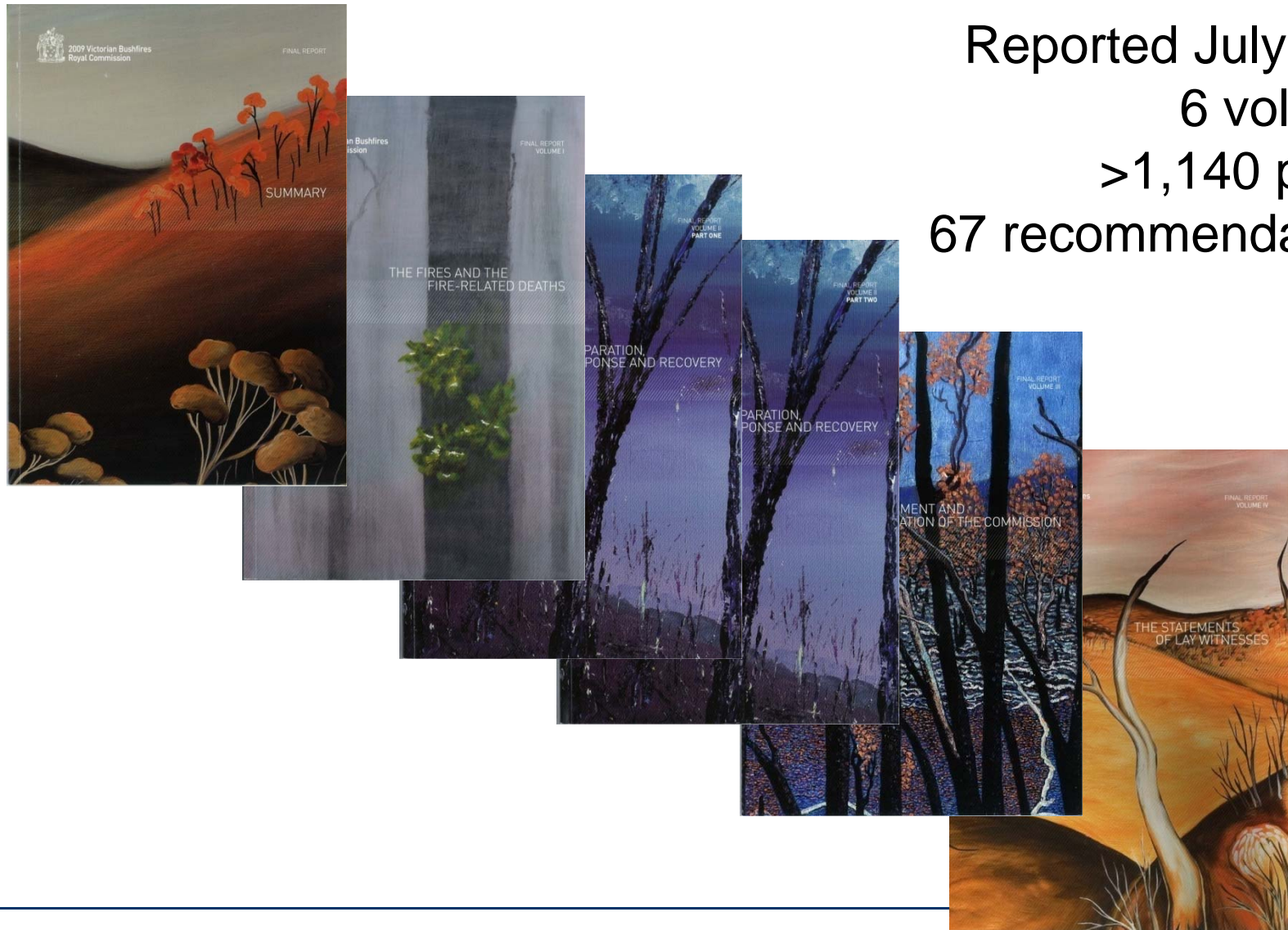
- Fire fighting agencies attended 316 grass, scrub or forest fires
- 430,000 ha burnt
- >2,000 homes, 400 machinery sheds, 60 businesses, 12 schools & churches, 1,000 farm buildings destroyed
- >11,000 farm animals killed or injured
- Substantial losses of fodder, fruit trees, plantations, pasture & crops
- >10,000 km of fencing destroyed
- >500 people treated for burns
- 173 human lives lost





# 2009 Victorian Bushfires Royal Commission

Reported July 2010  
6 volumes  
>1,140 pages  
67 recommendations







## RECOMMENDATION 56

The State fund and commit to implementing **a long-term program of prescribed burning based on an annual rolling target of 5 per cent minimum of public land.**

## RECOMMENDATION 57

The Department of Sustainability and Environment **report annually on prescribed burning outcomes** in a manner that meets public accountability objectives, including publishing details of targets, area burnt, funds expended on the program, and **impacts on biodiversity.**

## RECOMMENDATION 58

The Department of Sustainability and Environment significantly upgrade its program of long-term data collection to **monitor and model the effects of its prescribed burning programs and bushfires on biodiversity in Victoria.**



\$382.4M to DSE to contribute to the staged increase in the amount of planned burning to 275,000 ha. by 2013-4 (5% of treatable public land)

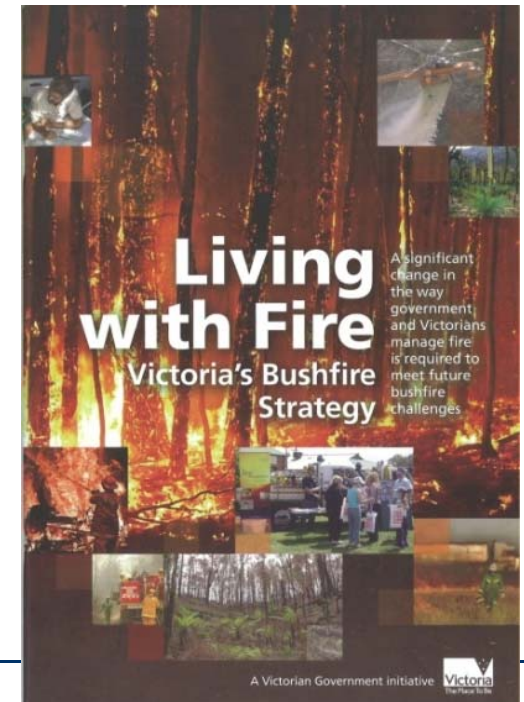
Following a review of the effectiveness of the program, the government will grow the program to achieve 385,000 ha. By 2015-6.

\$13M for the development of a strategic, coordinated roadside management framework & program of works (managed by VicRoads)

\$6.1M to DSE to further examine impacts of planned burning on biodiversity: Long-term data collection, research, monitoring, modelling of the effects of planned burning on biodiversity

\$2.3M to the CFA to undertake research on fire ecology, behaviour, biodiversity, roadside safety & risk management, develop training to management roadsides

- ENRC (Environment and Natural Resources Committee) Enquiry Report 2008
  - Recommended 5% PB target
- Victoria's Bushfire Strategy 2008
  - Managing the Land With Fire
    - Increased planned burning effort
    - (Landscape) Mosaic Burning
    - Genesis of a monitoring 'strategy'







WILLIAM GRIFFIN

GOOD  
NEWS,  
**BAD  
NEWS**

2009 Victorian Bushfires  
Royal Commission:  
Implications for  
Biodiversity  
Conservation in Victoria

1. Firebreaks/Fuelbreaks
2. Towns 'most at risk'
  - 10/30 Right & fence line clearing
  - Modified zoning arrangements
3. Planned burning 'targets'

I consider  
there are three  
major 'issues'  
of concern in  
regard to  
biodiversity  
conservation



## 1. Fuelbreaks/ Firebreaks



During 2006/7 fires 350km of fuelbreaks constructed  
Target = 600km  
~20m wide, ~30% canopy cover retained



## OEFP - Strategic Priority Fuel Break Network



Department of  
Sustainability and  
Environment



~50m wide



Copyright Department of Sustainability  
and Environment 2007.

Base data sourced from Corporate  
Geographic Data Library, DSE 2007.  
Layers displayed may not be intended  
to be accurate at this scale.







## 2. (52) Towns most at risk

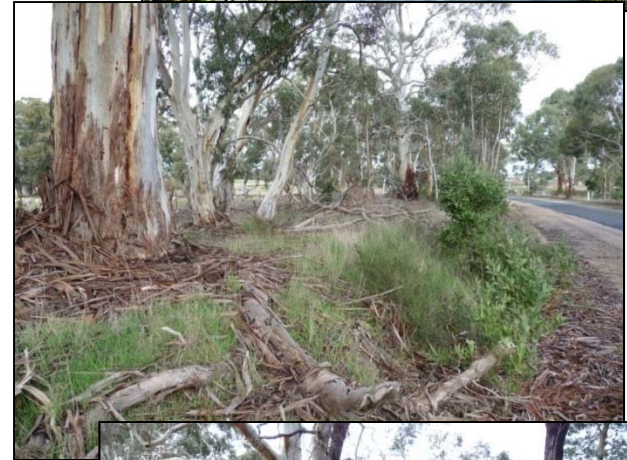
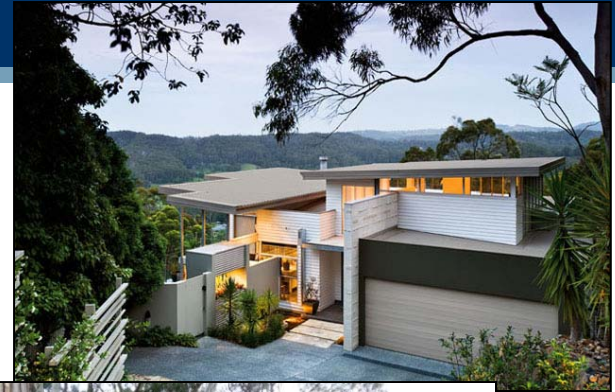


Marysville



## ***10/30 RIGHT & fence line clearing (Sept. 2009)***

- Victorian Government overriding Council permit requirements. Residents can:
  - remove trees and vegetation within 10 m of homes
  - remove low-lying vegetation and ‘ground fuel’ within 30 m of homes
  - Clear vegetation up to 4 m adjacent to fence lines
- Collect fallen timber along certain roadsides
- CFA to conduct ‘hazard reduction’ burns along roadsides





# Victoria towns most at risk: some strategies

## Fuel reduction

Township Strategic Wildfire  
Moderation Zone (3km arc)

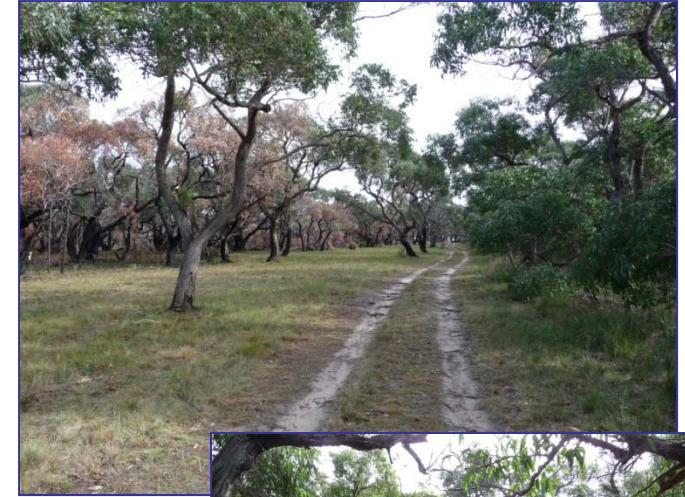


*Candling*



After

Clearing/  
slashing  
Asset  
Protection  
Zone

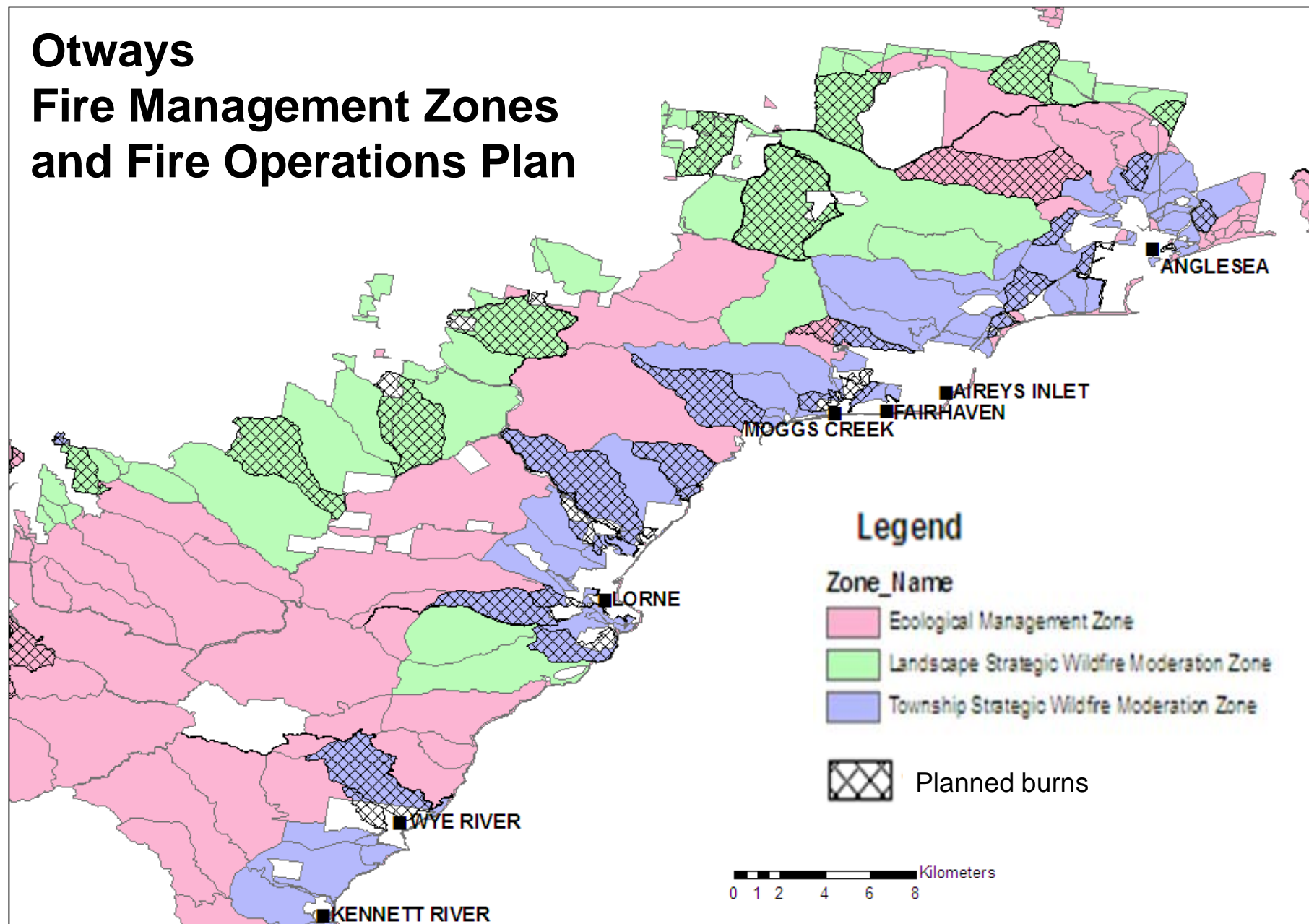


Before

Adjacent to Anglesea  
(Otways)



# Otways Fire Management Zones and Fire Operations Plan





### 2008 ENRC *Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria*: Recommendation 2.2

*That ... the Department of Sustainability and Environment increase its annual prescribed burning target from 130,000 ha to 385,00 ha. This should be treated as a rolling target, with any shortfalls to be made up in subsequent years.*

### 2009 VBRC RECOMMENDATION 56:

*The State fund and commit to implementing a long-term program of prescribed burning based on an annual rolling target of 5 per cent minimum of public land.*

### 2010 Victorian Government VBRC response:

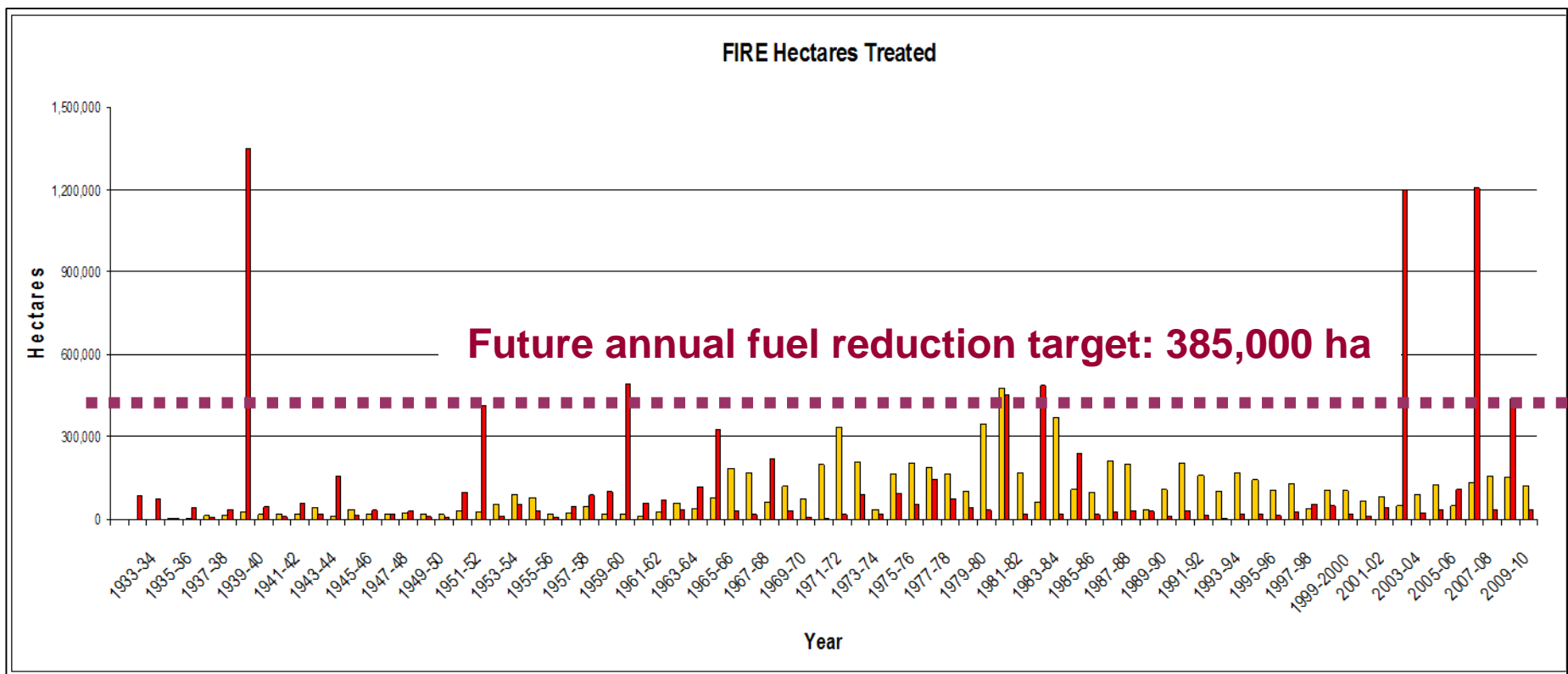
*\$382.4M to DSE to contribute to the staged increase in the amount of planned burning to 275,000 ha. by 2013-4 (5% of treatable public land)*

*Following a review of the effectiveness of the program, the government will grow the program to achieve 385,000 ha. By 2015-6.*



# Recorded fire history, Victorian public land 1933-2010

WITHDRAWN



Figures from annual reports tabled in Parliament



Fuel reduction burns



Bushfires

Courtesy of Victorian National Parks Association



## 2009 VBRC RECOMMENDATION 56:

*The State fund and commit to implementing a long-term program of prescribed burning based on an annual rolling target of **5 per cent minimum of public land**.*

## 2010 Victorian Government response:

*...(5% of treatable public land)*

## 2011 situation:

*planned burning of 5 % of public land per annum*



Bittern Lagoon, Langi Kal Kal



Public golf course

Vegetation initially classified as *treatable/not treatable*, then this information used to set targets (in response to ENRC Report)

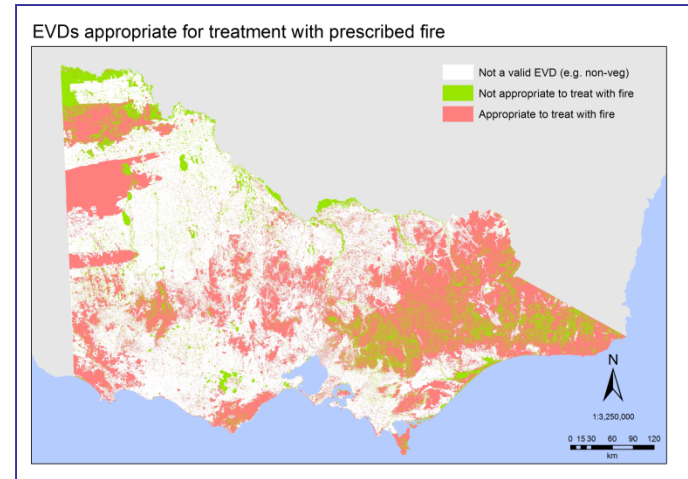
- Issues:

- Operational feasibility

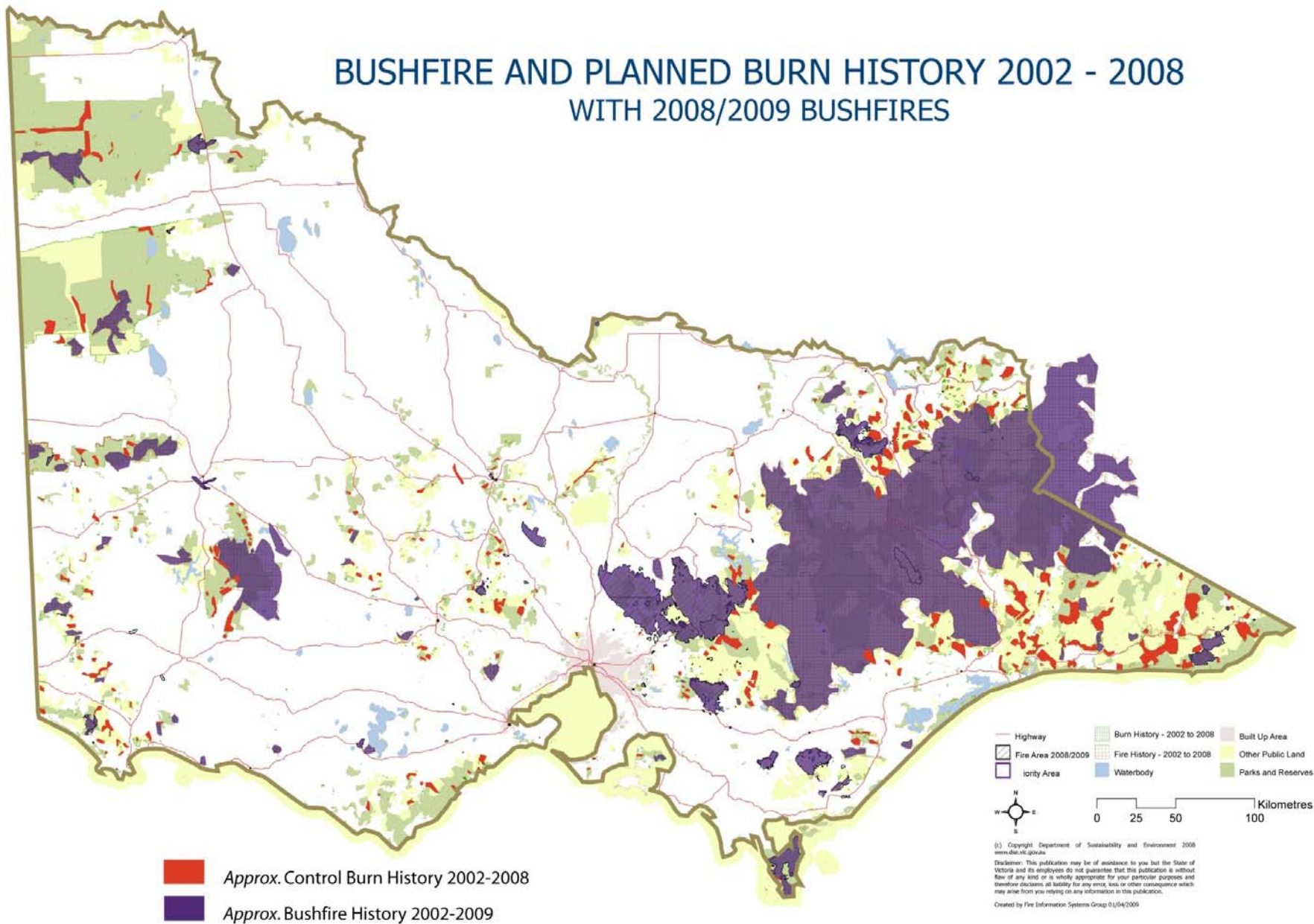
- For a given vegetation community, levels of treatability might vary across state
    - Some only treatable under a particular set of conditions (e.g. weather)

- Ecological desirability

- Ignores current growth stage (time since last fire), fire history, fire dependence/sensitivity
    - Ignores incidence of unplanned fire (wildfire)



## BUSHFIRE AND PLANNED BURN HISTORY 2002 - 2008 WITH 2008/2009 BUSHFIRES



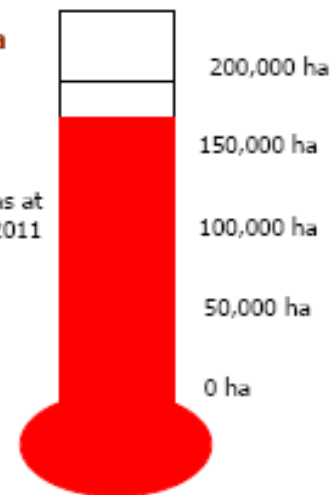
# Rewarded for overachieving?

## Burn Plan & Site Preparation Figures @ end of April 2011

Burn District	% Burn Plan Complete Hectares	% Site Preparation Complete Hectares
Central Total	95%	111%
East Gippsland Total	126%	110%
North East Total	167%	212%
North West Total	110%	105%
South West Total	121%	111%
Victoria Total	129%	131%

**Planned Burn Area treated to date**  
(includes 'other' burns)

183,302 ha as at 30/04/2011



Source: FireWeb

## Planned Burning Project

Project Update

Issue No.5 April 2011

### Planned Burning News

Areas are to be congratulated on achieving a total of 183,302 ha of treated area as at the end of April 2011.





WHELAN@UNIMELB.EDU

- Encourage ‘easier/cheaper’ burning in remote areas, not achieving strategic advantage where it is needed
- **Wildfire not considered in area burned figures**
- Gives no indication of the effectiveness of burns with regard to public safety or biodiversity objectives
- *“Comparing the gross area treated annually in fuel reduction burning – that is, for a whole agency, region or state – with a published target is not a good basis for assessing performance and is likely to be counterproductive.”*

p. 105, Ellis, Karnowski & Whelan (2004) National Enquiry on Bushfire Mitigation and Management. COAG.





WILDLANDFIRE

A. (Landscape)  
Mosaic Burning ?  
(& Monitoring)

B. Statewide  
monitoring  
(*HawkEye*)

C. Commissioned  
Research

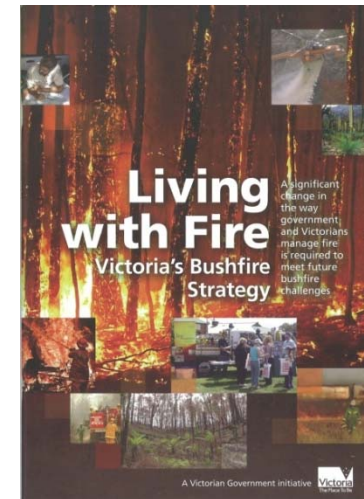
And now for the  
good news !

- Mosaic Burning aims to break up large (forested) landscapes by providing the right mix of fire to create a more extensive range of habitat and fuel age-classes (i.e. increased **landscape heterogeneity**).
- It is assumed that Mosaic Burning will thereby help reduce the size, severity and impact of large-scale fire events, and maintain healthy and resilient ecosystems.

## Victoria's Bushfire Strategy 2008

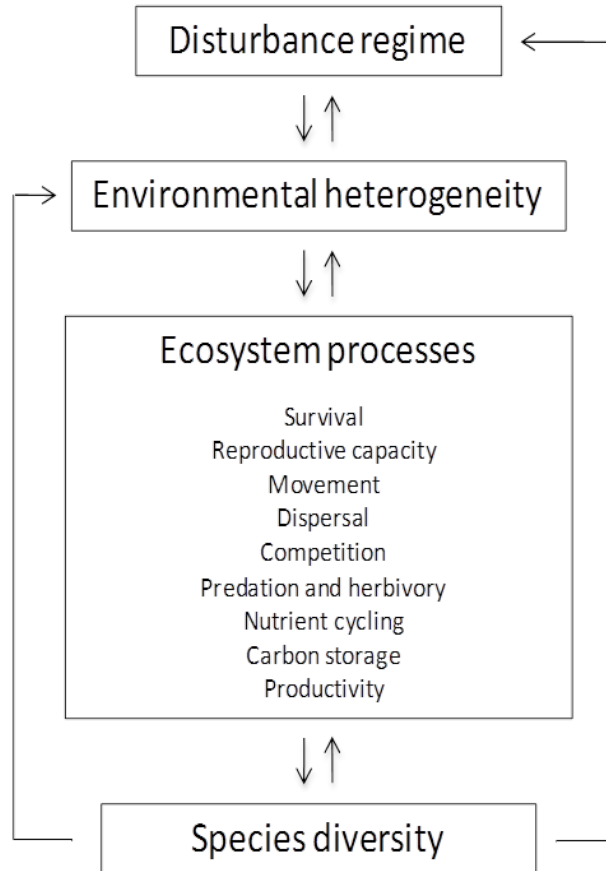
### *Managing the land with fire*

Increased planned burning effort  
Landscape Mosaic Burning

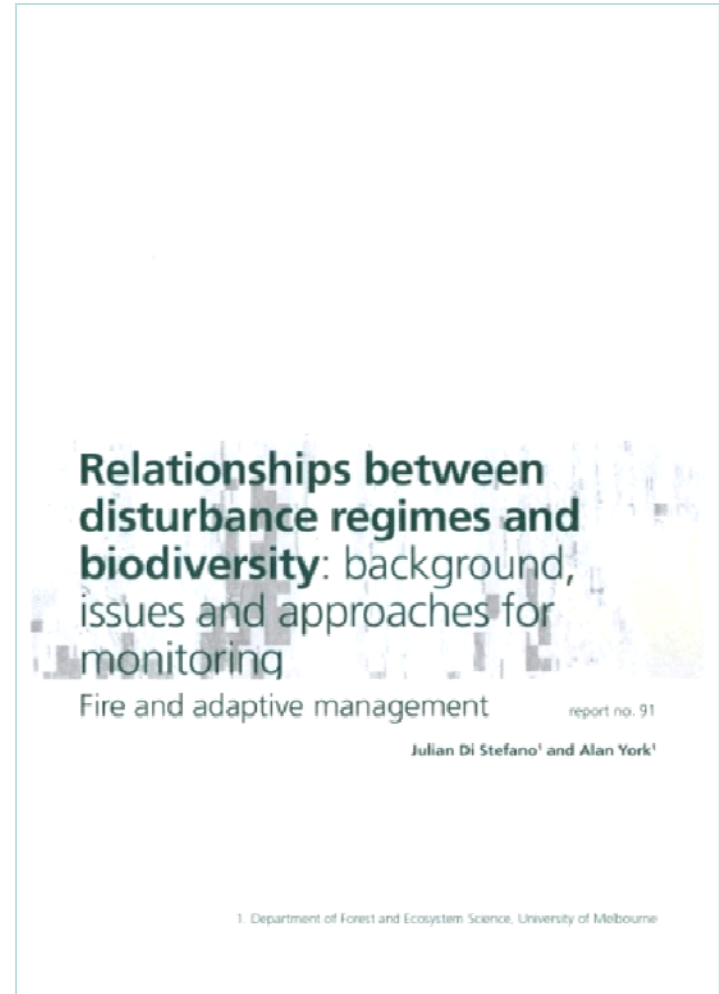


# Mosaic burning & landscape heterogeneity

WILLIAMS ET AL.



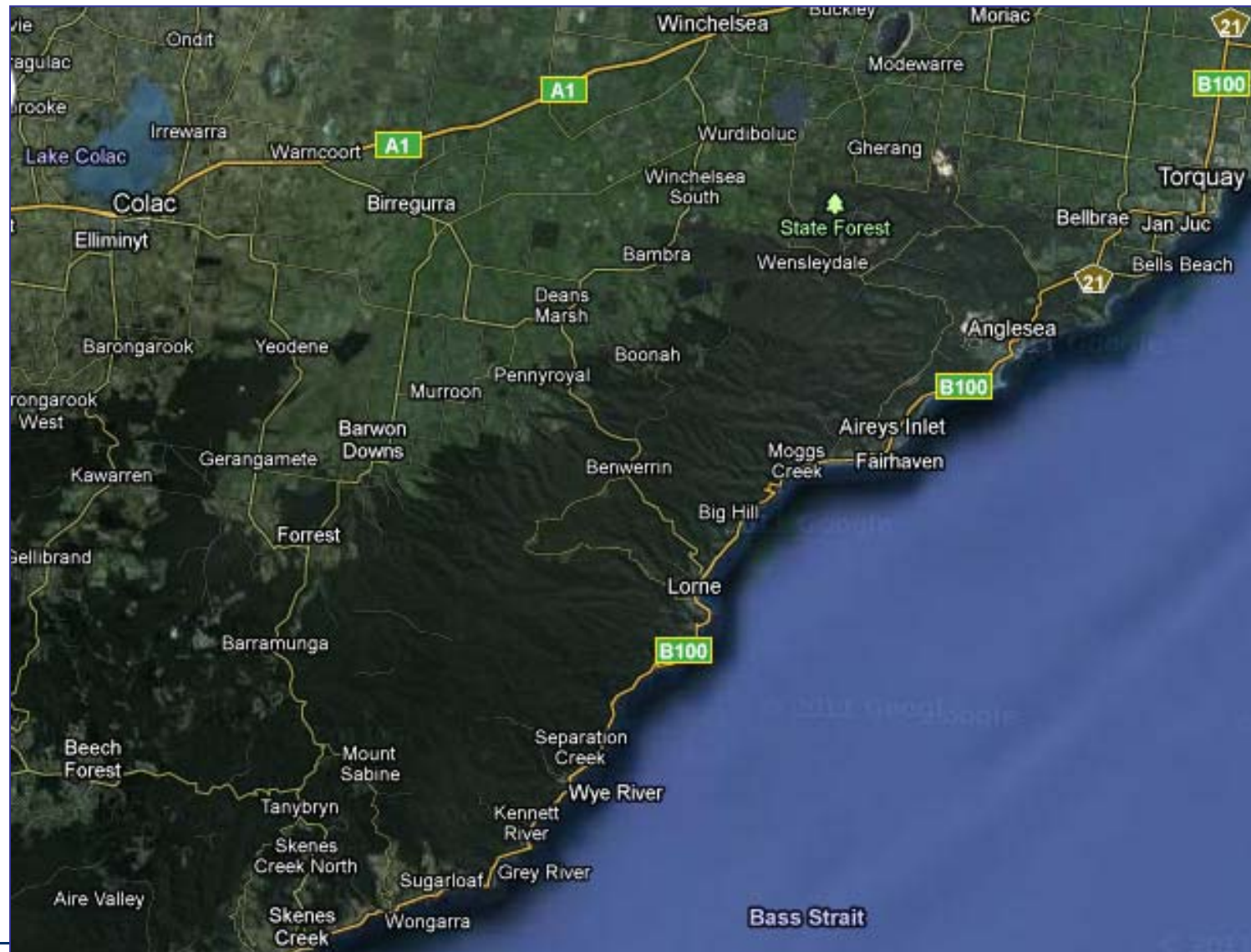
Simple model linking disturbance regimes, environmental heterogeneity and species diversity .





# Mosaic burning & landscape heterogeneity

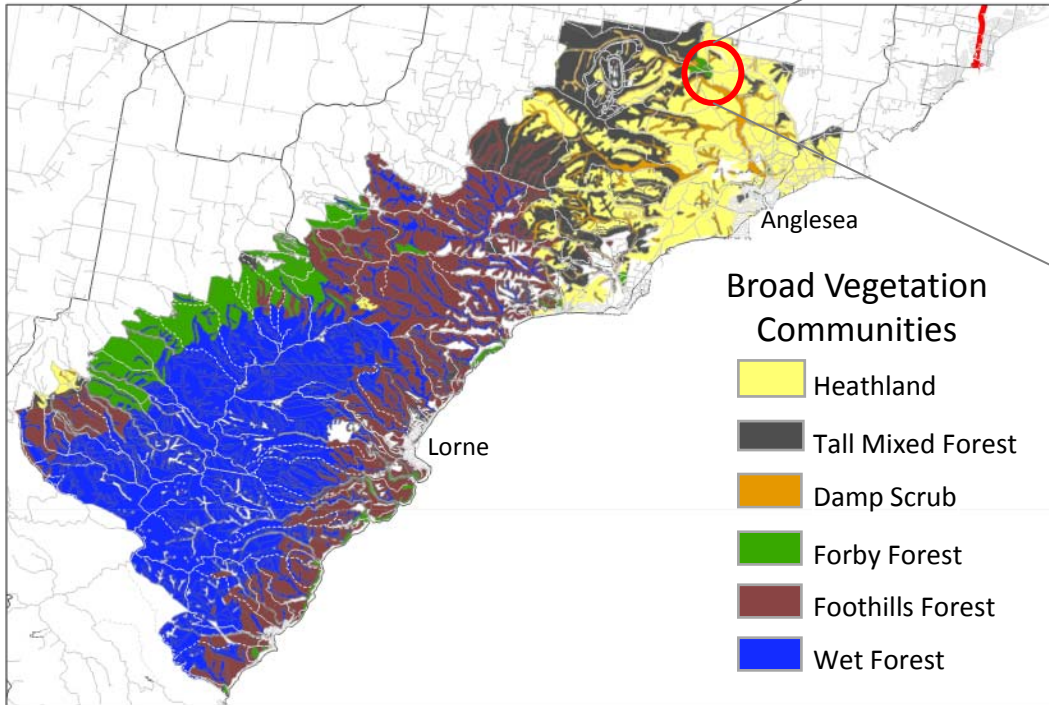
WILDLANDSCAPES



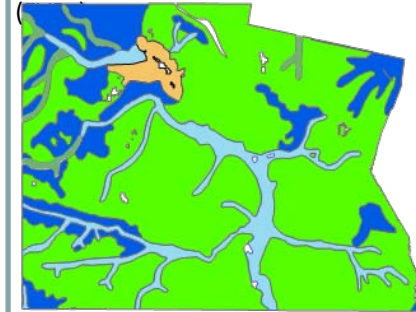


# Mosaic burning & landscape heterogeneity

WILLIAMS ET AL. 2015



## Ecological Vegetation Divisions

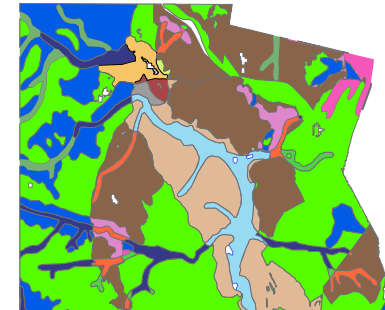


Damp Scrub  
Forby  
Heathland  
Tall Mixed  
Treed Swamp

+ Fire  
History



## EVD & Growth Stage

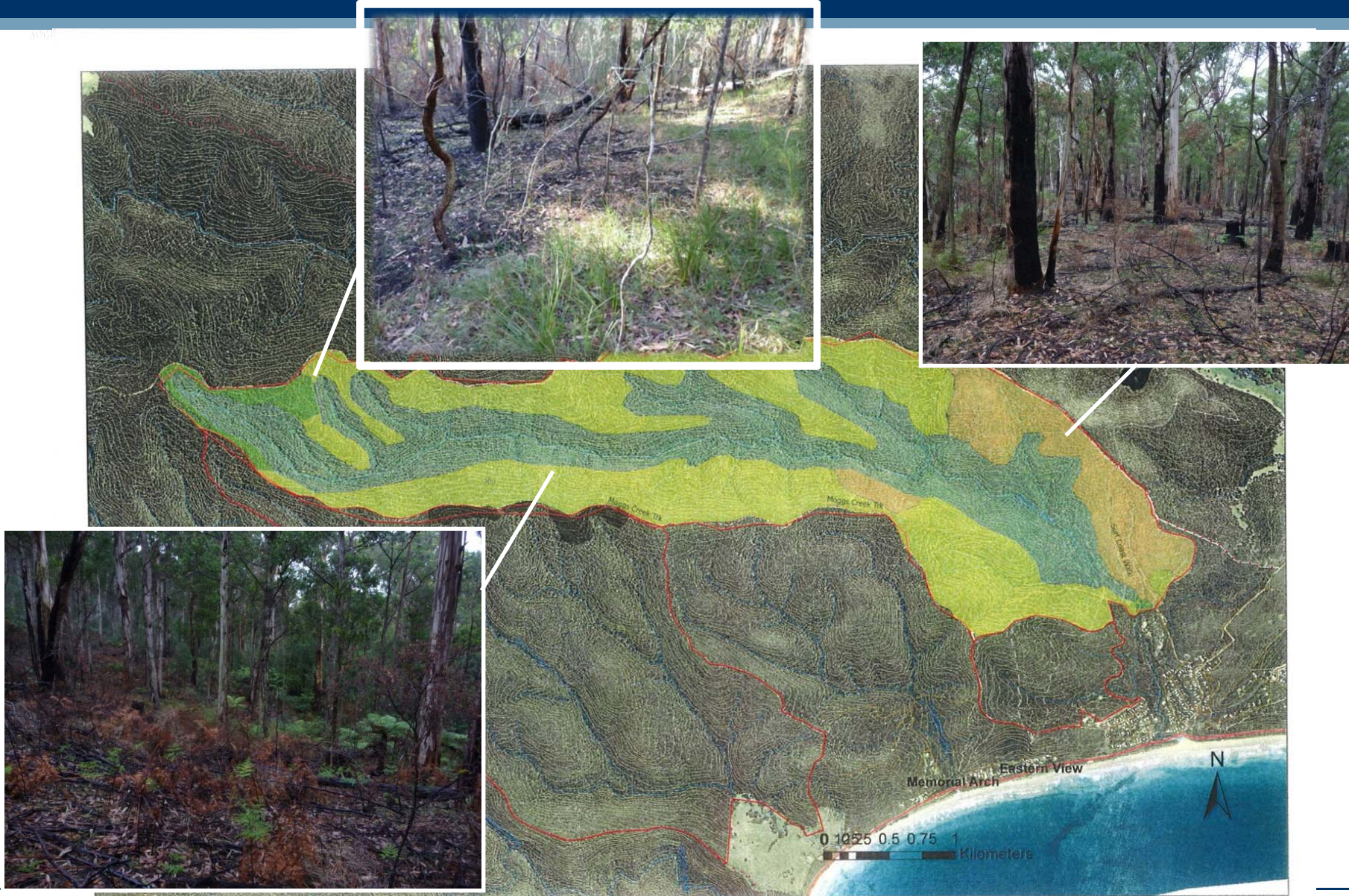


Damp Scrub Juv  
Damp Scrub Adol  
Damp Scrub Mature  
Damp Scrub Stasis  
Forby Juv  
Forby Adol  
Forby Mature  
Heathland Juv  
Heathland Adol  
Heathland Mature  
Tall Mixed Juv  
Tall Mixed Adol  
Tall Mixed Mature  
Tall Mixed Stasis  
Treed Swamp Mature





# Mosaic burning & landscape heterogeneity





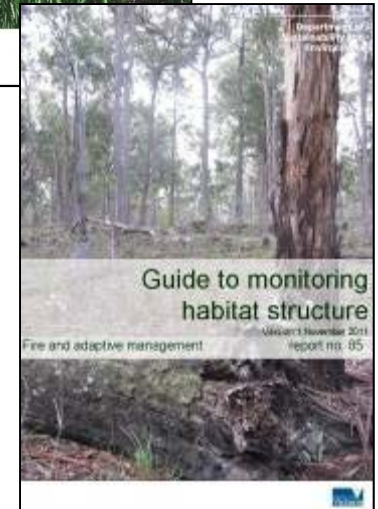
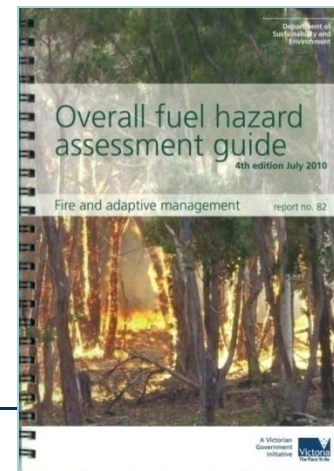
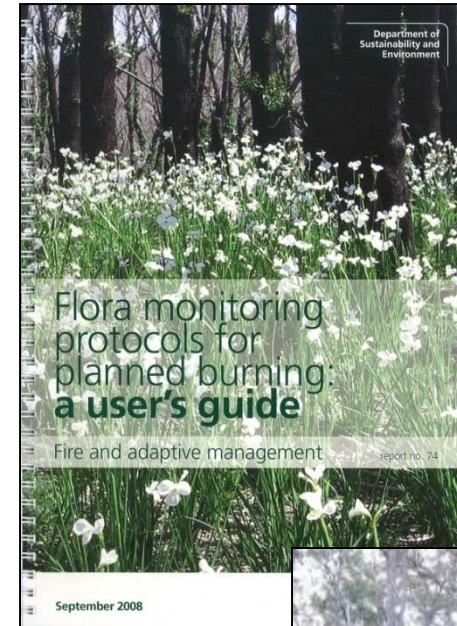
- Likely to benefit biodiversity by:
  - creating a range of vegetation age-classes that suit different species (habitat accommodation model)
    - Test the assumption that increased heterogeneity of age classes across the landscape will increase species richness and diversity and reduce the size scale and severity of large scale bushfires  
i.e. *pyrodiversity begets biodiversity*
  - Leaving patches of unburnt vegetation that can act as a refuge after fire
  - Reducing risk and impact of uniform, large-scale fires
- May offset negative impacts of burn targets
  - Report area ‘treated’ not area ‘burned’



## 1. Statewide Planned Burn Monitoring Program

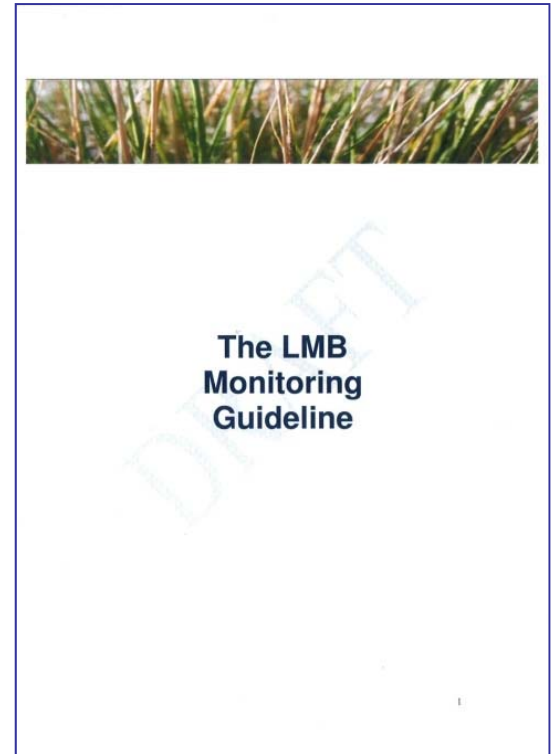
Monitoring flora, habitat, fuel

- Pre & post-burn Flora monitoring **2006+**
  - By 2010 413 sites have been established & monitored
  - Data to be analyzed & report produced August 2011(?)



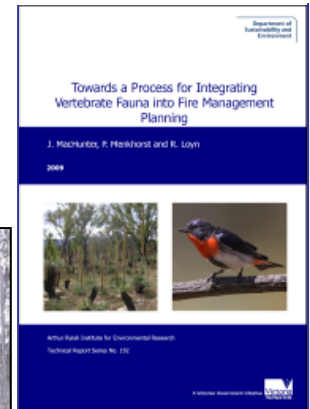
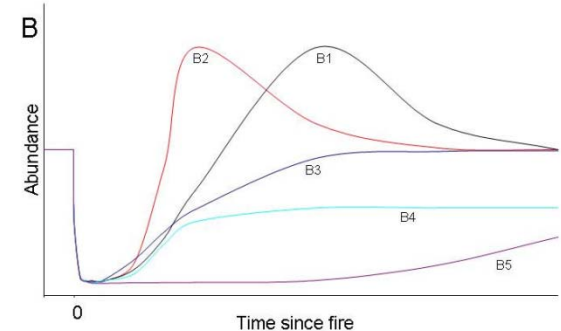
## 2. (Landscape) Mosaic Burning (LMB) Monitoring program

- Commenced September 2009
- LMB Statewide coordinator & Landscape Monitoring Officer (Head Office)
- 12 DSE Landscape Monitoring Coordinators (regional)
  - Monitoring at 221 sites across 12 LMB areas
  - Pre-burn assessments conducted for flora, habitat, birds, fauna cameras & fuel hazard
  - Post-burn assessments for 5 areas
  - Data published July 2011 (?)





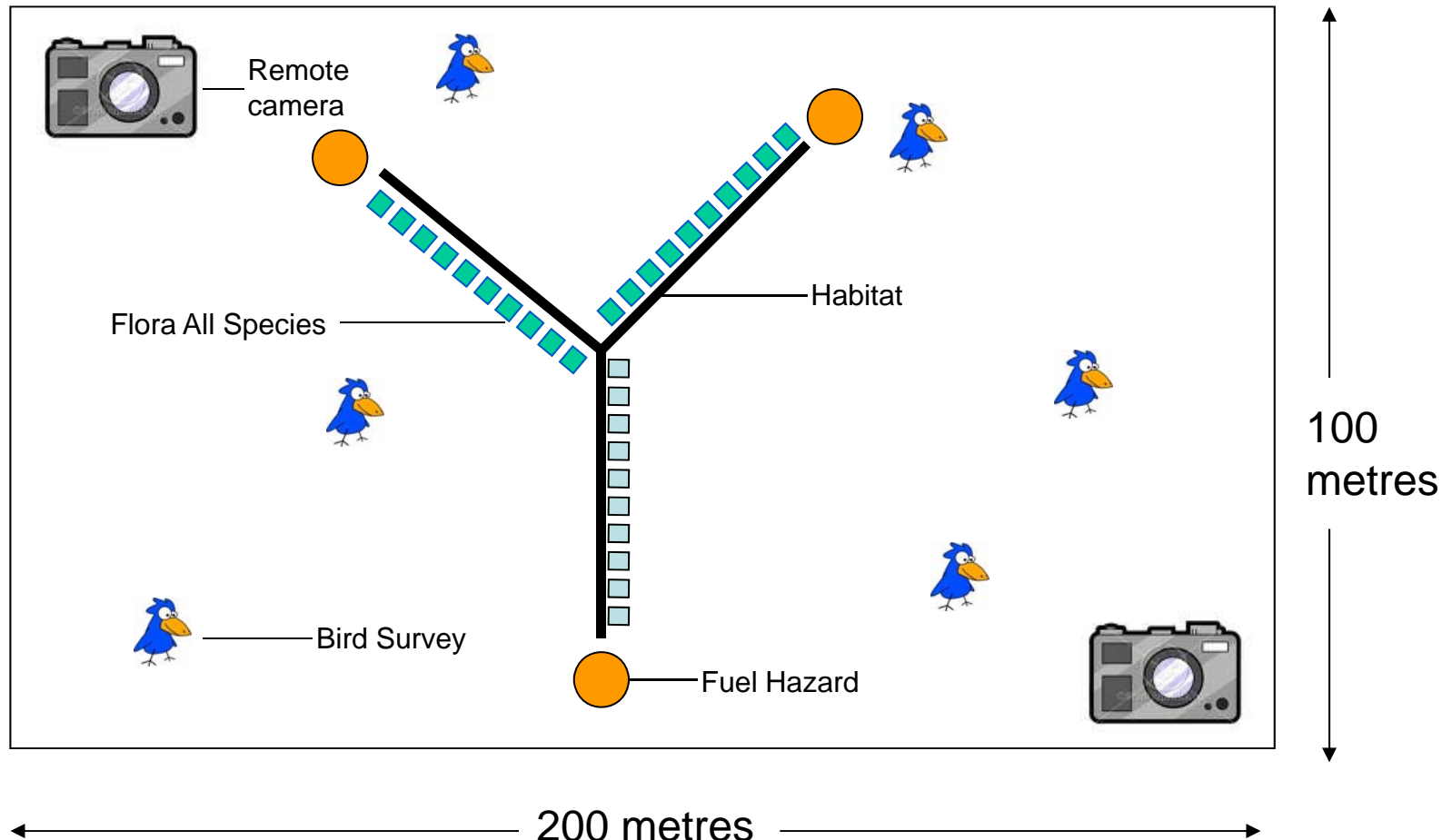
- Based on the development of faunal vital attribute model (MacHunter *et al.* 2009) provided a basis against which the relationship between fauna and fire could be tested.
- The faunal vital attributes model identifies two components that require testing through monitoring:
  - (i) *The development of habitat over time and in relation to disturbance events (stand replacing and non-stand replacing fire),*
  - (ii) *The relationship between habitat and its suitability for fauna.*





# LMB monitoring program - Site design

WILLIAMS, GRIFFIN





WILDLANDFIRE

A. (Landscape)  
Mosaic Burning ?

- Monitoring

B. Statewide  
monitoring  
(*HawkEye*)

C. Commissioned  
Research

More good  
news !

## 3. *HawkEye*: Monitoring flora, habitat & fauna

- Addressing VBRC Recommendation # 58
- \$6.1M over 4 years



HawkEye  
Biodiversity monitoring  
for improved fire management

- Statewide Biodiversity Monitoring Program
  - Senior Scientist & Data analyst
  - 3 project officers; Mallee, east Gippsland & Otways
    - Value-adding & extending existing projects
  - Monitoring database & spatial layers
  - Technologies & protocols
  - [www.dse.vic.gov.au/hawkeye](http://www.dse.vic.gov.au/hawkeye)



## Major partnerships – building on existing monitoring:

1. Mallee HawkEye - with La Trobe and Deakin Uni
2. Gippsland HawkEye - Arthur Rylah Institute (DSE)
3. Otways HawkEye - with Melbourne Uni



## Other elements:

4. Interaction between fire and threats to biodiversity (e.g. weeds, predators – fox, cat)
5. Opportunistic monitoring
6. Community involvement
7. Information systems and monitoring protocols

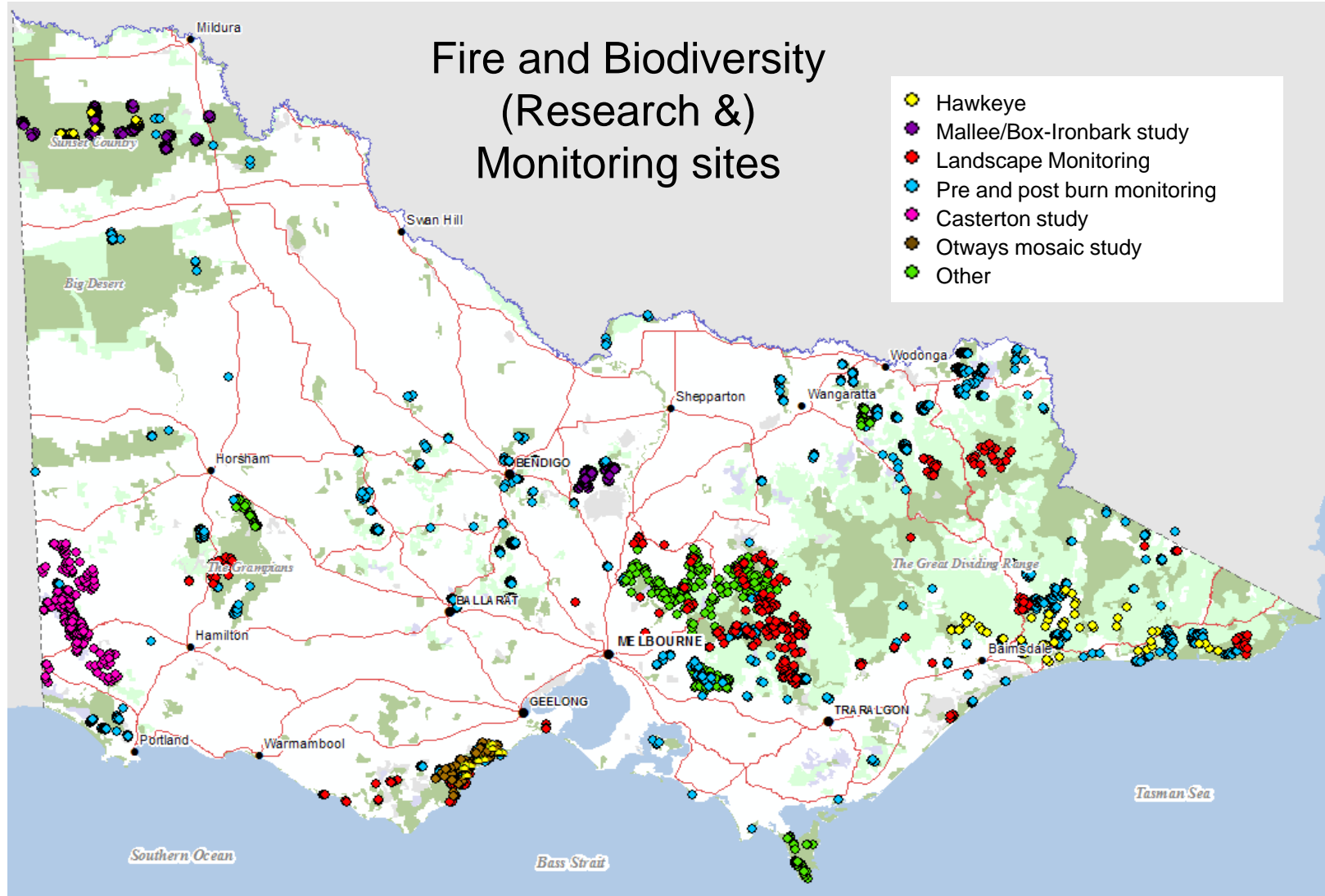


## Some monitoring/research questions

- Does pyrodiversity beget biodiversity?  
(**mosaics**)
- What are the **interactions** between fire management and other drivers of ecosystem change? e.g. predation, weeds
- What constitutes and where are habitat **refugia** for conservation dependent flora, fauna and ecosystems?
- What is the effect of burning at and beyond **thresholds** on the most sensitive/at risk species and ecosystems?
- How adequate are habitat growth stages as a **surrogate** for fauna?



WITH LANDSCAPE FIRE





WILDLANDFIRE

A. (Landscape)  
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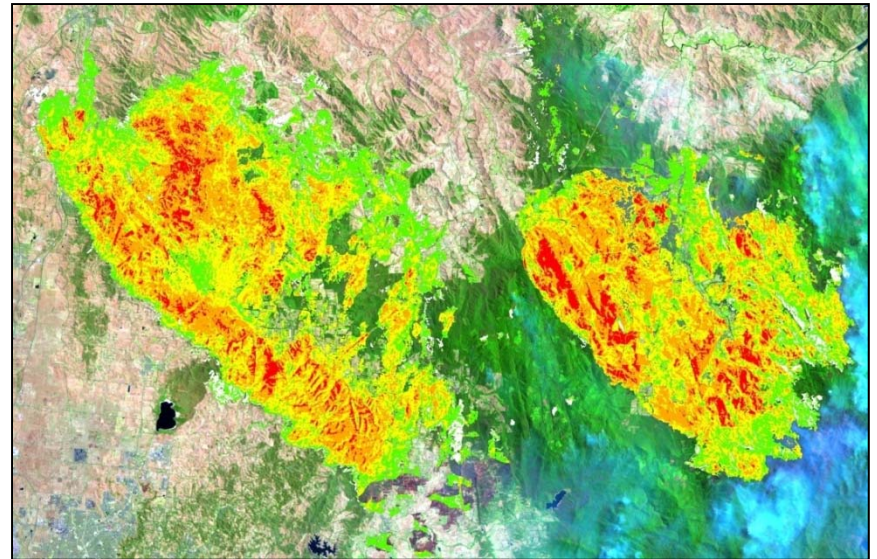
More good  
news !



## Research Project 1

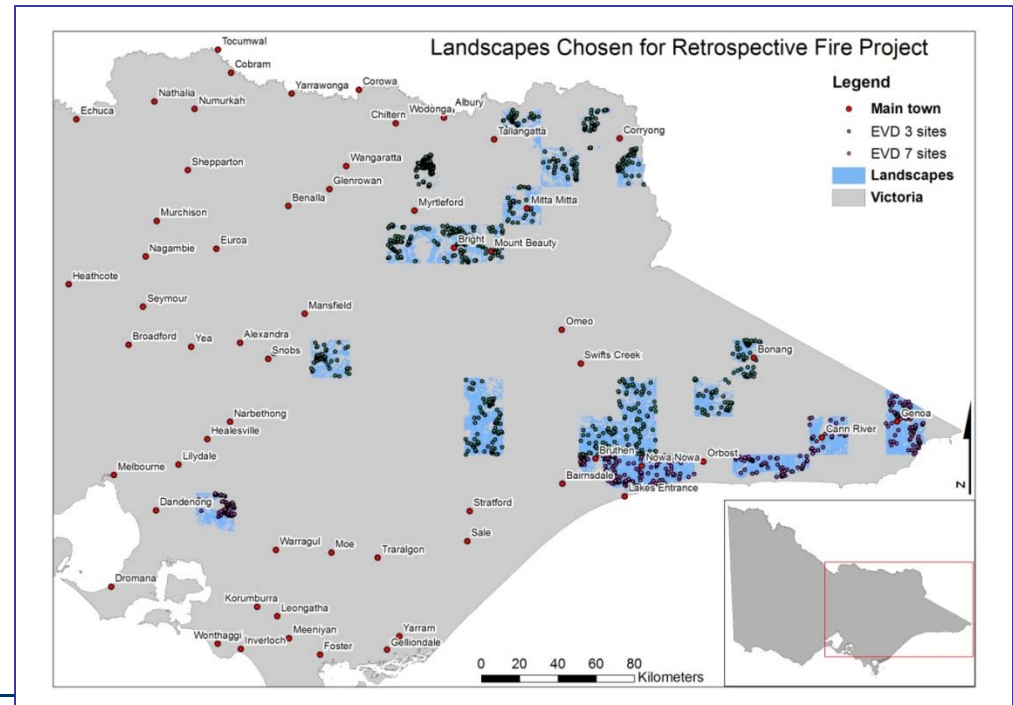
- Relationships between biodiversity and baseline landscape mosaic burning in the 2009 bushfire areas (*Faunal refuges in Fire-Prone Landscapes*)
- La Trobe & Deakin Universities
  - *How does the amount of recent (planned) burning in the landscape influence the resilience of the landscape to future events, including severe wildfire?*

Fire Severity Map



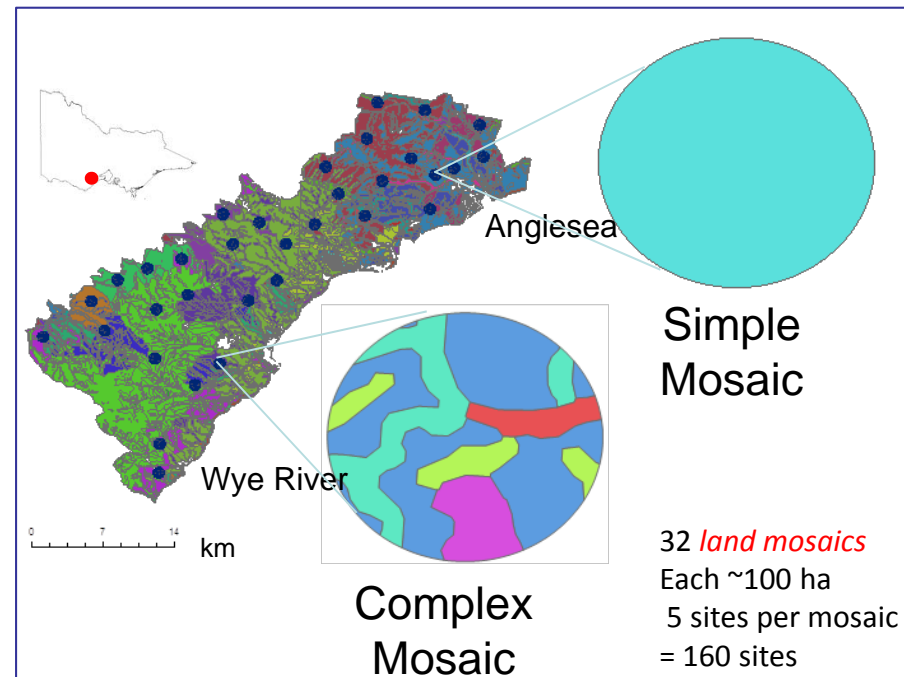
## Research Project 2

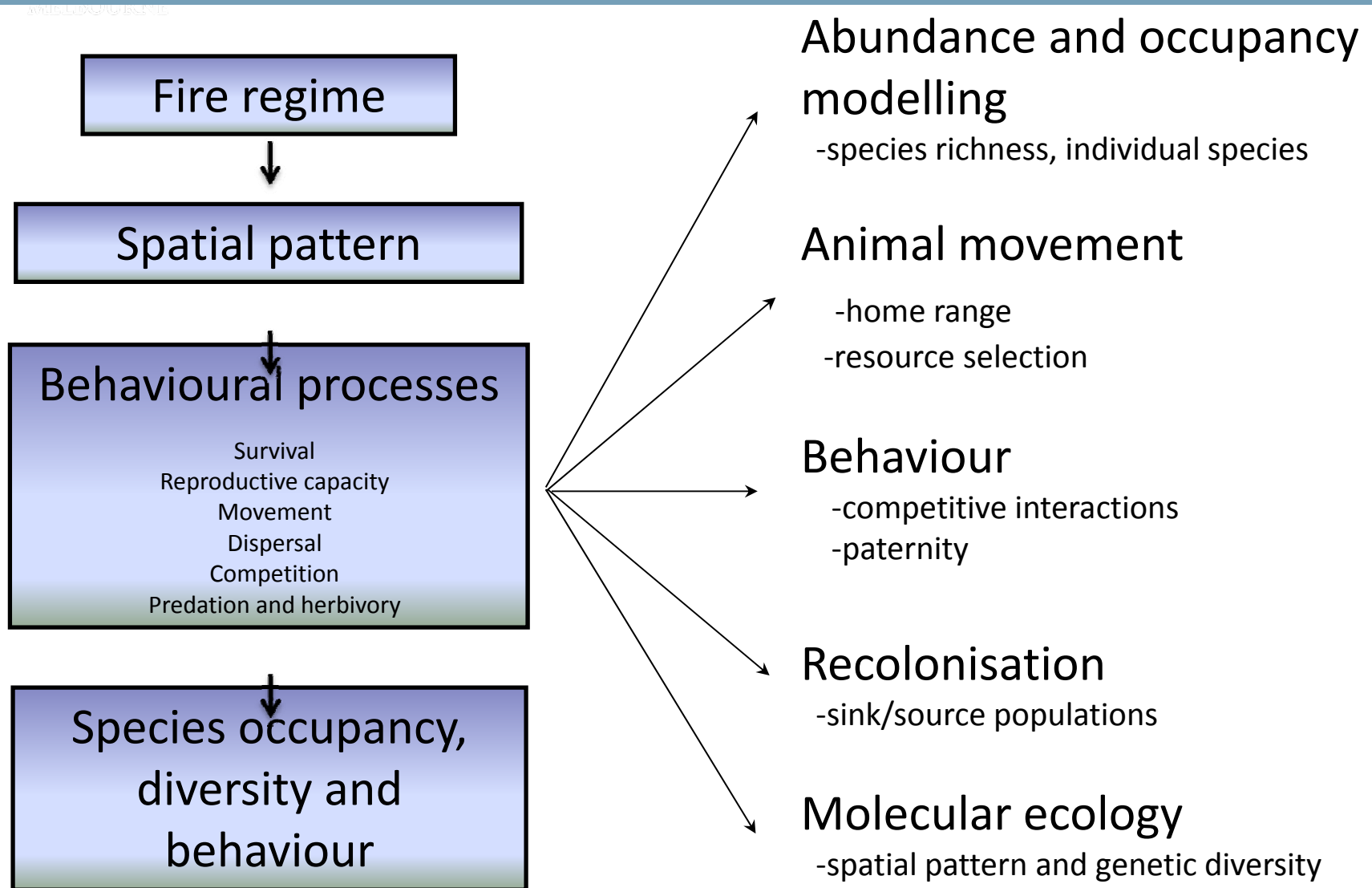
- Retrospective approach to identify the biodiversity values of different fire mosaics
- Arthur Rylah Institute, DSE
  - *How do flora & fauna communities develop over time (after fires of different intensity and spatial pattern)?*



## Research Project 3

- Experimentally examining mosaics created by planned landscape Mosaic Burns  
*(Fire, Landscape Pattern and Biodiversity)*
- Forest & Ecosystem Science, Uni. Melbourne
  - *How do flora and fauna respond to fine- and coarse-grained mosaics at the landscape scale?*





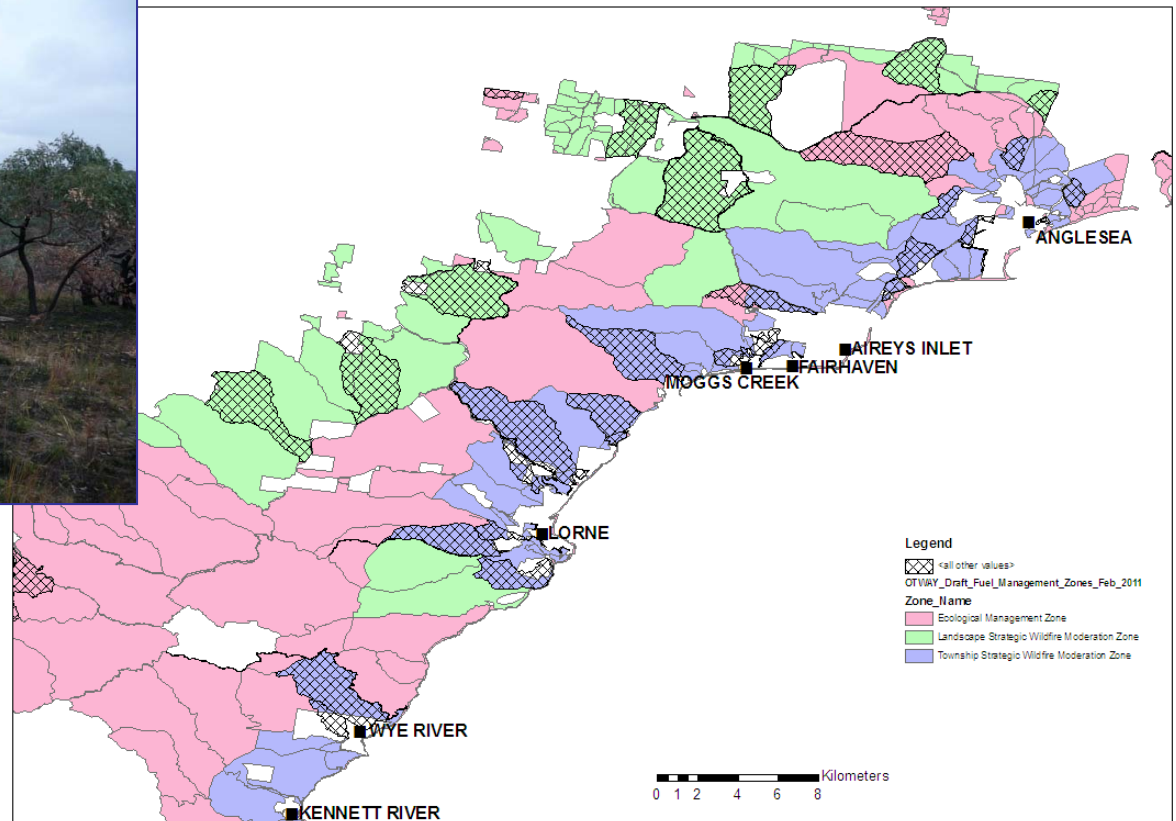


## Fuel reduction

Township Strategic Wildfire  
Moderation Zone (3km arc)



## Targetted monitoring in 'high impact' TSWMZ





## Issues ☹️

- Arbitrary targets based only on area burned (treated)
- Associated prevention measures with localized severe impacts

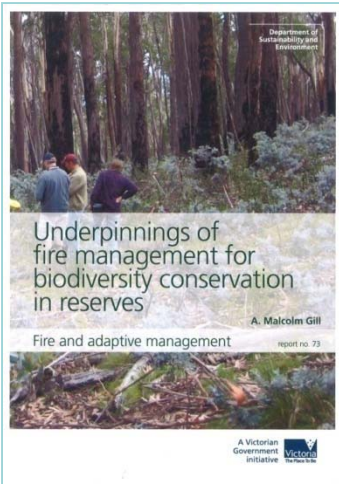
## Prospects 😊

- Renewed momentum (and resources) to support substantive biodiversity research and monitoring programs





WILDLAND CRISIS 10

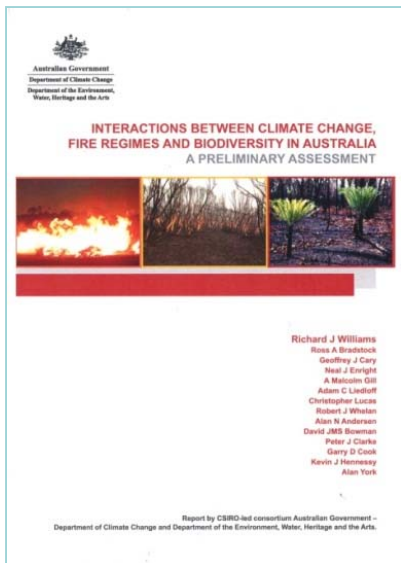
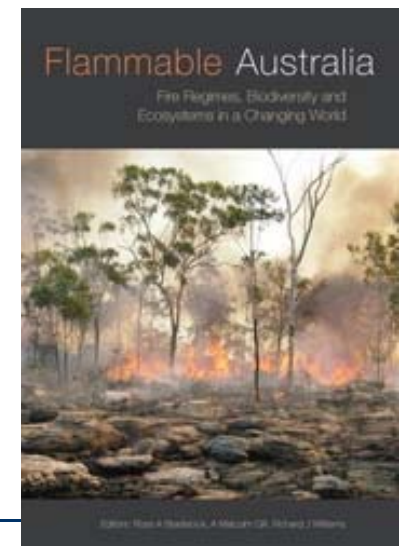


Driscoll, D.A., Lindenmayer, D.B., Bennett, A.F., Bode, M., Bradstock, R., Cary, G.J., Clarke, M.F., Dexter, N., Fensham, R., Friend, G., Gill, M., James, S., Kay, G., Keith, D.A., MacGregor, C., Russell-Smith, J., Salt, D., Watson, J.E.M., Williams, R.J. and York, A. (2010) **Fire management for biodiversity conservation: key research questions and our capacity to answer them.** *Biological Conservation* 143, 1928-1939.

Penman, T.D., Christie, F.J., Andersen, A.N., Bradstock, R.A., Cary, C.J., Henderson, M.K., Price, O., Tran, C., Wardle, G.M., Williams, R.J., York, A. (2011) **Prescribed burning: how can it work to conserve the things we value?** *International Journal of Wildland Fire* 20, 721-733.

New, T.R., Yen, A.L., Sands, D.P.A., Greenslade, P., Neville, P.J., York, A. & Collett, N.J. (2010) **Planned fires and invertebrate conservation in south east Australia.** *Journal of Insect Conservation* 14, 567-574.

McMullan-Fisher, S.J.M., May, T.W., Robinson, R.M., Bell, T.L., Lebel, T., Catcheside, P. and York, A. (2011) **Fungi and fire in Australian ecosystems: a review of current knowledge, management implications and future directions.** *Australian Journal of Botany* 59, 70-90.





THE UNIVERSITY OF  

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MELBOURNE