FESA in the Wombat Forest: Opportunities and challenges presented by long-term prescribed fire experiments

Forestry Australia: 2024 Fire Summit

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Image: J. Najera

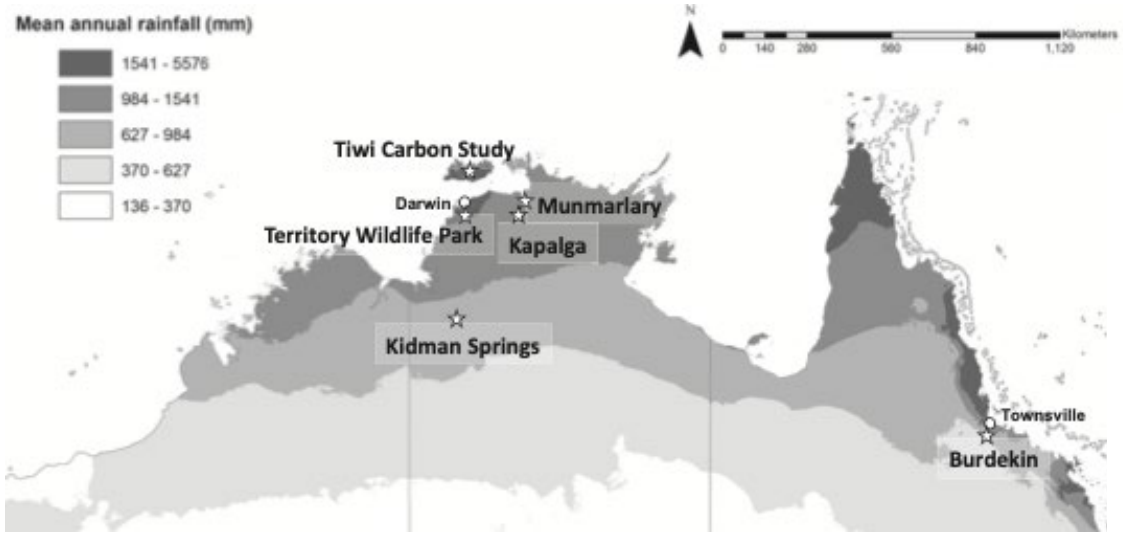
Acknowledgement of Country

I acknowledge the Traditional Owners of this land – the Wurundjeri people – and of the land of the FESA experiment – the Dja Dja Wurrung, Wadawurrung, and Wurundjeri peoples. I would like to pay my respects to their Elders, past and present, and their families.

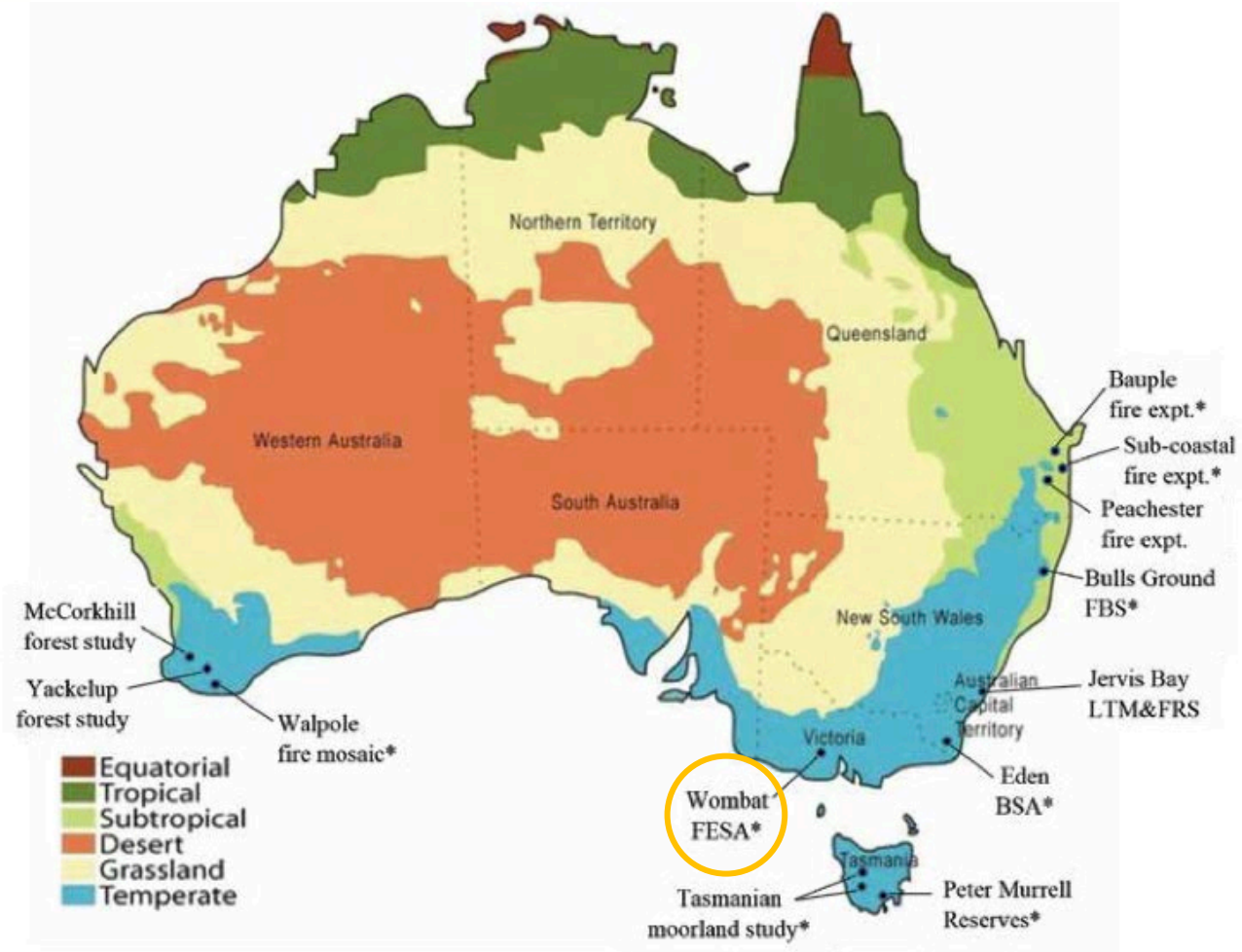
Thanks to:

- Staff and Graduate Research Students at The University of Melbourne
- Colleagues at DEECA (and predecessors) and Arthur Rylah Institute
- Integrated Forest Ecosystem Research (IFER) Program supported by DEECA

Australian fire experiments



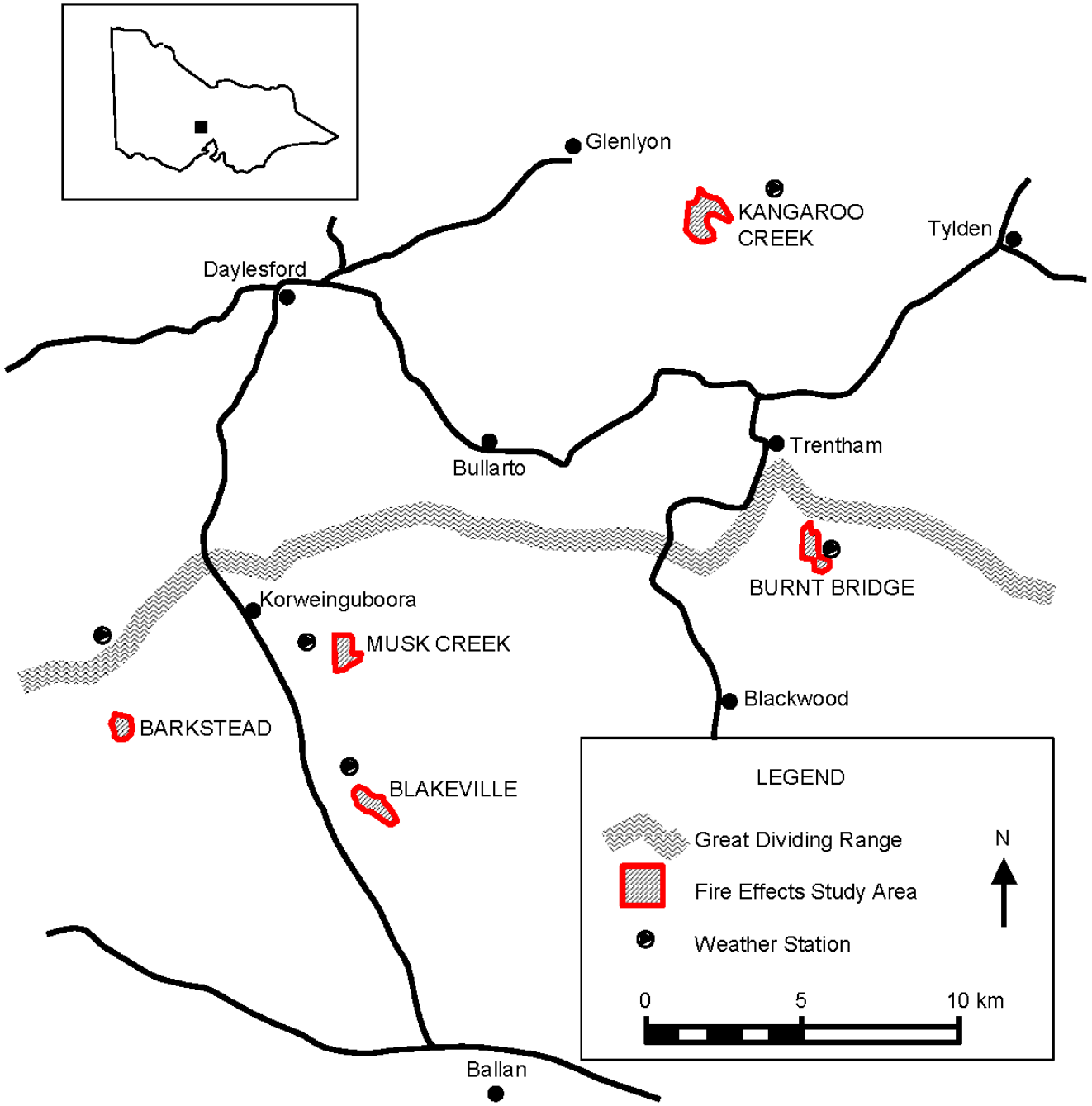
Andersen 2021



York and Lewis 2018

Fire Effects Study Areas (FESA)

Image: J. Najera



FESA

- Wombat Forest
- Mixed-species eucalypt forest
- Messmate-Peppermint-Gum
- Five locations
- First prescribed fire burns 1985 to 1987

(Tolhurst 1992; DSE 2003)

DSE FESA Summary Report (2003), Foreword:

I would like to also pay particular tribute to Dr Kevin Tolhurst, of the University of Melbourne, who has so ably kept the project 'on the rails' over the last two decades and who has coped so patiently with many funding and organizational vicissitudes.

Gary Morgan, (then) Chief Fire Officer, Department of Sustainability and Environment

Image: A. Eutsler

FESA Objectives

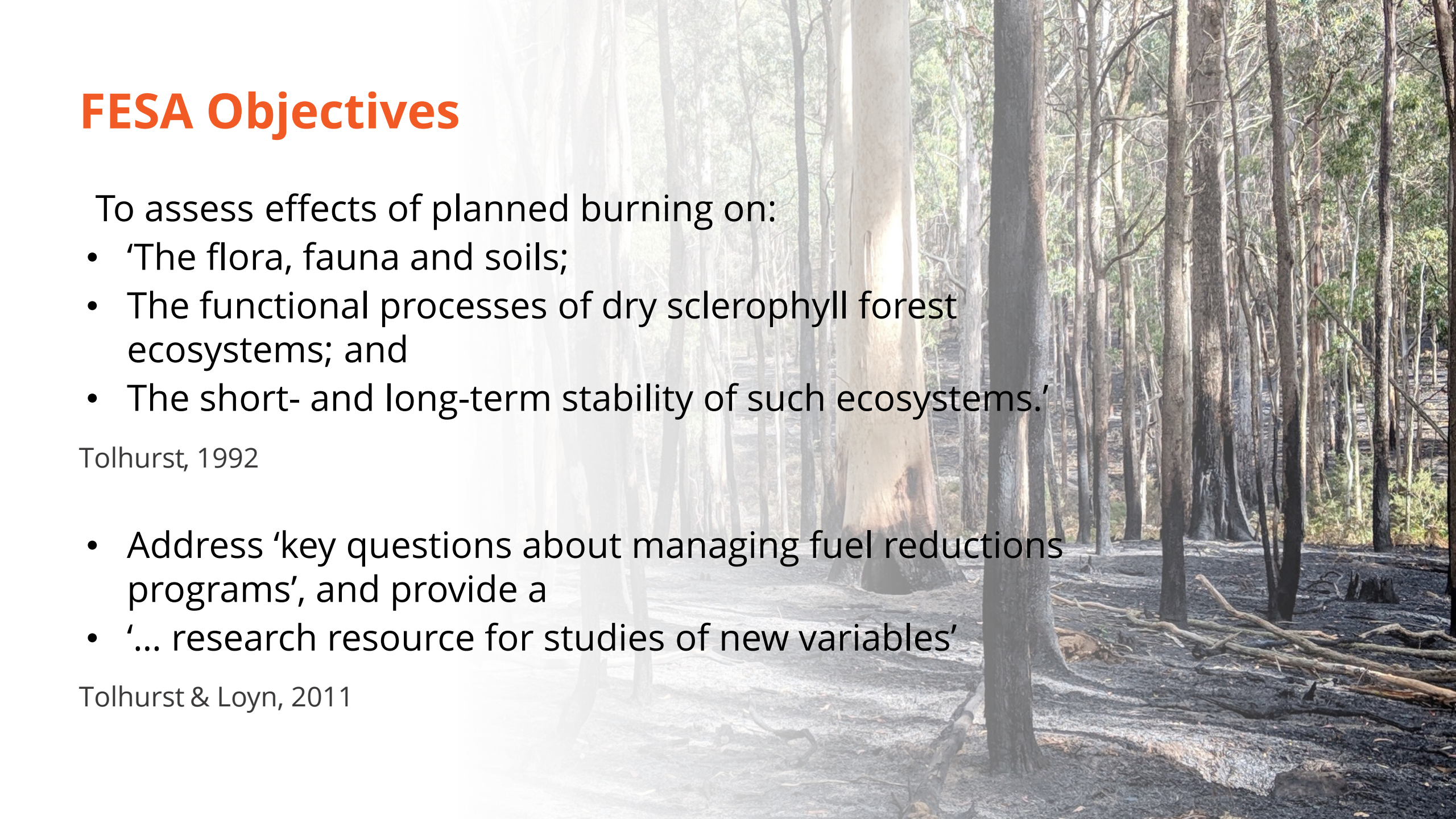
To assess effects of planned burning on:

- ‘The flora, fauna and soils;
- The functional processes of dry sclerophyll forest ecosystems; and
- The short- and long-term stability of such ecosystems.’

Tolhurst, 1992

- Address ‘key questions about managing fuel reductions programs’, and provide a
- ‘… research resource for studies of new variables’

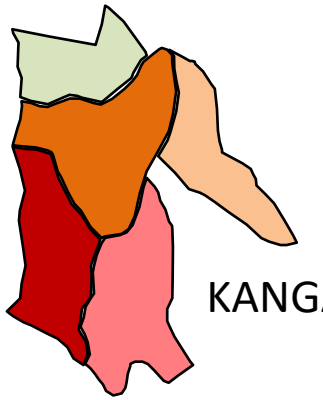
Tolhurst & Loyn, 2011



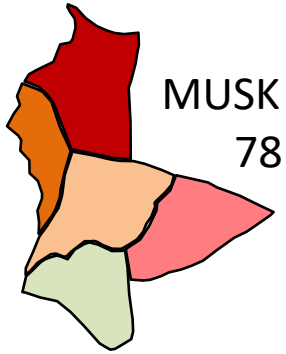
FESA Design

C	Control
S3	Spring 3 yearly (6-7 burns)
S10	Spring 10 yearly (3)
A3	Autumn 3 yearly (4-6)
A10	Autumn 10 yearly (2-3)

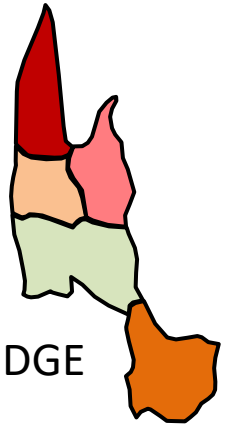
Low intensity
(mean <260 kW m^{-1})



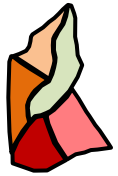
KANGAROO CREEK
128 ha



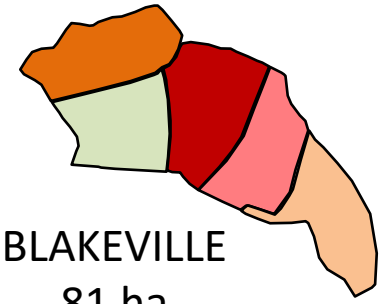
MUSK CREEK
78 ha



BURNT BRIDGE
62 ha

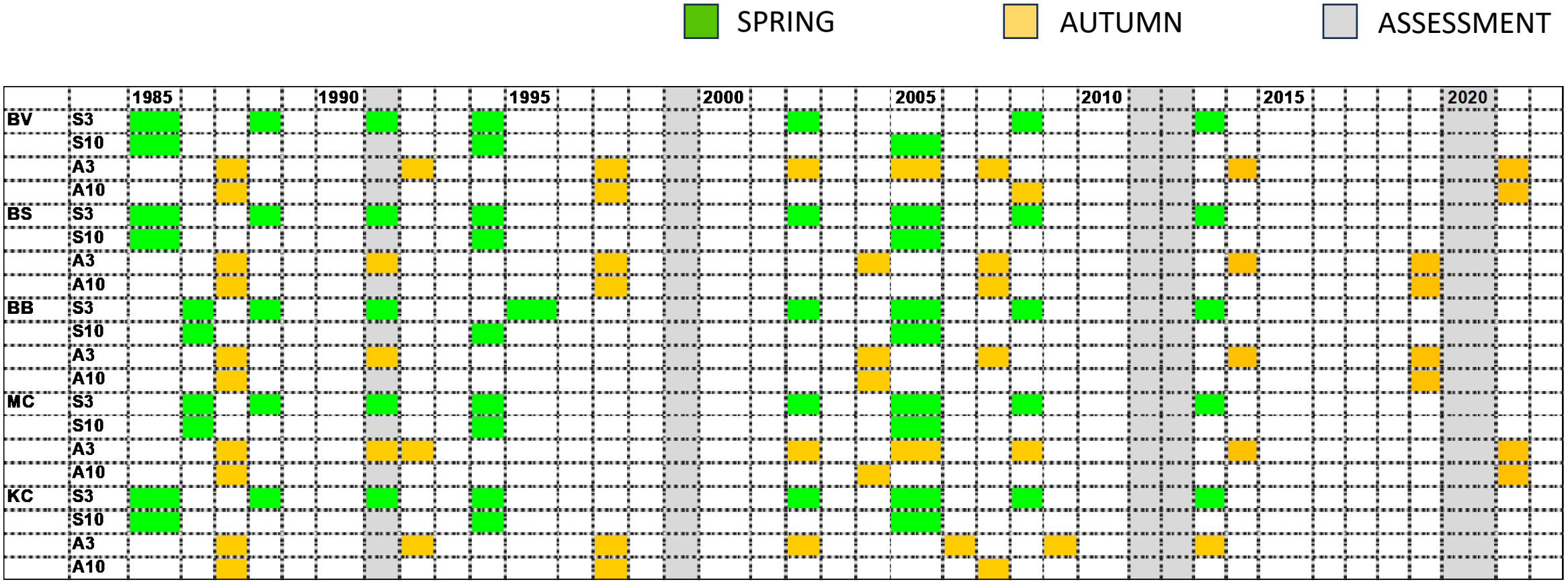


BARKSTEAD
19 ha



BLAKEVILLE
81 ha

FESA Burning schedule



FESA Assessments

1991 & 1999:

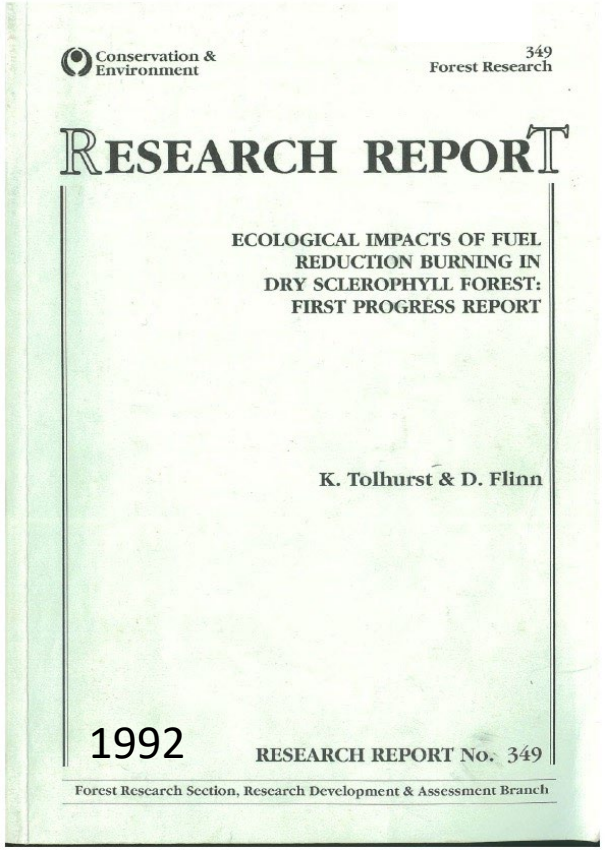
- Weather (ongoing)
- Fire behaviour (to 2009)
- Fuel loads
- Species and abundance/ activity:
  - Plants
  - Invertebrates
  - Reptiles
  - Bats
  - Mammals
  - Birds
- Soil nutrients
- Tree growth, mortality, bark

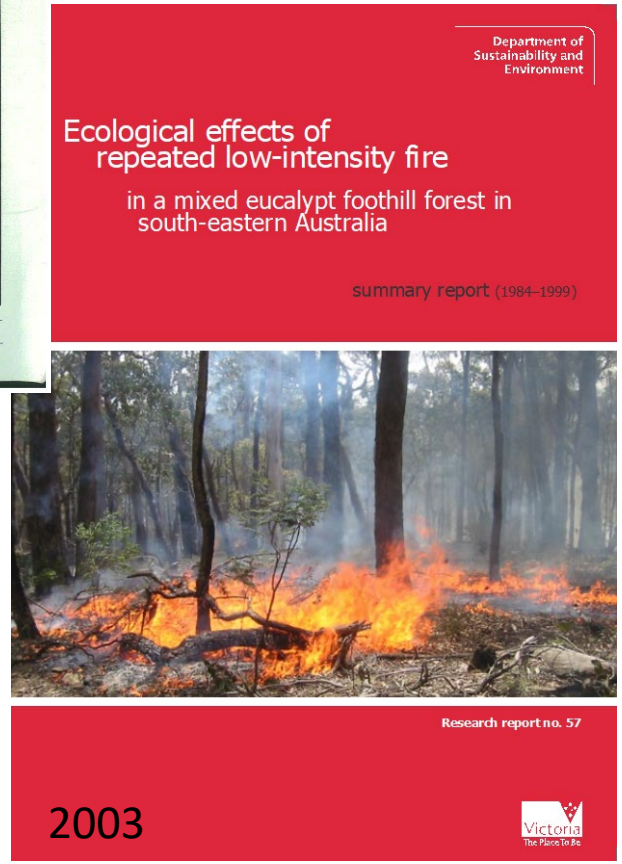
2011/12, above plus:

- Carbon stocks (above-ground, soil)

2020:

- Plant species and abundance

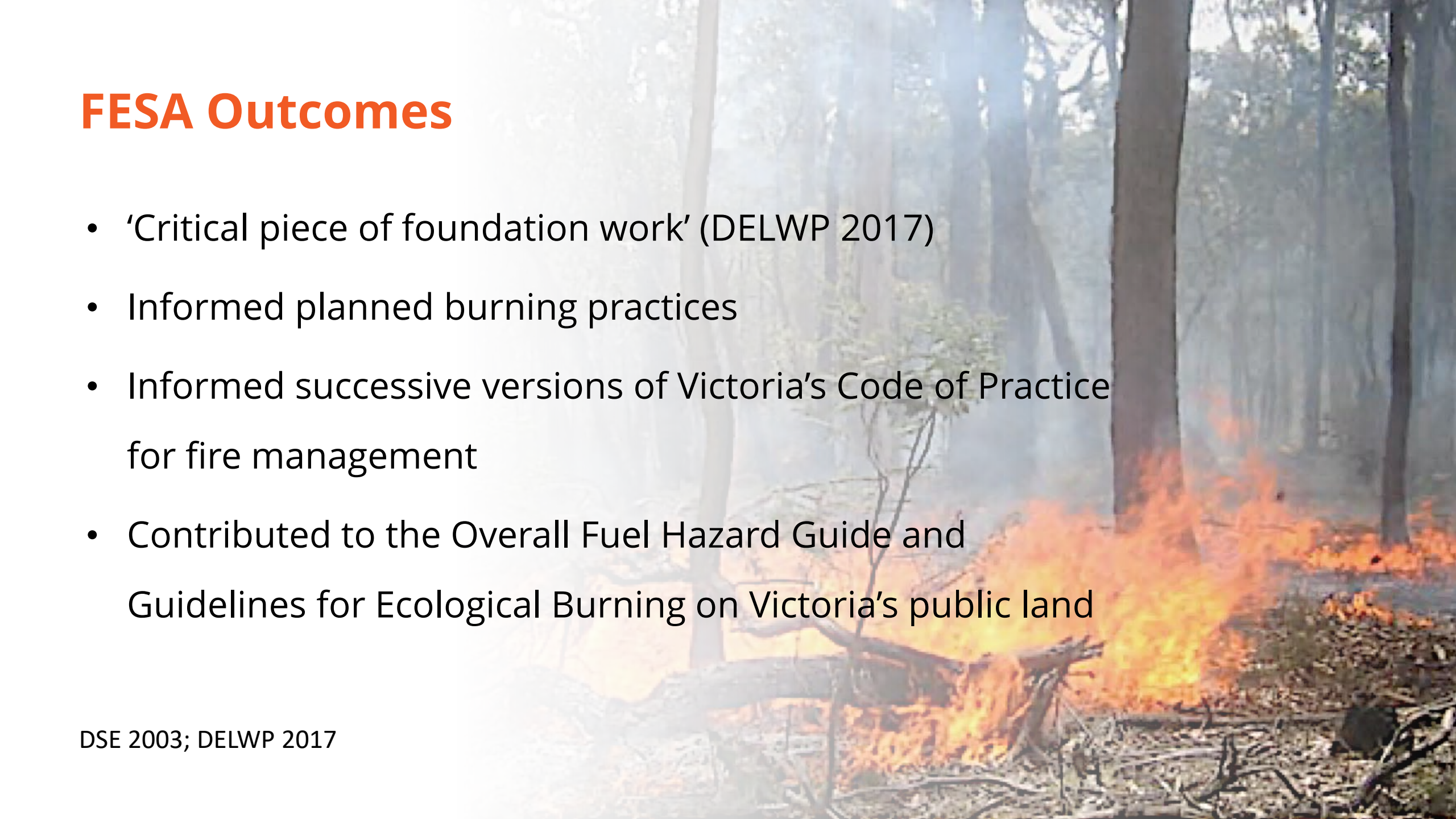




FESA Outcomes

- ‘Critical piece of foundation work’ (DELWP 2017)
- Informed planned burning practices
- Informed successive versions of Victoria’s Code of Practice for fire management
- Contributed to the Overall Fuel Hazard Guide and Guidelines for Ecological Burning on Victoria’s public land

DSE 2003; DELWP 2017



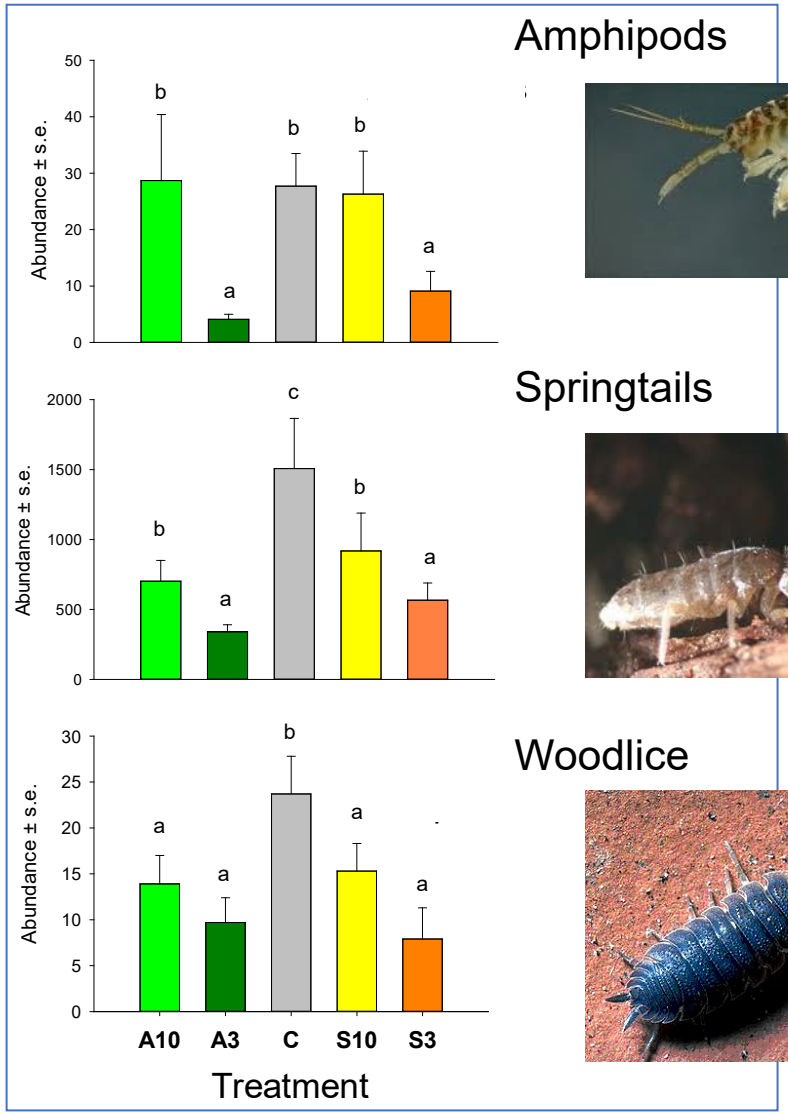
FESA Effects (1999, 14 years)

- Fuels: surface fine fuels recover to within 90% of unburned levels within four years (all PF treatments)
- Plants: no species lost or gained, cover decreases with more frequent burning
- Fauna: no detectable effects (bats, reptiles, birds) or recovery within 2-3 years (small mammals)
- Soil nutrients: decreased surface carbon and nitrogen concentrations with more frequent burning

DSE 2003

FESA example results: litter-dwelling invertebrates (2012, 27 years)

Abundance (4 years post PB)

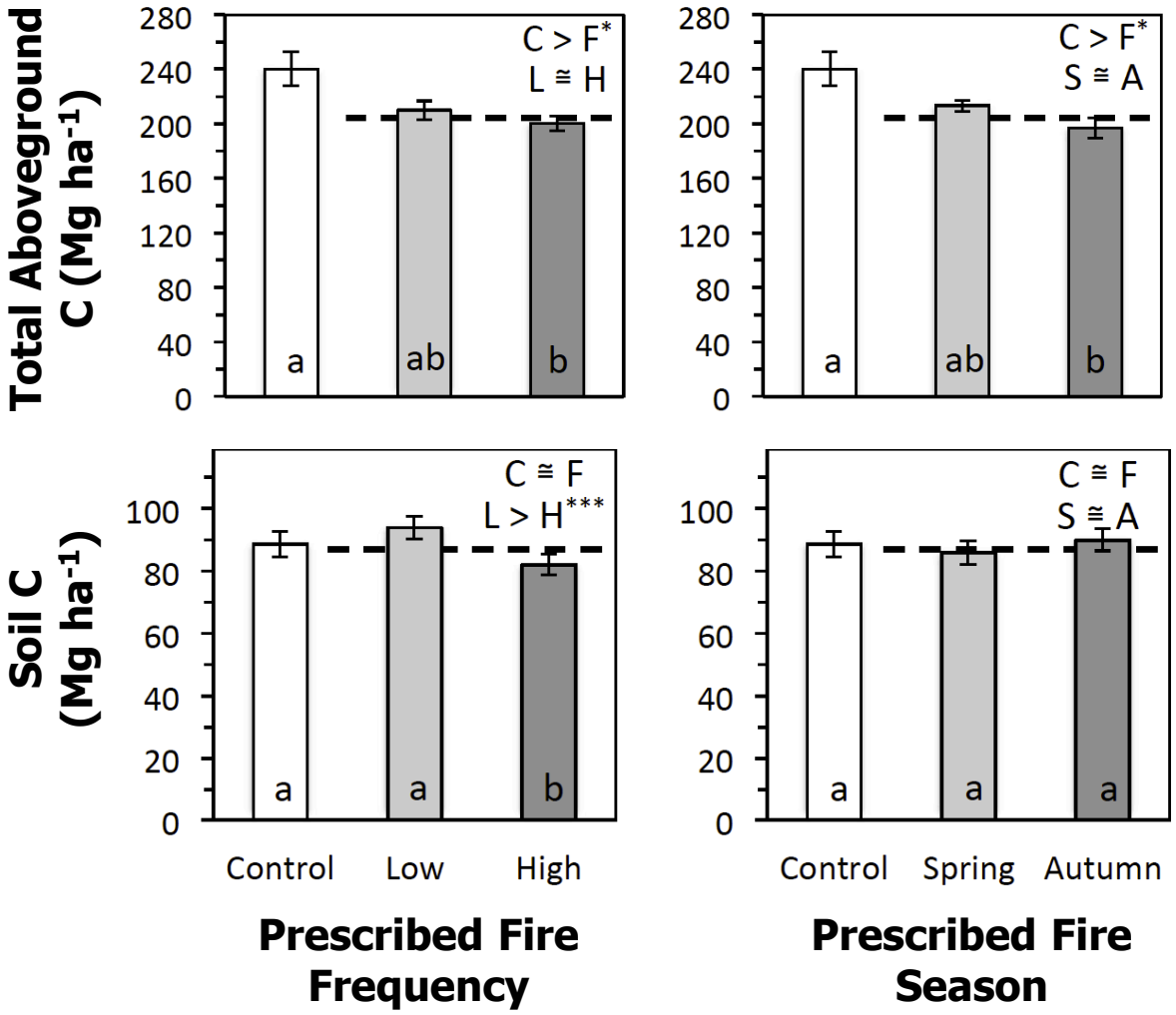


Main effects:

- *Invertebrate abundance consistently decreased by high-frequency burning irrespective of season*
- *No effect of low-frequency burning*

York (2014)

FESA example results: carbon (2012, 27 years)



To minimise carbon losses

- *Burn at 10-yr rather than 3-yr interval*
- *Burn in Spring (moister) rather than Autumn (drier)*

Bennett et al. (2014)

FESA Challenges

Design:

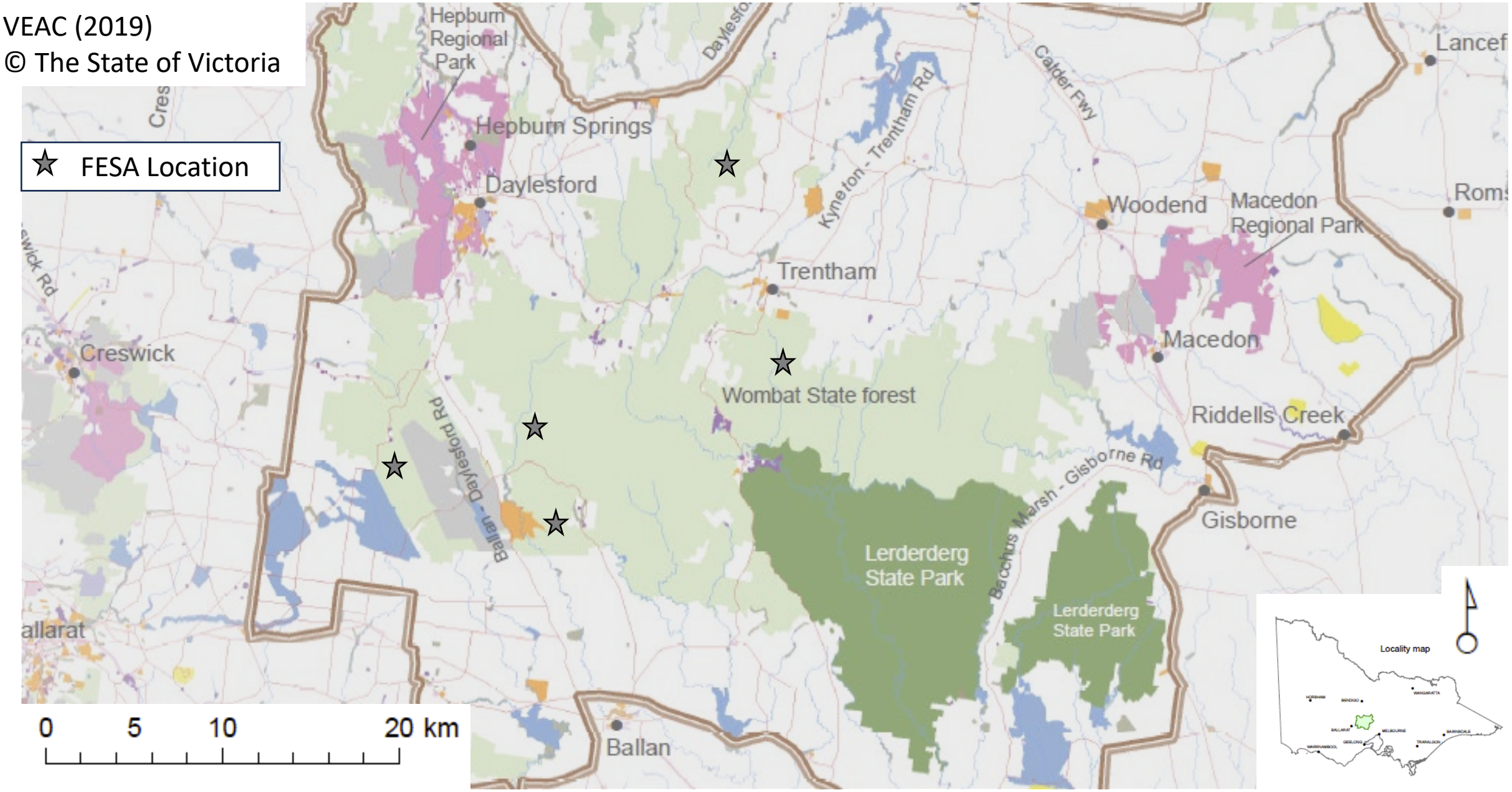
- One forest type, highly disturbed (atypical)
- ‘Small scale and non-independence of some treatments for some variables’
- ‘Now more efficient [ways] to examine key questions at larger scales’

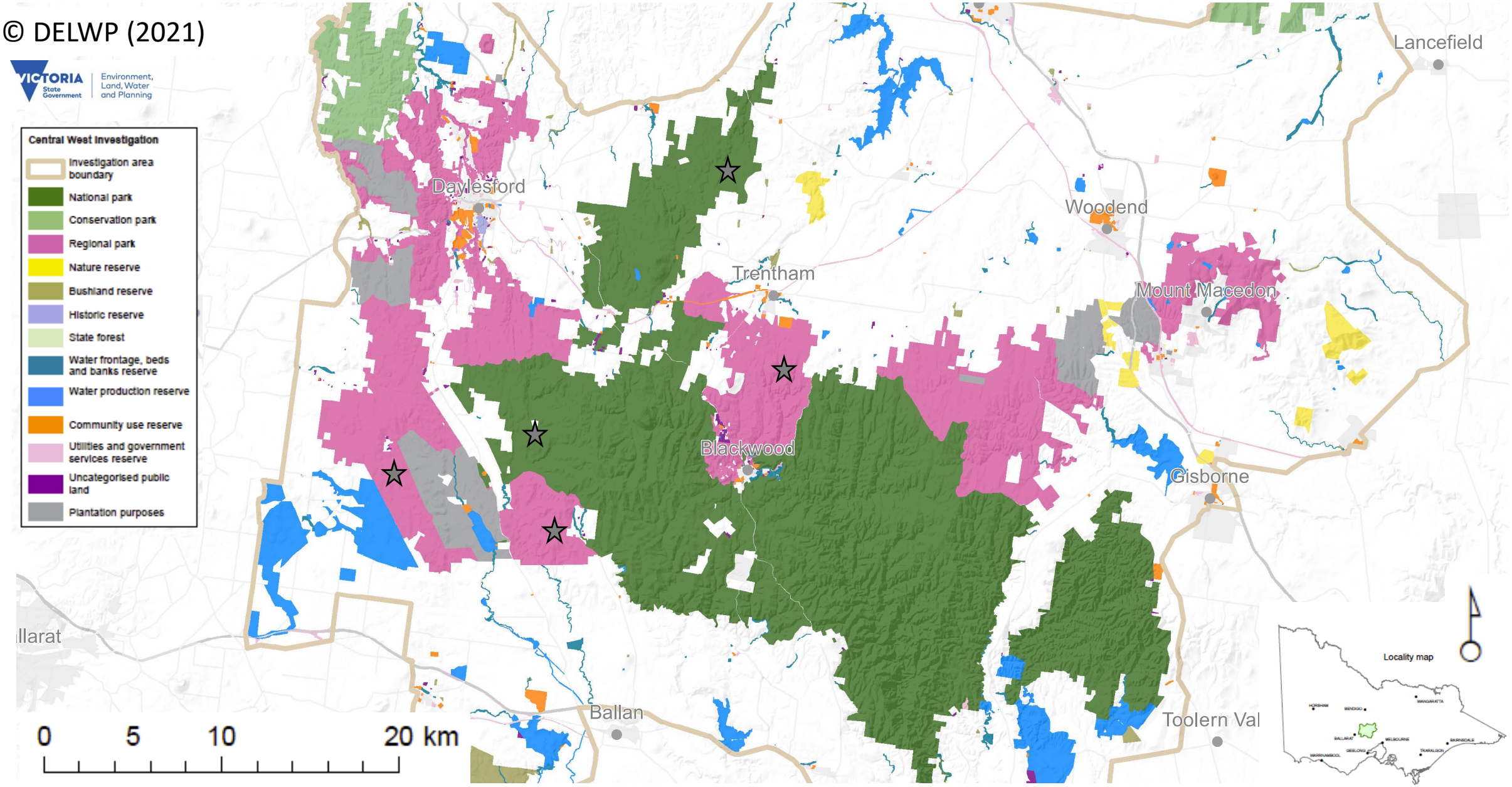
Continuity of:

- Treatments (consistent return intervals across sites)
- Capacity (e.g., fire behaviour assessment) and funding
- People (monitoring, research, relationships, champions)
- Social license for prescribed burning
- Data management and access

(Independent) Review of the Fire Effects Study Areas (FESA) Research Program, 2022

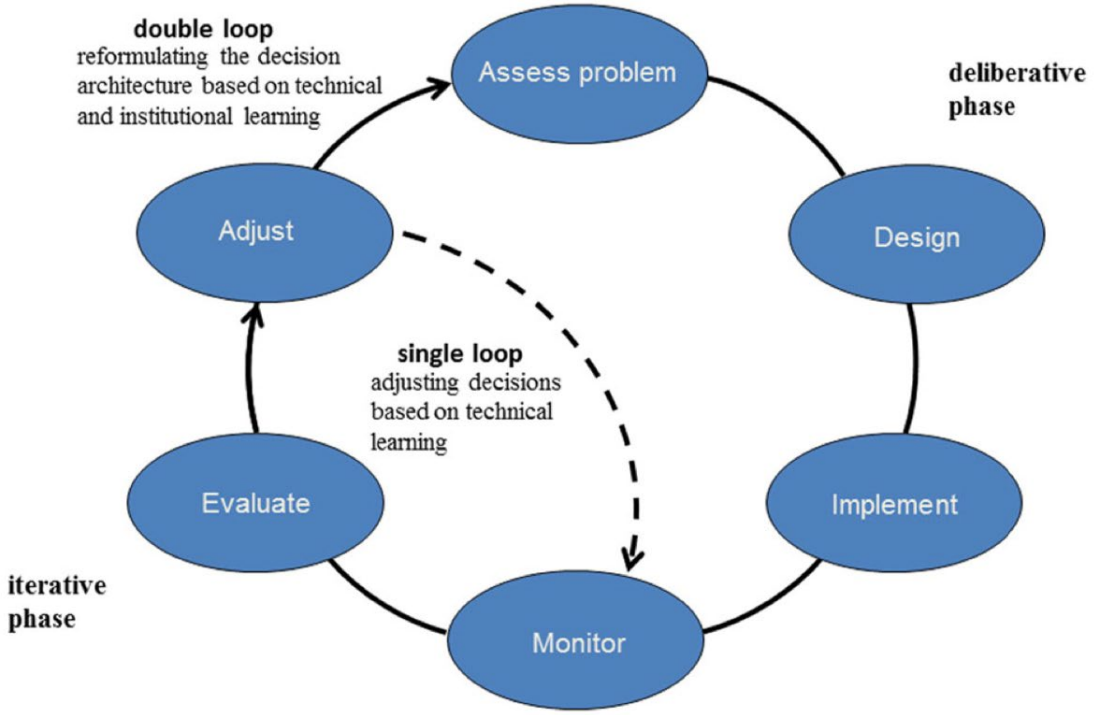
VEAC (2019)




VICTORIA State Government
Environment, Land, Water and Planning
Central West Investigation
Investigation area boundary
National park
Conservation park
Regional park
Nature reserve
Bushland reserve
Historic reserve
State forest
Water frontage, beds and banks reserve
Water production reserve
Community use reserve
Utilities and government services reserve
Uncategorised public land
Plantation purposes
Lancefield
Daylesford
Woodend
Trentham
Mount Macedon
Blackwood
Gisborne
llarat
Ballan
Toolern Val
0 5 10 20 km
Locality map

FESA Opportunities

- Long unburned controls (50 to 93 years): baseline data, fuel accumulation
- Ongoing relevance to current (& future?) questions about ecological effects of prescribed fire (to complement other approaches)
- Training/ education/ communications: adaptive management example



Williams and Brown (2018)

(Independent) Review of the Fire Effects Study Areas (FESA) Research Program, 2022

FESA – where to from here?

- **Recognition** of research infrastructure (long-unburned controls, documented treatments, change detection)
- **Advocacy** based on scientific importance (e.g., effects of frequent burning)
- **Resourcing** and **Innovation** to ensure continuity and relevance.

FLARE WILDFIRE RESEARCH

THE UNIVERSITY OF MELBOURNE

Thank you for listening

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