Ecosystem Risk: Impact of Climate Change

Bayesian Network Workshop

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Aim of this session

- Brainstorm impacts of climate change on native vegetation
  - Link climate change scenarios, terrestrial vegetation extent and social/land use pressures
  - Use of Bayesian model approach – influence diagram
- Focus on
  - Climate scenario for 2030
  - Threatened vegetation type - Grassy Woodland
  - A landscape in North Central CMA region – Muckleford zone
- Question: *How resilient are the grassy woodlands in the Muckleford zone to 2030 climate change scenario?*

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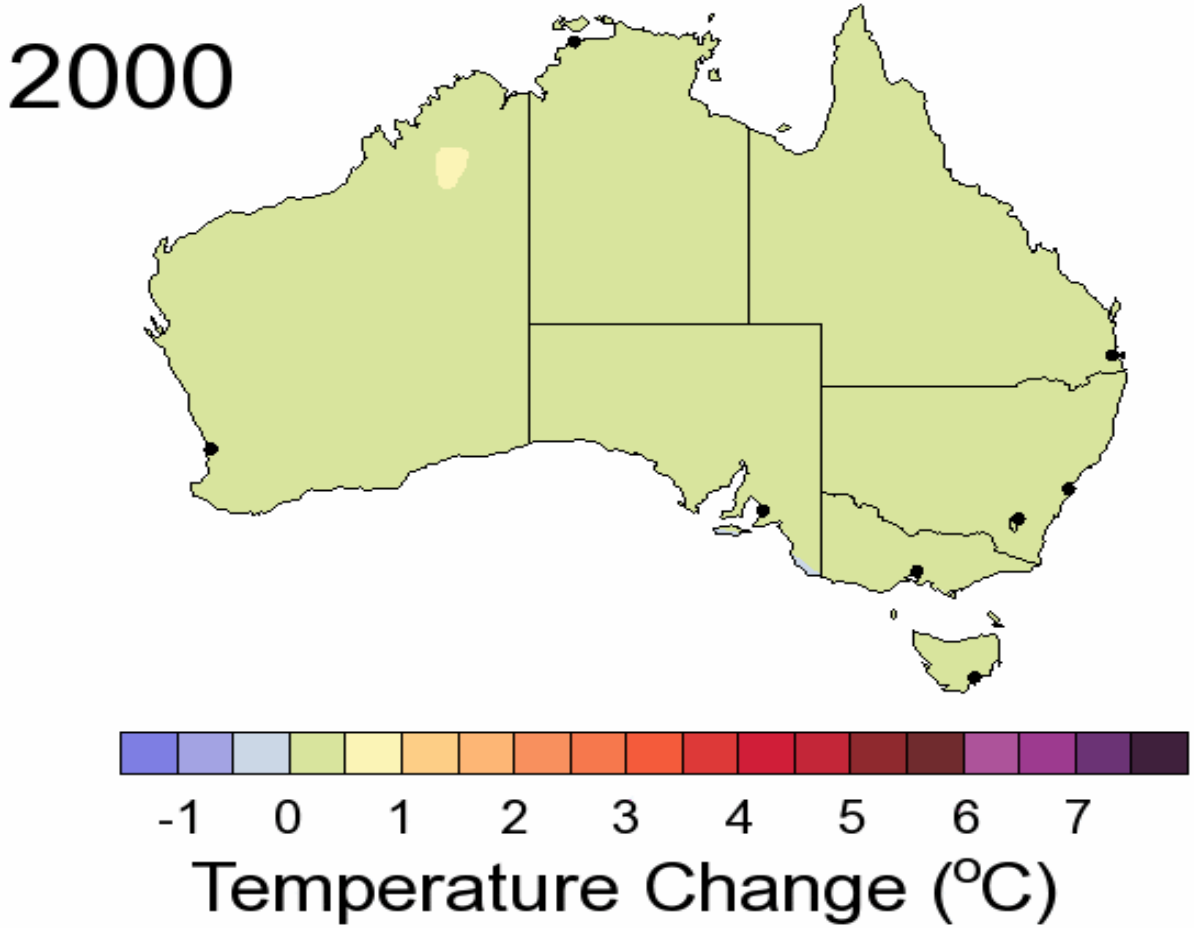
Climate Scenario 2030

Temperature

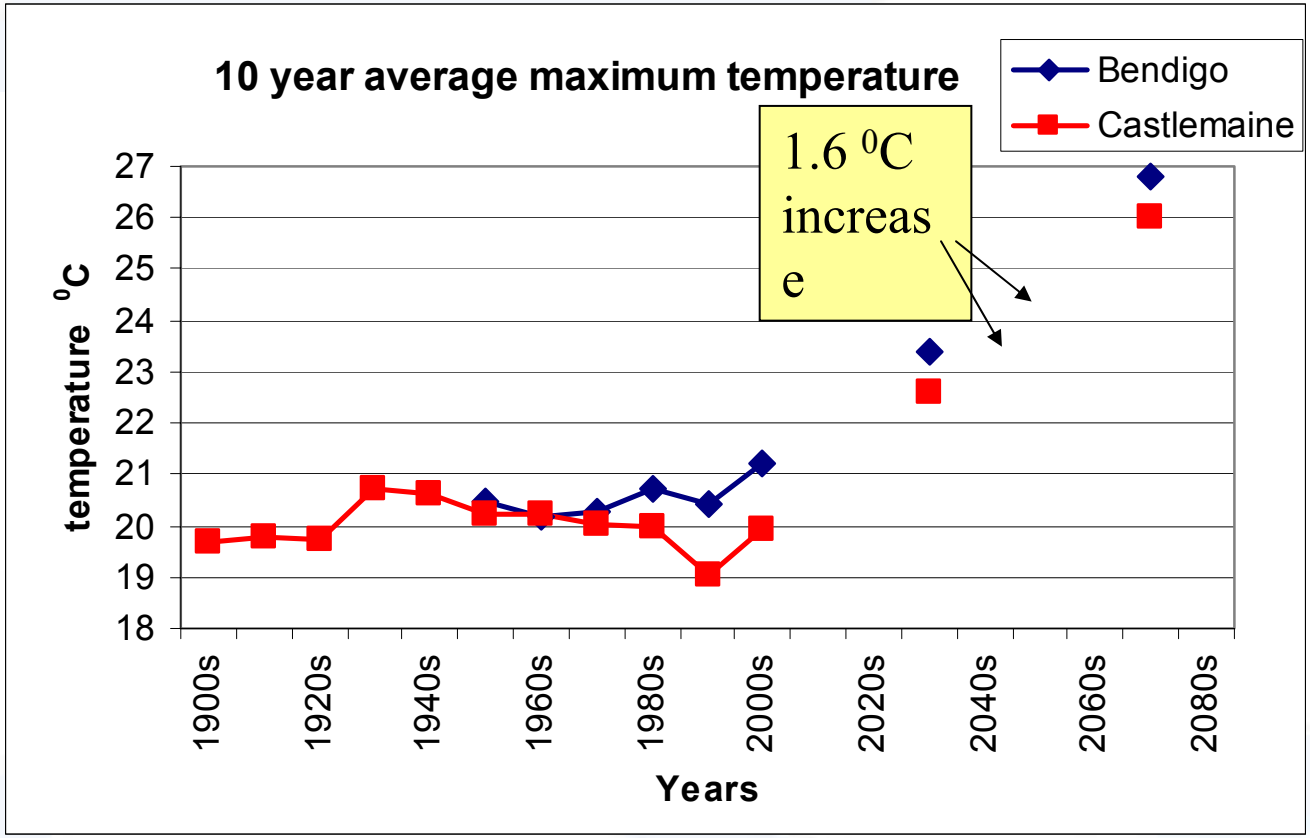
- Annual warming of 0.3 to 1.6^{0}C
- Warming will be similar throughout seasons
- 10 to 50% increase in number of hot days over 35^{0}C
- 0 to 70% reduction in the number of frost days

Climate Scenario 2030



CSIRO Mark 3.5 climate model
IPCC SRES A1B emission scenario
Change relative to 1980-1999 average

Climate Scenario 2030



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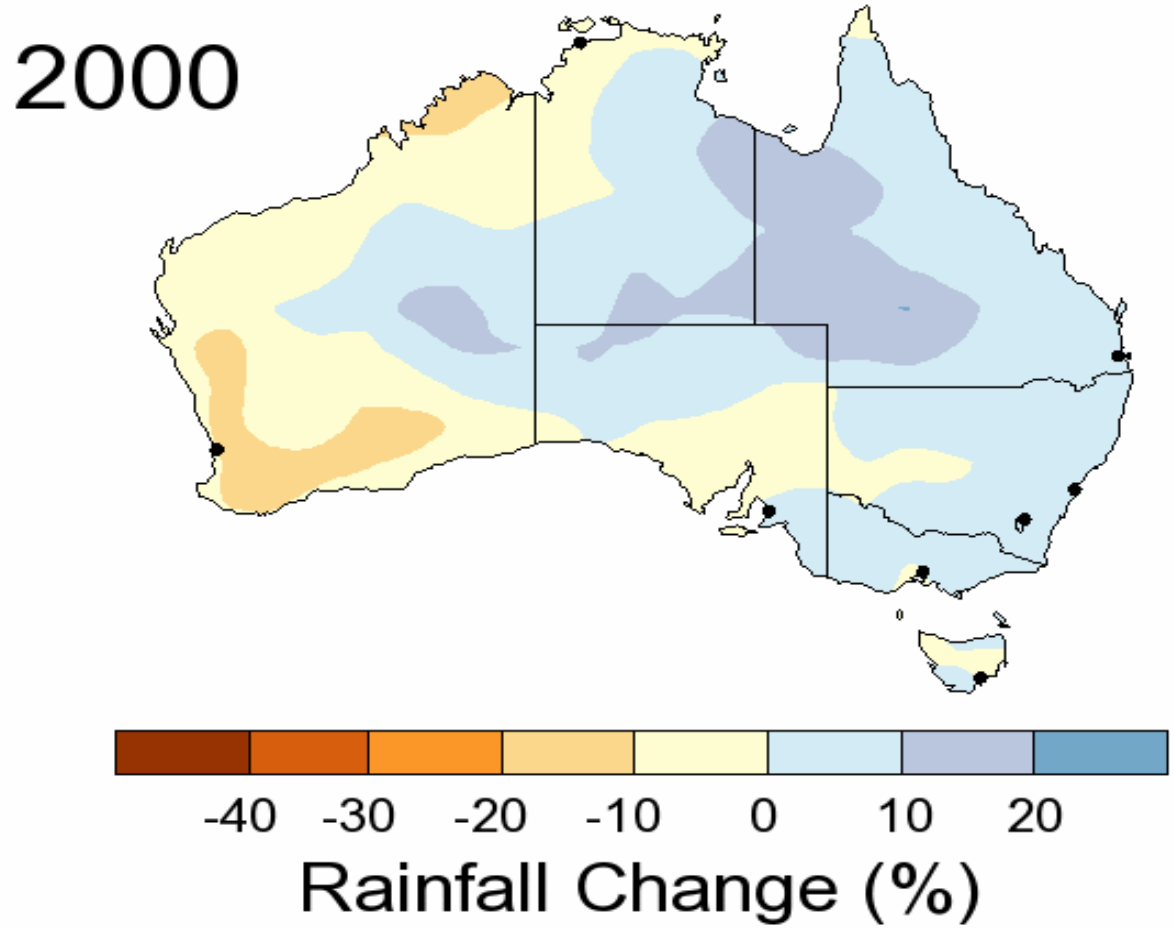
Climate Scenario 2030

Rainfall

- Annual rainfall decrease by 3 to 15%, less so in summer
- Extreme heavy rainfall events may become more intense



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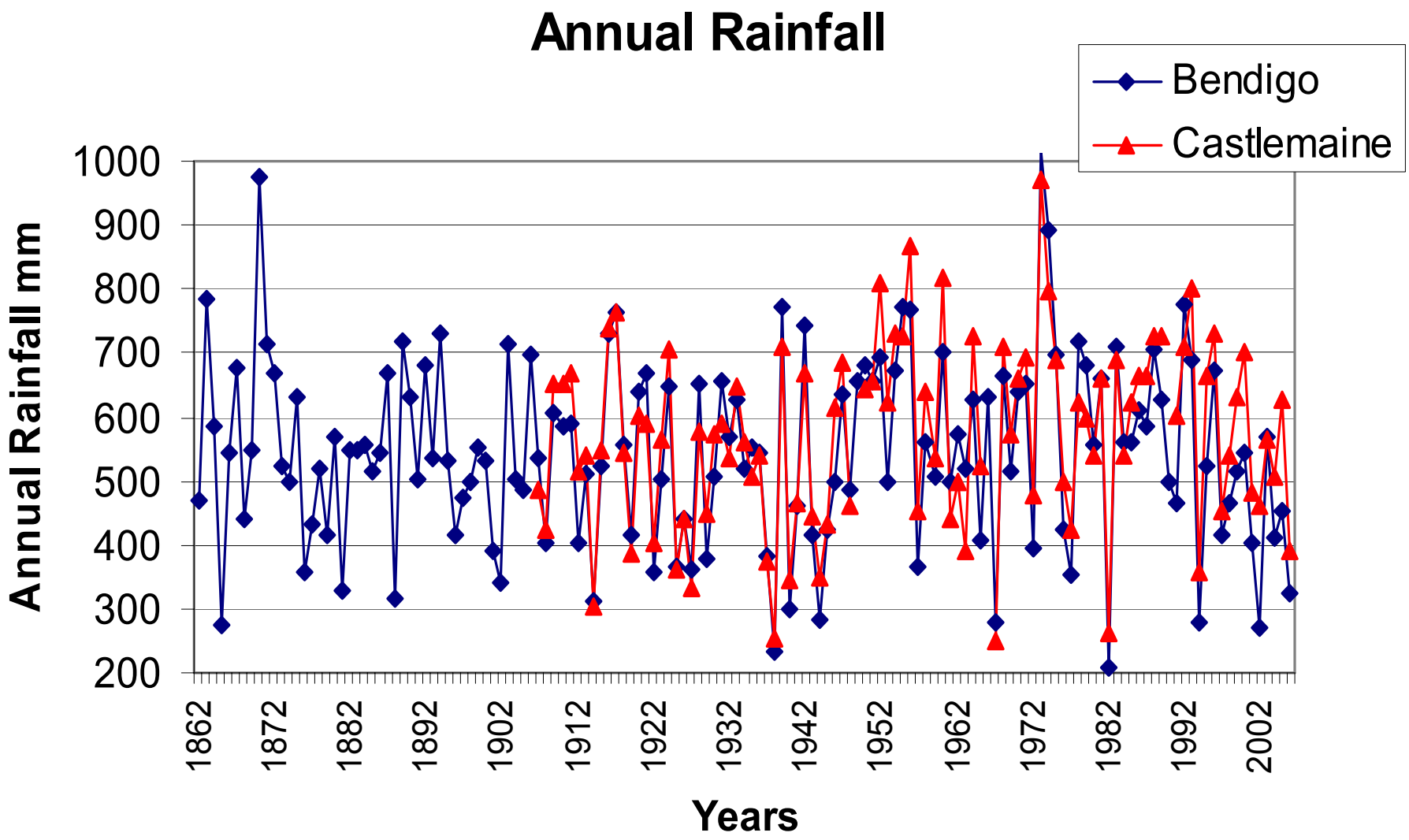

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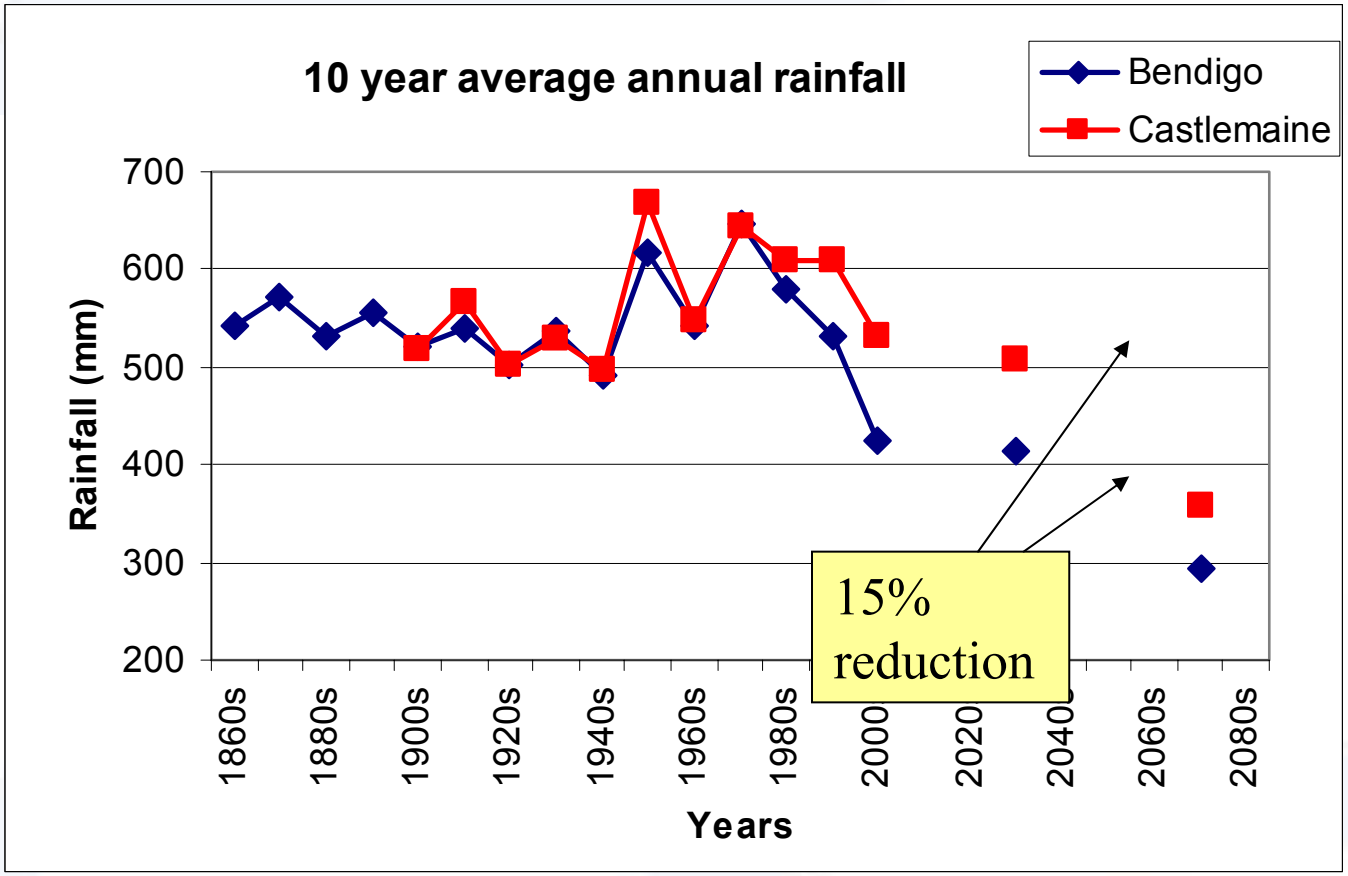

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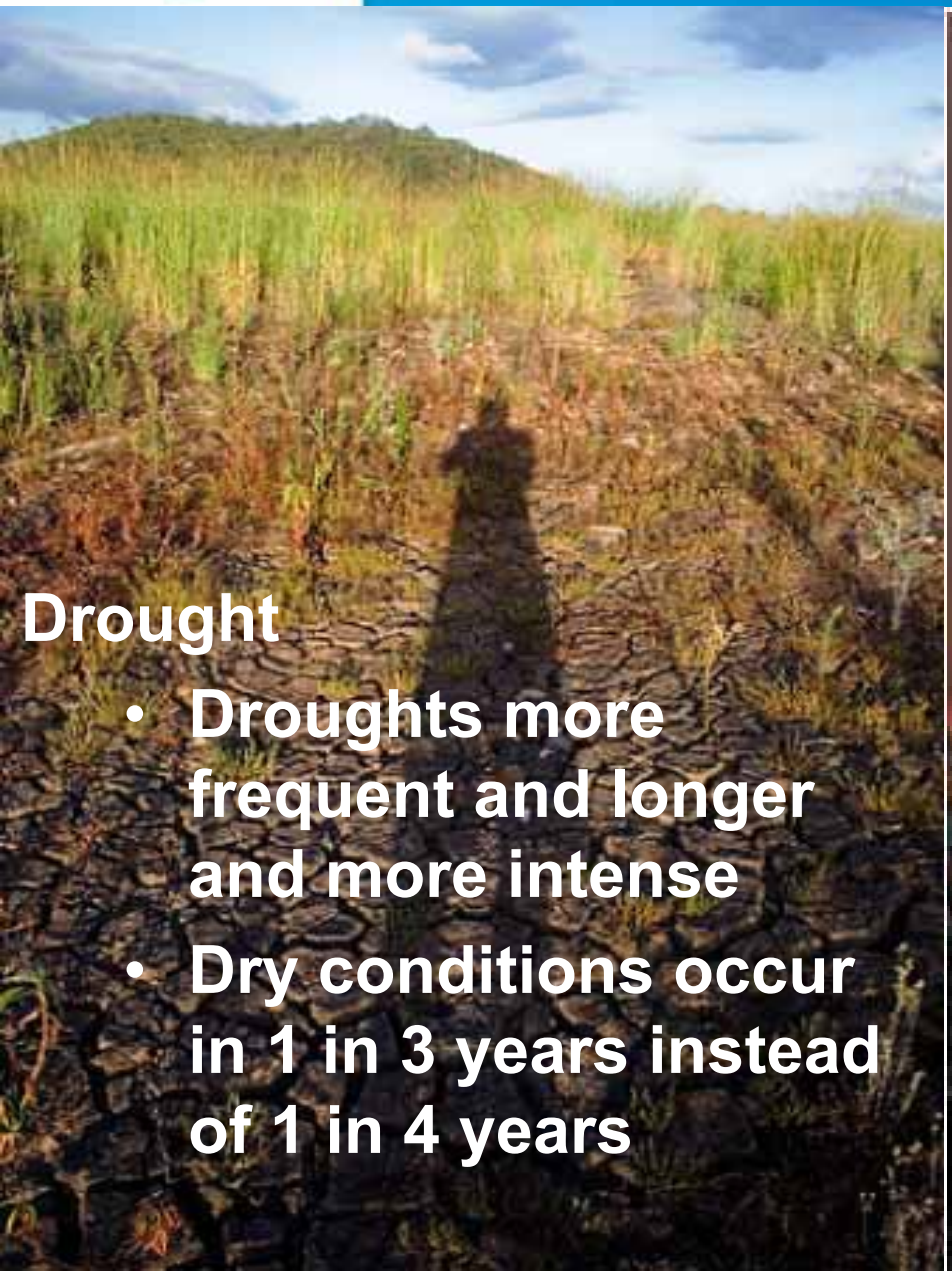
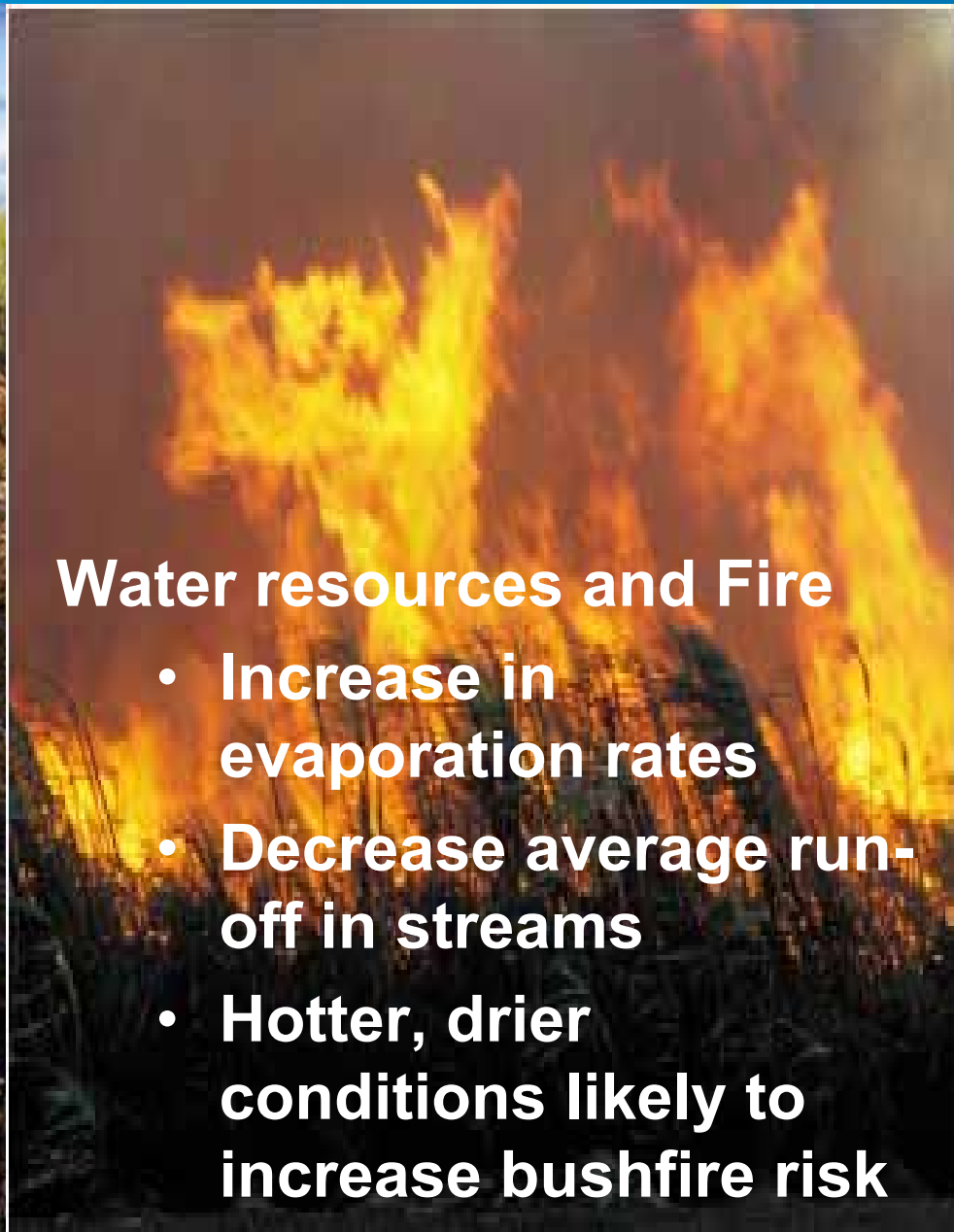


Drought

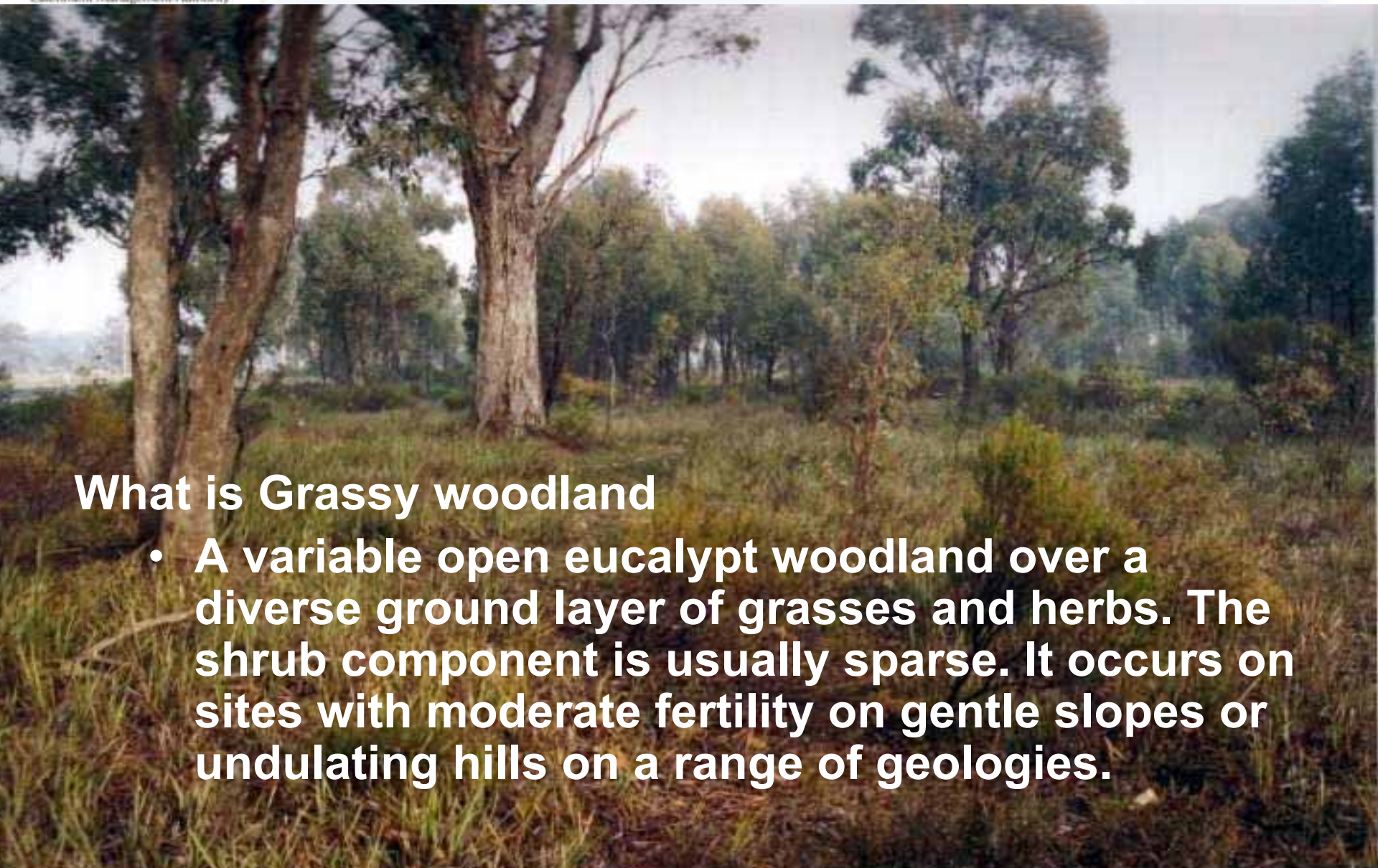
- Droughts more frequent and longer and more intense
- Dry conditions occur in 1 in 3 years instead of 1 in 4 years



Water resources and Fire

- Increase in evaporation rates
- Decrease average run-off in streams
- Hotter, drier conditions likely to increase bushfire risk

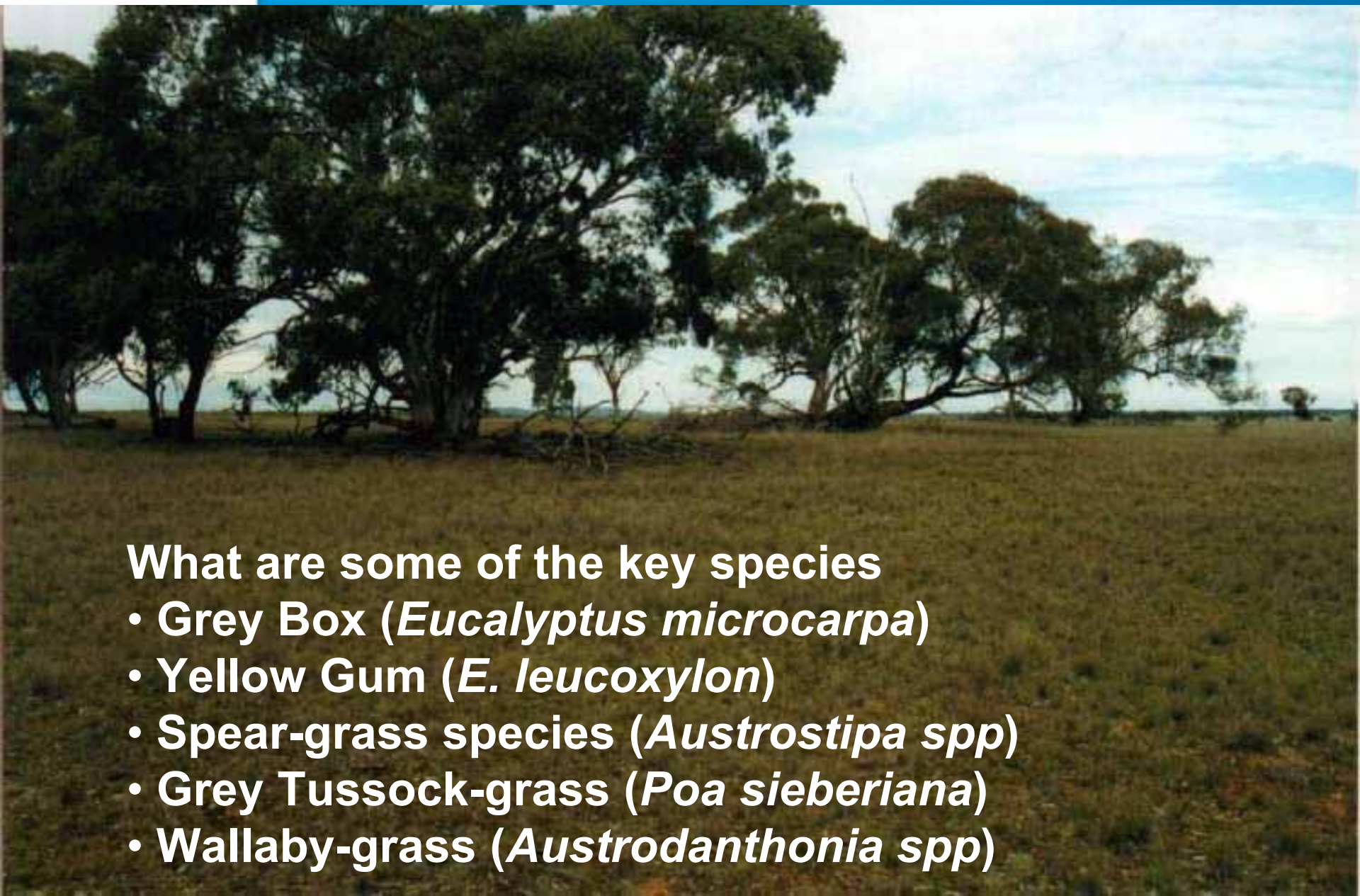
Threatened Vegetation type – Grassy Woodland complex



What is Grassy woodland

- A variable open eucalypt woodland over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies.

Threatened Vegetation type – Grassy Woodland complex



What are some of the key species

- Grey Box (*Eucalyptus microcarpa*)
- Yellow Gum (*E. leucoxylon*)
- Spear-grass species (*Austrostipa spp*)
- Grey Tussock-grass (*Poa sieberiana*)
- Wallaby-grass (*Austrodanthonia spp*)

Threatened Vegetation type – Grassy Woodland complex

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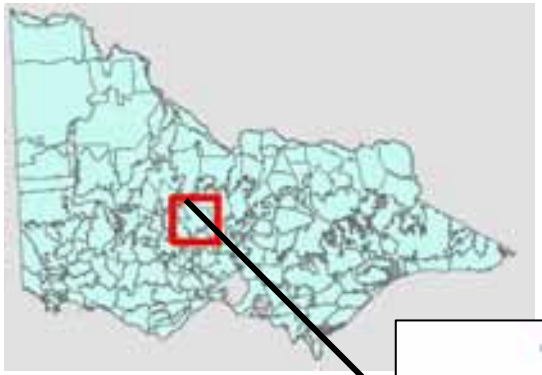
Provides habitat for:

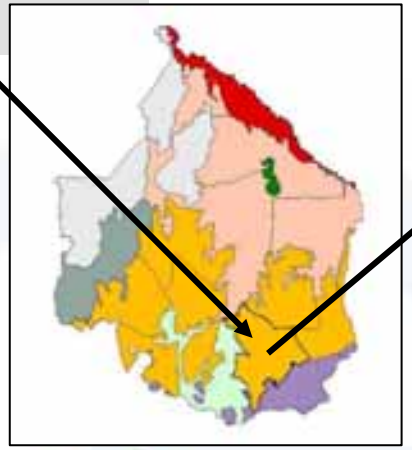
- Swift Parrot
- Barking Owl
- Brush-tailed Phascogale
- Striped Legless Lizard

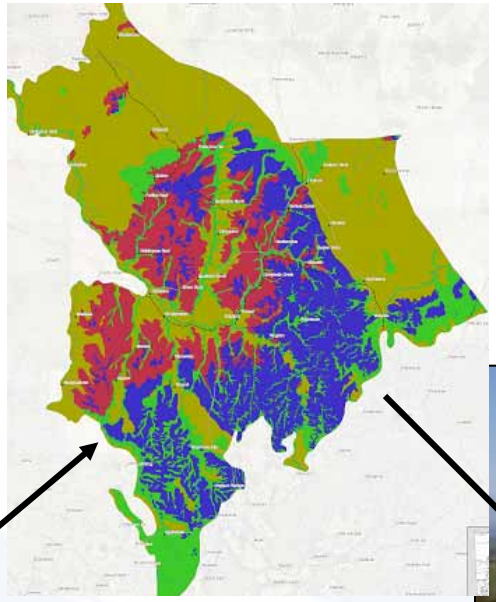
Phascogale (Parks Victoria)

A landscape in North Central CMA – Muckleford Landscape Zone

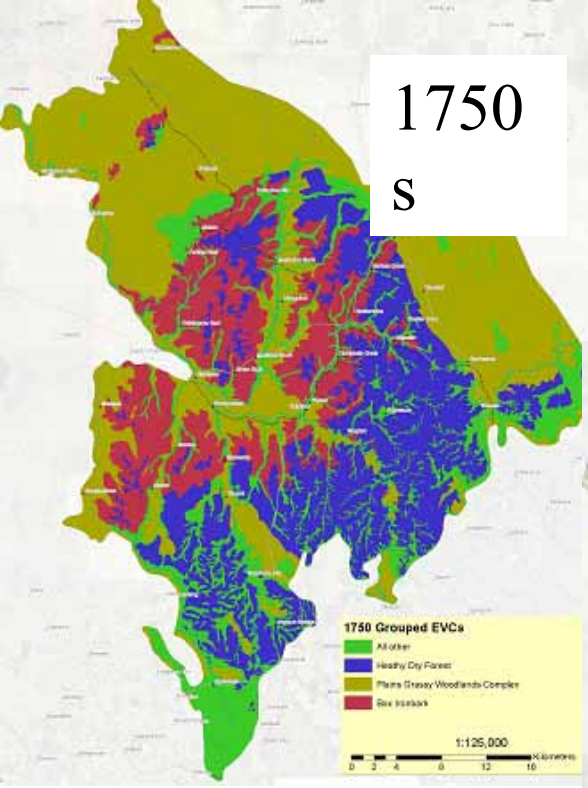
- A relatively well vegetated landscape with potential for improving biodiversity values through retention and improvement of native vegetation.

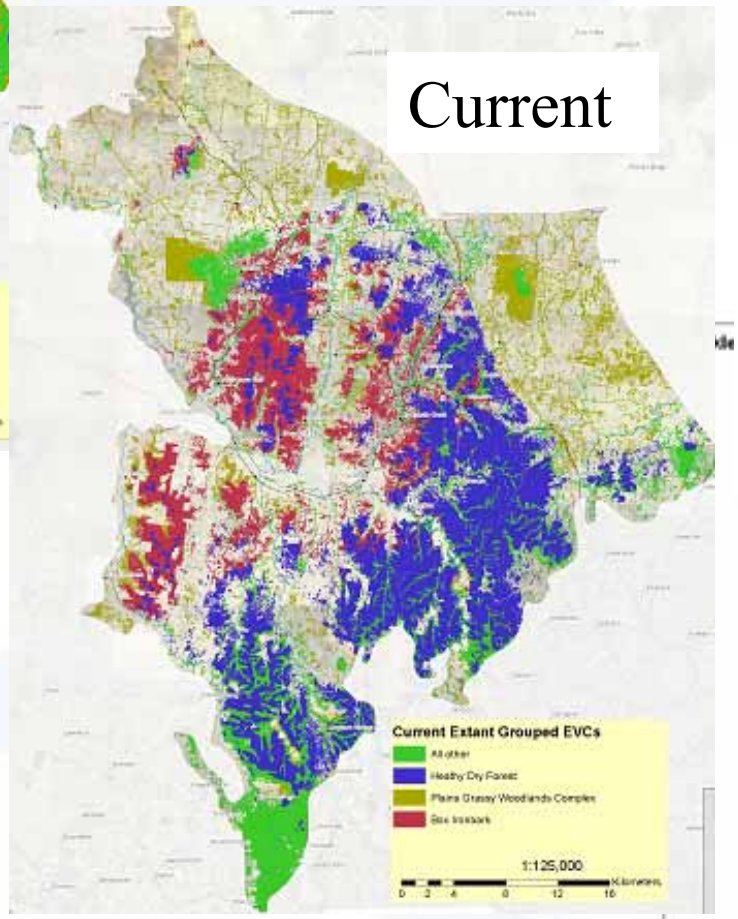




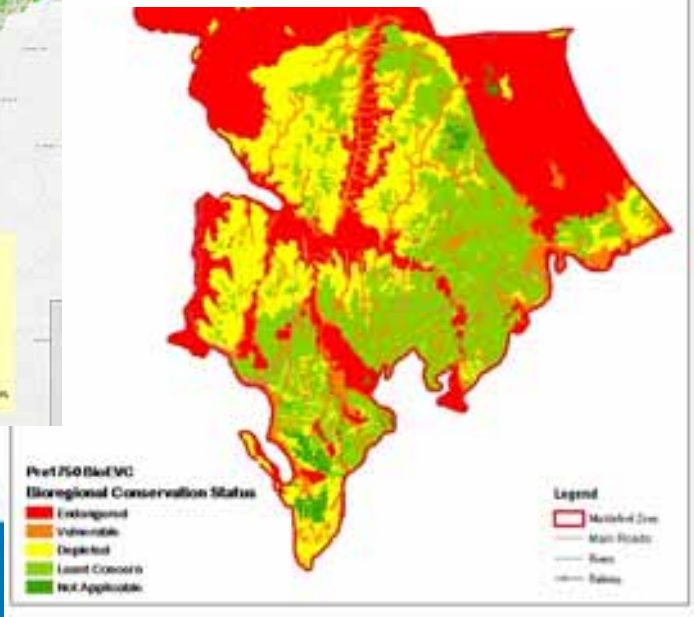


Muckleford Landscape Zone





Bioregional Conservation Status

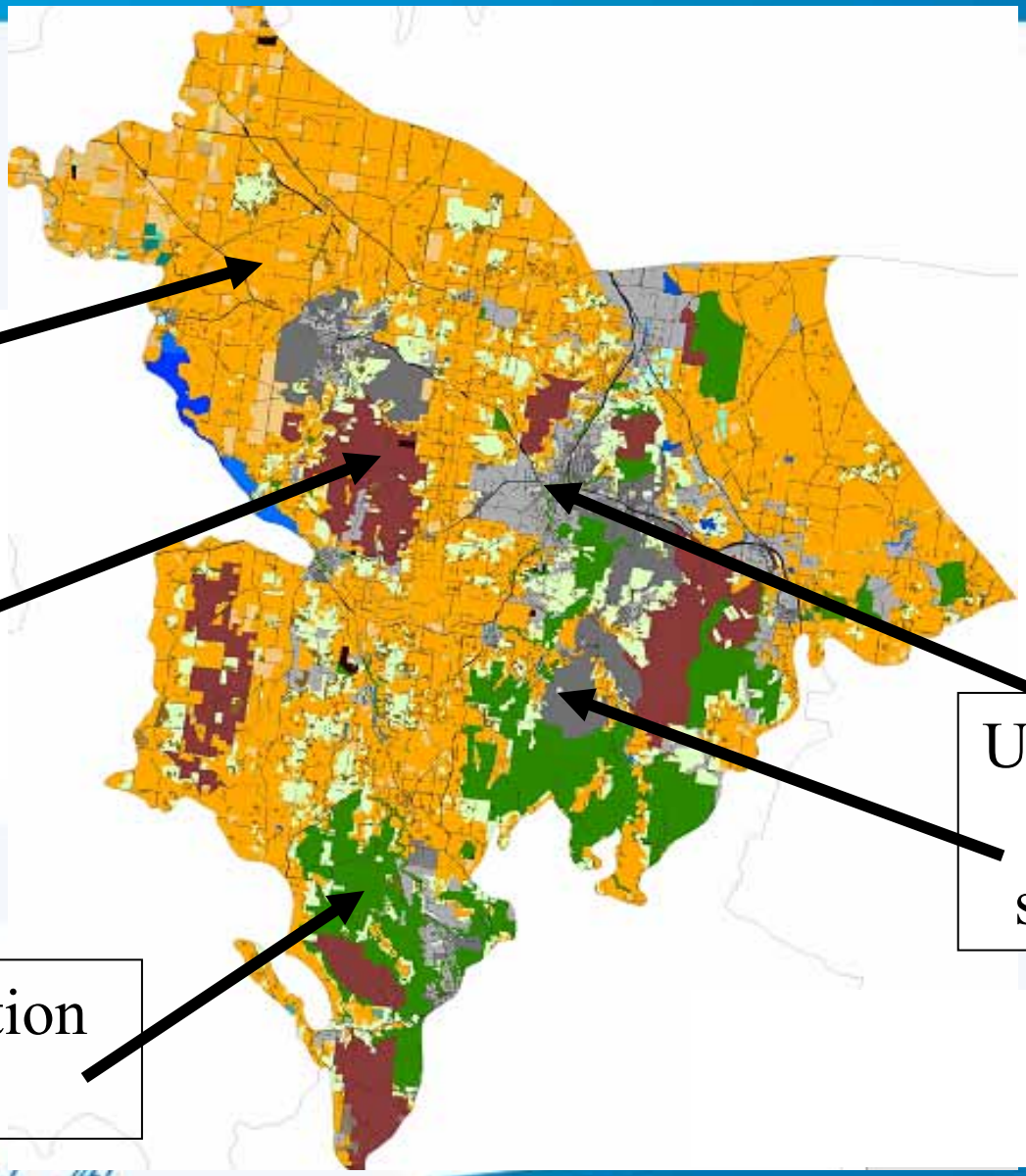


Only 8% of the original Grassy Woodland complex is left in the landscape

Muckleford Landscape Zone

- 76% of the zone area is privately owned
- 31% of remaining native vegetation is on private land
- Most of the remaining grassy woodland complex is on private land

Muckleford Landscape Zone



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Resilience

- ‘The capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same function, structure, identity, and feedback mechanisms."

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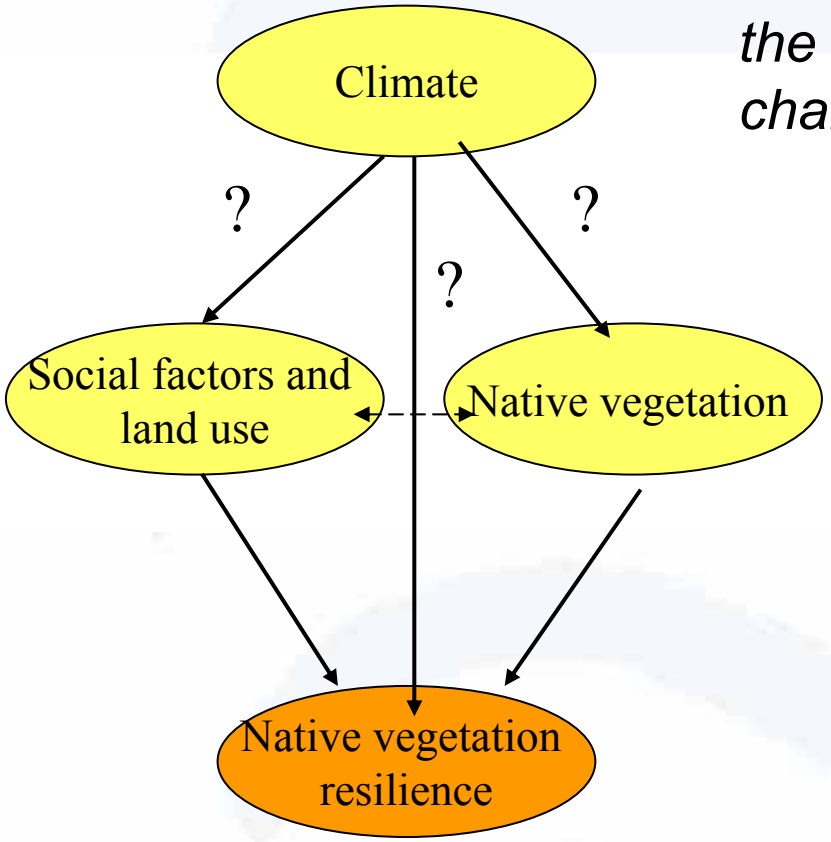
Bayesian model approach – influence diagram

How resilient are the grassy woodlands in the Muckleford zone to 2030 climate change scenario?



Examples of some variables

Climate change	**Native Veg**	**Social factors and land use**
Temperature	Past distribution	Current land use
Rainfall	Topography or terrain	Land holder type
Evaporation	Geology	Proportion of remnant veg
Extreme events -floods &	Fragmentation	Landcare involveme

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Bayesian model approach – session steps

- Form into 4 groups – each group to a white board
- Starting with 4 main themes – discuss what these key themes should encompass and identify another 10 or so key influencing variables (e.g. Drivers, Actions, Threats or Values) (see table of some variable examples)
- Link key variables to any of the 4 themes. Discuss causes and link the variables.
- If time allows, consider what the definitions and assumptions behind these variables, and how to categorize and measure them.
- Groups present their frameworks and explain rationale

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Bayesian model approach – influence diagram

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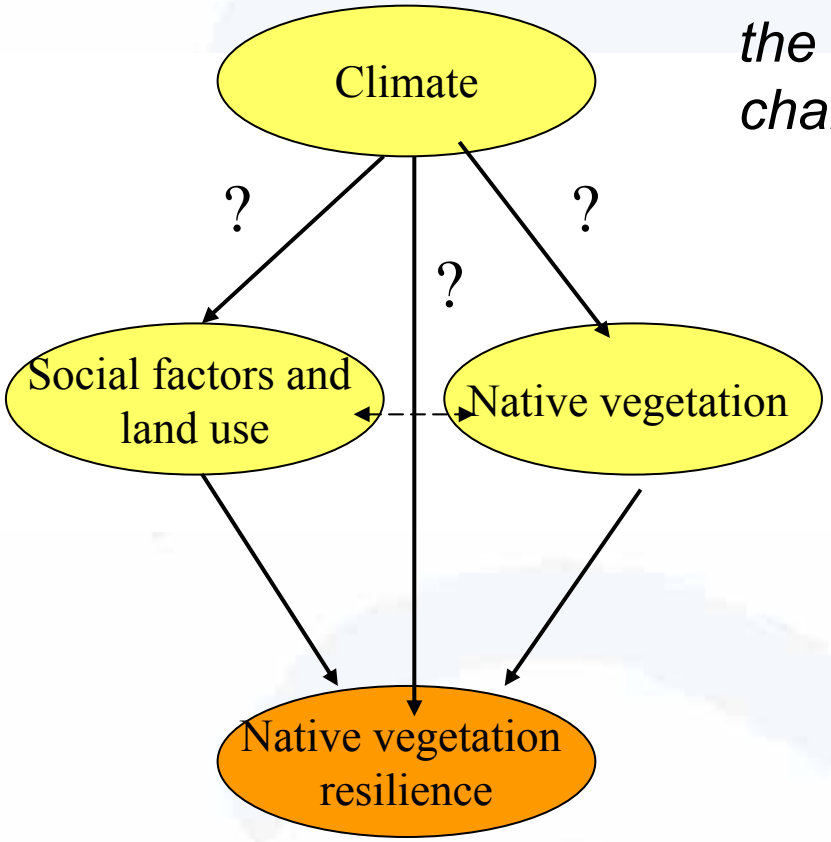

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