



Prescribed burning Australia's forests: the facts

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Forestry Australia 2024 Fire Summit

Prescribed burning

The introduction of fire to a defined area, under specific environmental conditions, to achieve a desired outcome.

Fire at a time and place of our choosing.

Fuel reduction is a common desired outcome.



PRESCRIBED BURNING

**STRATEGIC
PLANNING**

**PROGRAM
PLANNING**

**OPERATIONAL
PLANNING**

**BURN
IMPLEMENTATION**





Prescribed burning: Strategic overview

- **Primacy of life**
- **Integral to land management**
- **Land manager's responsibility**
- **Legal, policy and moral obligations**
- Underpinned by science
- Risk-based
- Adaptive –plan, do, check
- Resources
- Partnerships
- Political and community support



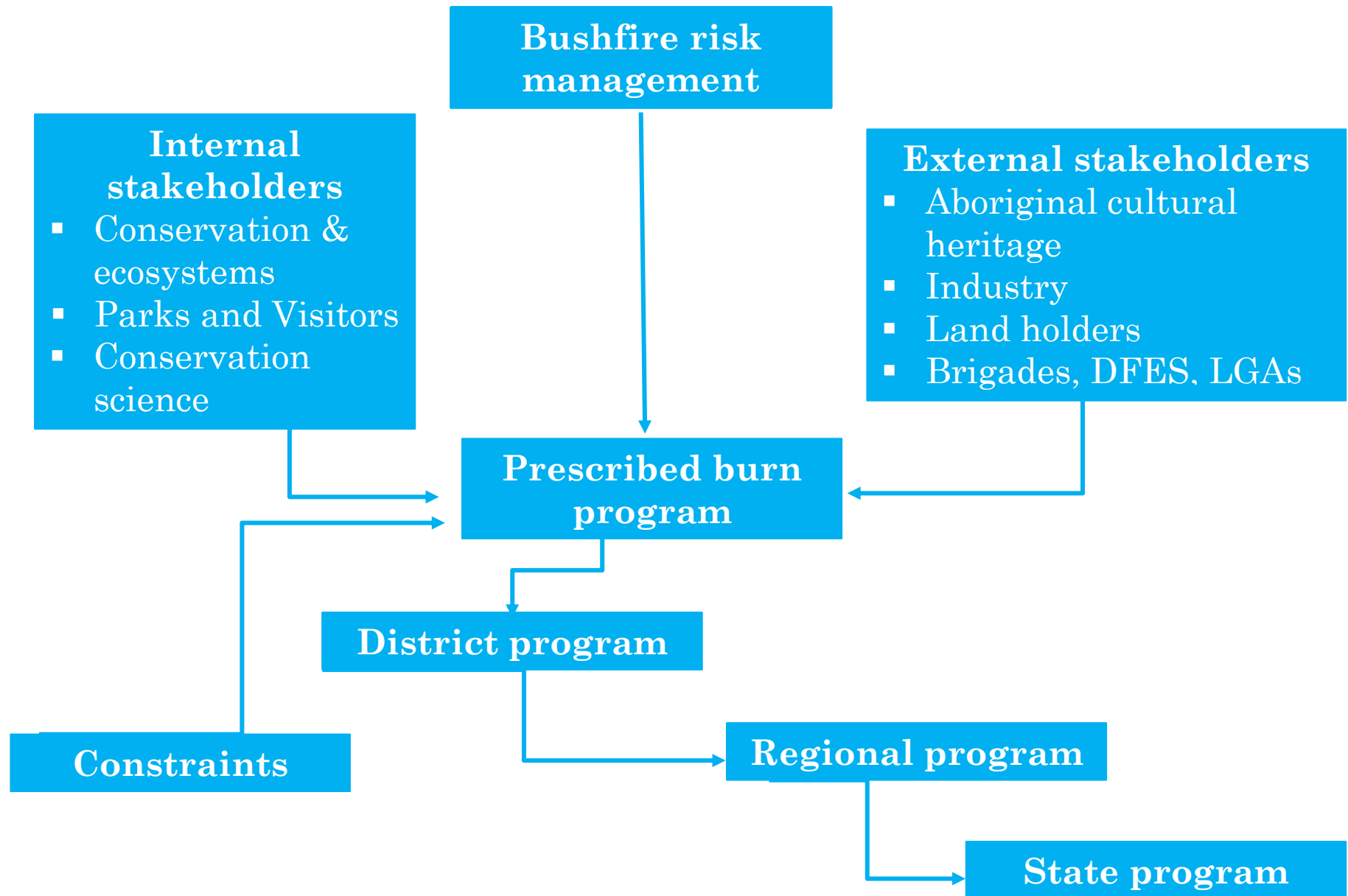
Prescribed burning for fuel reduction

To reduce the intensity of bushfires and the size of bushfires

- Proxies for losses, damages and costs
- Firefighter safety
- Fire intensity a key factor in risk-based frameworks

Reluctant to use measures such as loss of life and house loss as KPIs

- Other factors outside the jurisdiction of public land managers
 - Where and how people live
 - Community preparedness, response
 - Fuel on private property and other land





Prescribed burn implementation - overview

- Burn boundary track prep.
- Burn security – edging, raking etc.
- Signage, notifications, smoke alerts
- Monitor weather
- Assemble resources
- Briefings and safety checks
- Introduce fire
- Monitor fire behaviour
- Mop up and patrol
- Post-burn assessment



50H
0428105_{mE}
6273113_{mN}

DIRECTION
South

33° 40.768' S
116° 13.464' E
ACCURACY 4m

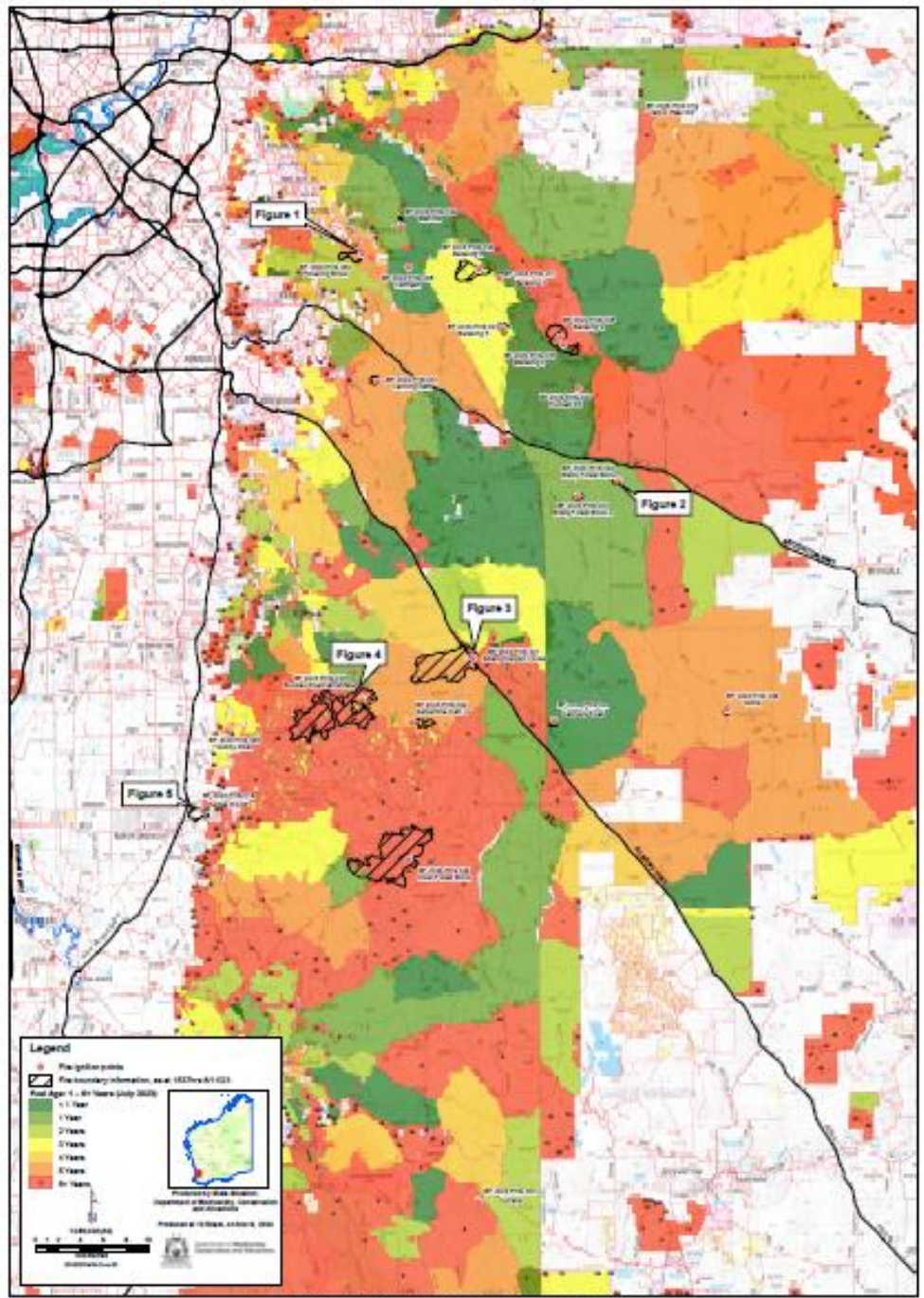
Manjimup Spotter
ID: -876643074

Blackwood Detection Circuit

16 May 2024
13:24:11 (AWST)



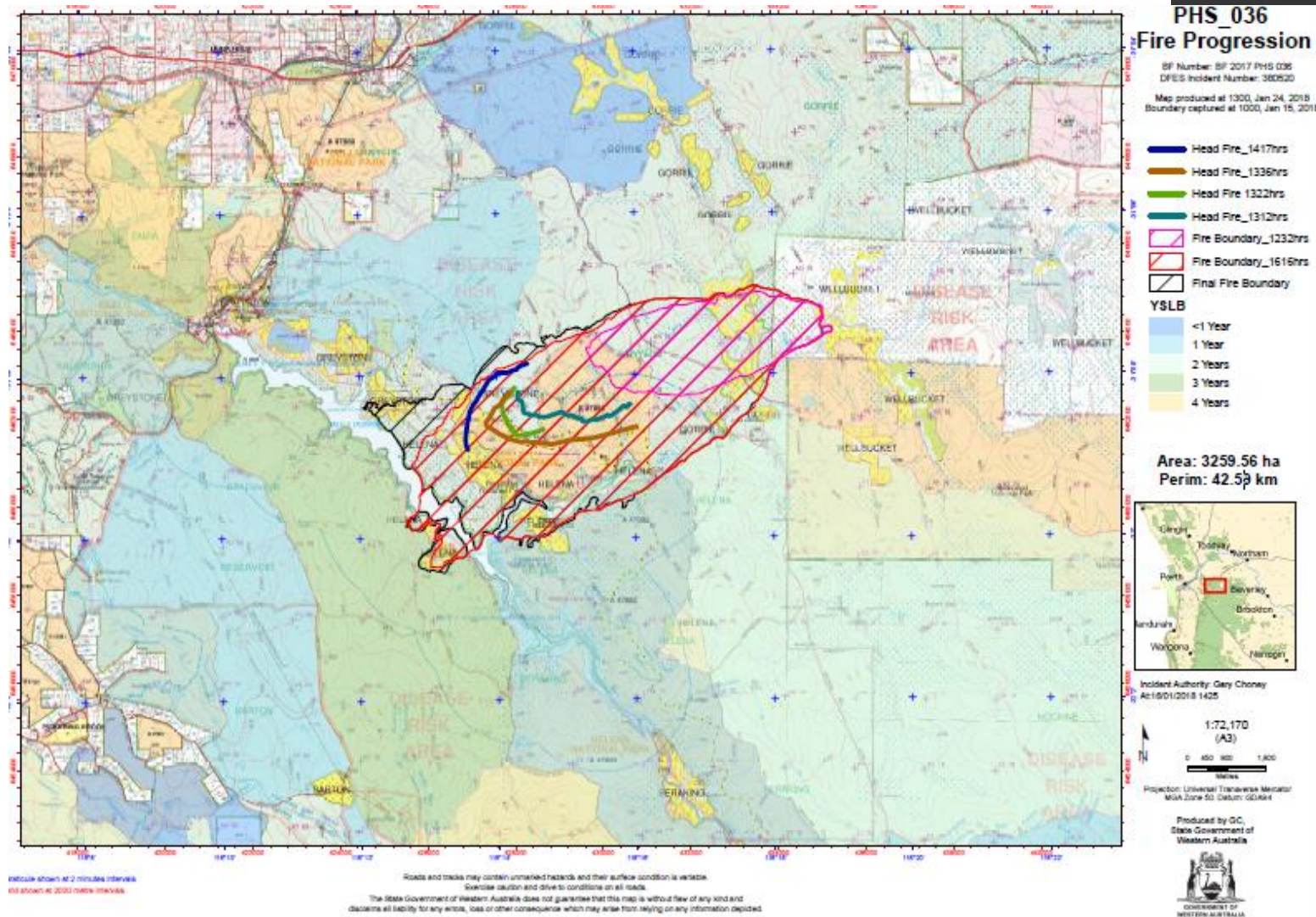
Perth Hills Fire Complex



Prescribed burning assists firefighters

Reduces fire intensity, speed, flame size and spotting

- Safer environment for firefighters
- Options for suppression strategies
- Anchor points and 'tie-in' opportunities
- 'Buys' time
- Prioritise fire complexes
- Enhances effectiveness of aerial suppression, fuel reduced buffers etc.



Controversial

Claims about prescribed burning:

- 100+ years ago
 - Poor soils - Aboriginal burning
 - Damages timber values
 - Prevention and suppression
- 50 years ago
 - Causes extinctions
 - Prevention and suppression
- Today
 - Causes extinctions
 - Creates a fire hazard
 - It doesn't 'work'
 - Forests can "look after themselves".
 - Prevention and suppression



These claims don't accord with the facts

Prescribed burning is the cornerstone of an integrated bushfire mitigation system.



Fact

Fire is a natural environmental factor

- Climate, vegetation, ignition, fire
- Pre-human occupation - lightning
- Aboriginal people used fire
 - *“This continent of smoke”*. Capt. James Cook (1770)
- Evolution of physical and behavioural adaptations
- No extinctions due to prescribed burning
- Large, high intensity fires threaten biodiversity





Fact

European settlement disrupted traditional Noongar burning practices

- Noongar burning vs prescribed burning. Similarities and differences
- Early foresters adopted fire exclusion policy
- Fuels accumulated resulting in severe bushfires 1932-1961 – the ‘big bushfire era’.
- 1961 bushfires Royal Commission – expand the prescribed burning program

Fact

Post-colonial fire exclusion policy failed.

“When fire control was wrested from the Aborigines and placed in the hands of Europeans, disaster resulted” (Flannery 2002).

A new policy emerged: Integrated system – prescribed burning the cornerstone.

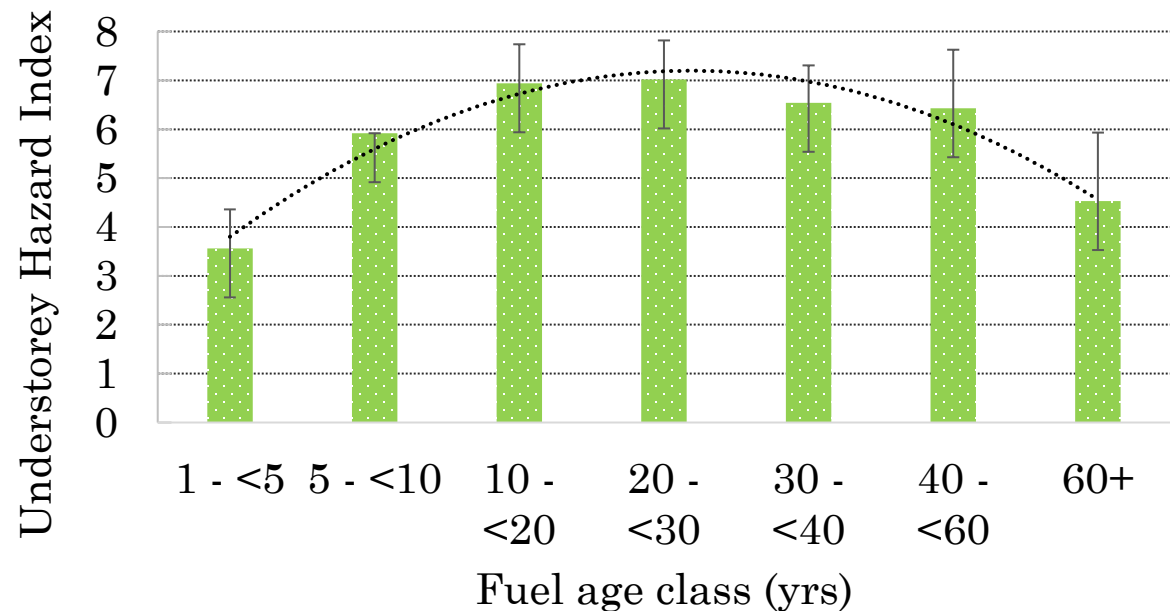
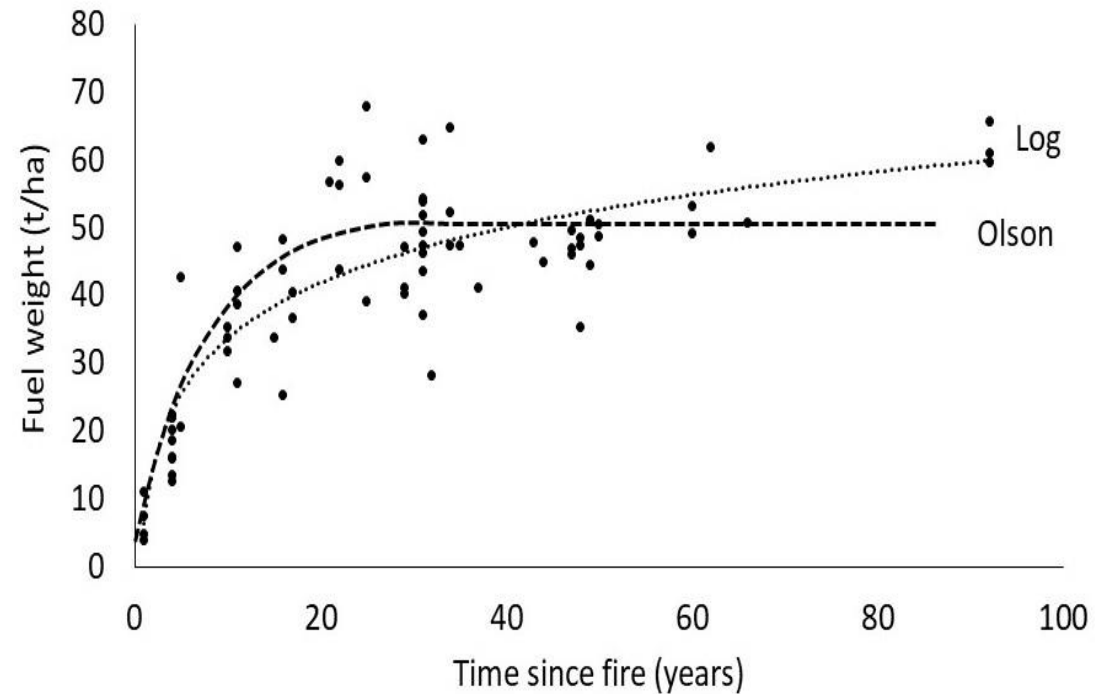
- High priority
- Expansion of bushfire science - fire behaviour and prescribed burning guides, fire ecology, aerial ignition.
- Expansion of capacity – equipment, people, training, etc.
- New systems and structures
- Aerial detection (spotters)



Fact

Dead fine fuel (DFF) is the driver of bushfire

- Mostly in surface and near surface fuel layers
- Fuel load increases with time, then plateaus
- DFF is ~90% of total fuel load
- Understorey 'hazard' increases with time then declines
- Understorey contributes <10% to fuel load
- Fire cannot sustain spread without DFF





Fuel loads and understorey hazard indices in karri forests for a A) prescribed burn program that aims to maintain 45% of the region with 6<yo fuels, and B) fire exclusion.

Fuel	A: 12yr rotation (8% PB per annum)	B: Fire exclusion 60+ yo fuels
Load t/ha	45% of region <18 55% of region 18-35	100% of region 50
Underst. Hazard	45% of region <3.5 55% of region 3.5- 6.5	100% of region 4.5

Fuel load and fire behaviour

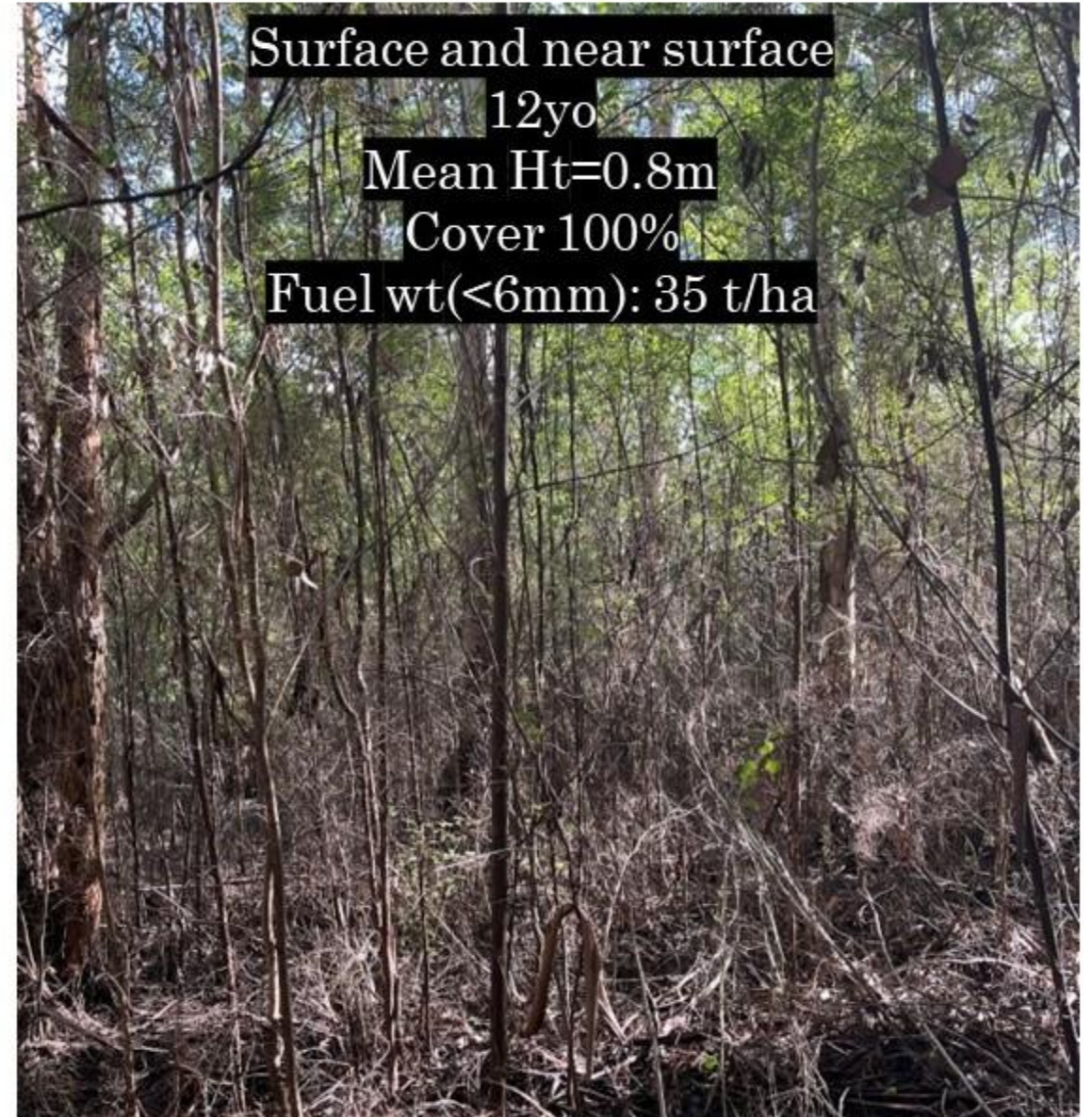
ROS

- McArthur (1972) & WA Red Book – direct relationship
- Burrows (1994) – no relationship
- Vesta 1 (Cheney et al. 2012) - weak relationship
- Vesta 2 (Cruz et al. 2022) – diminishes with increasing FDR

Intensity, flame size, spotting

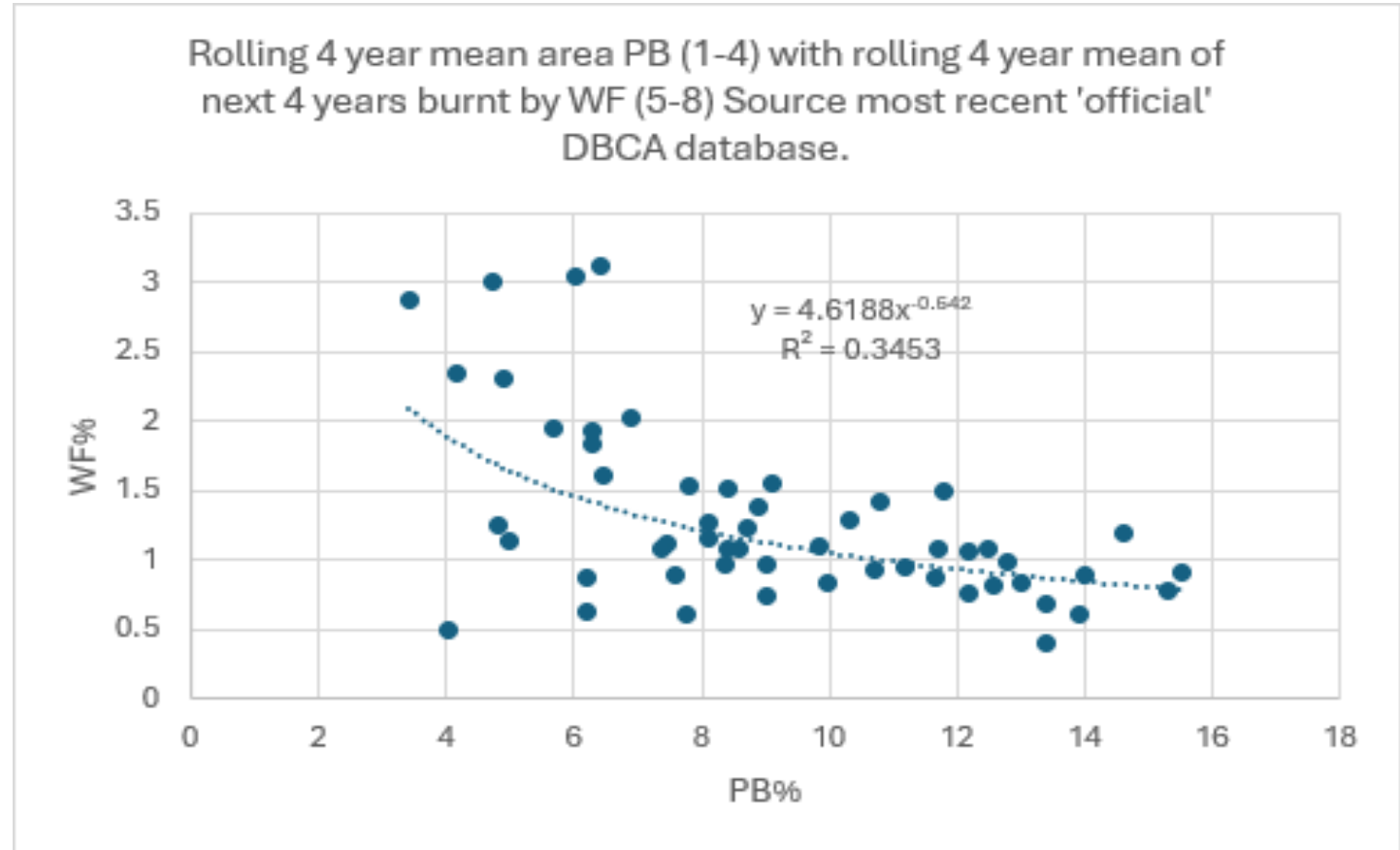
- $I = HWR$ (Byram 1959)
- Direct relationship with flame depth, length.
- Heavy fuels promote high intensity fires, facilitating long range spotting and PyroCb events





Fact

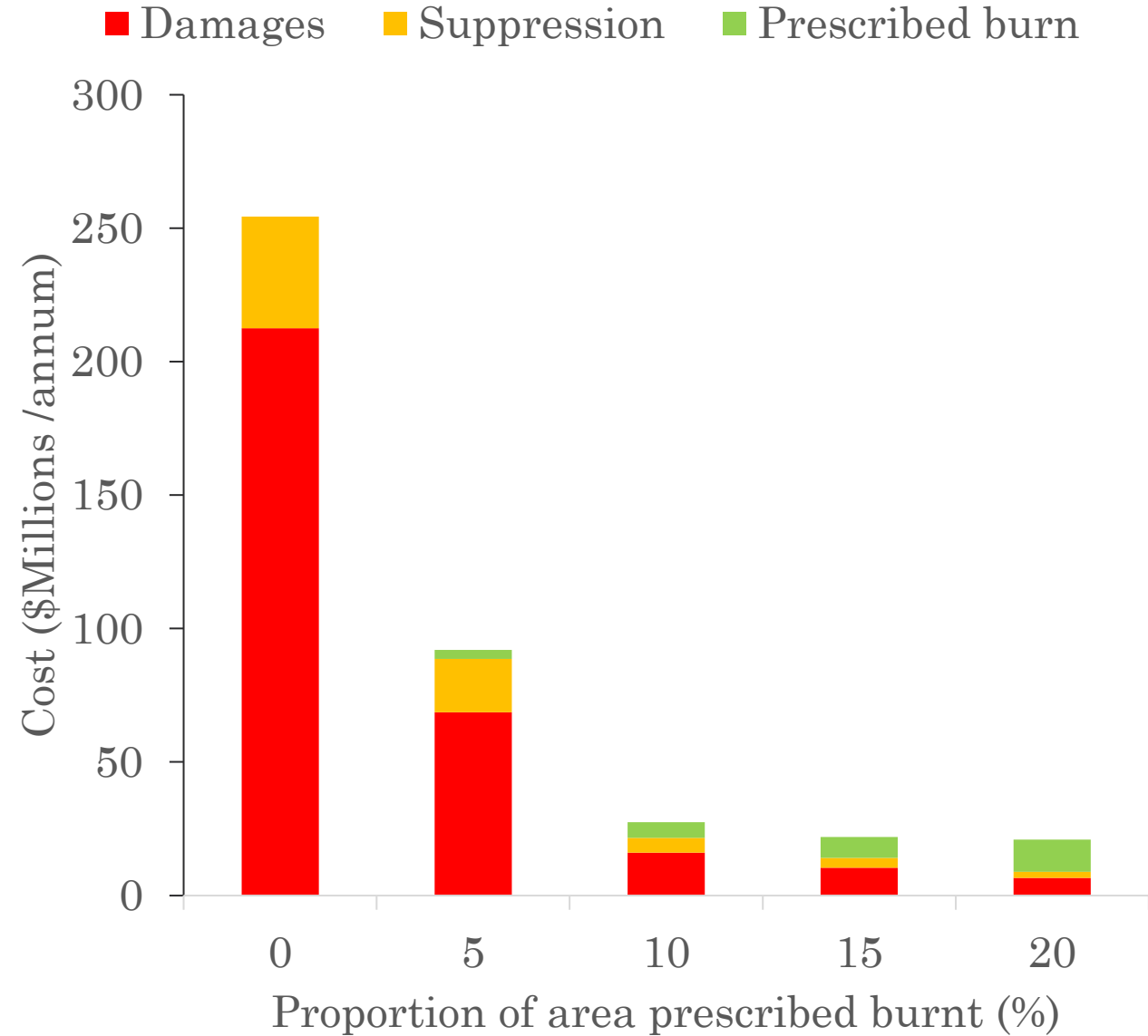
- Inverse relationship
- Left side of graph is 'messy' as interactions between area burnt by wildfire
- ~45% of the region carrying <6yo fuels aids firefighters



Fact

Significant benefits of PB including reducing:

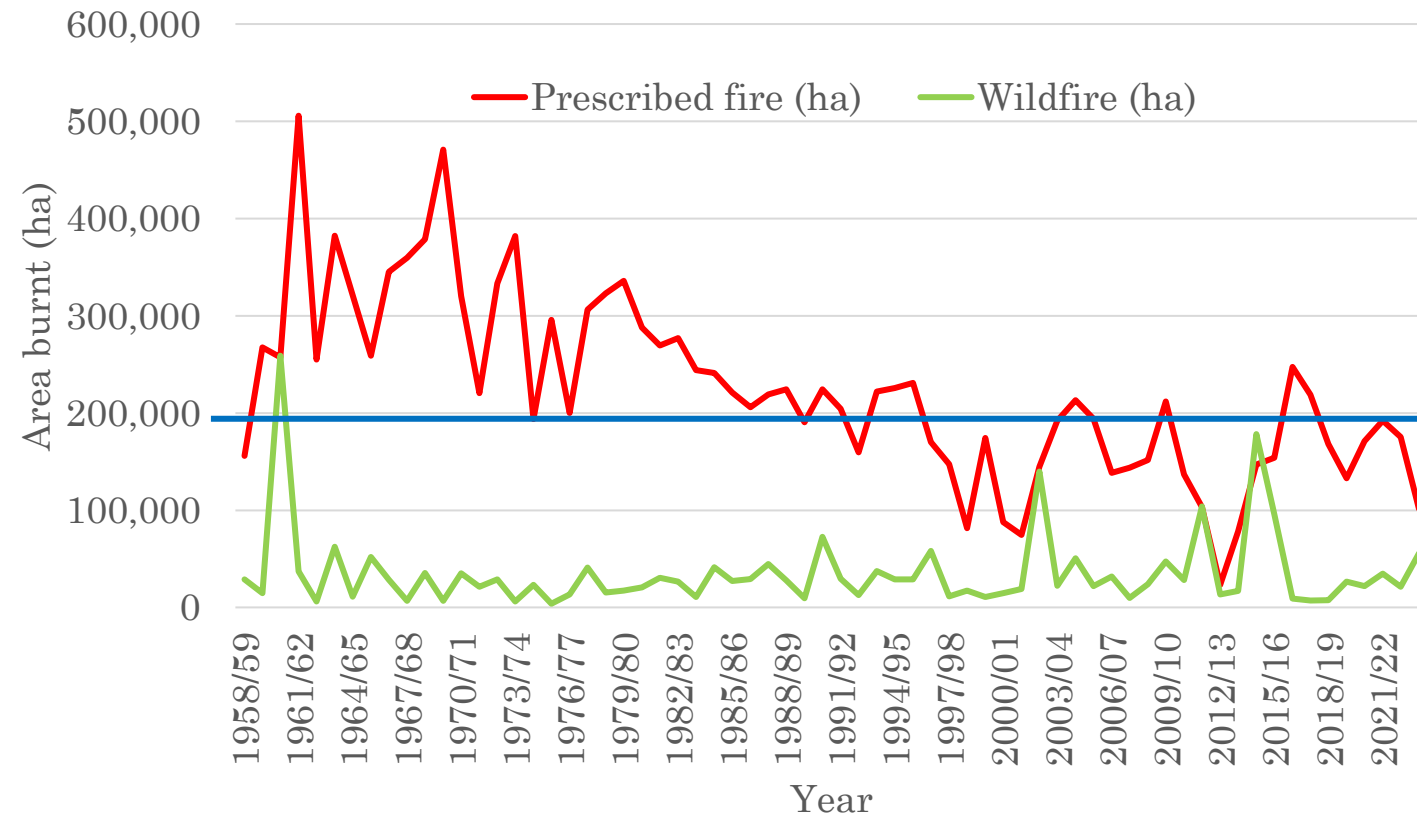
- Loss of human life and trauma
- Homes destroyed
- Communities dislocated
- Infrastructure and industries damaged
- Mortality and injury to wildlife
- Harm to environmental and conservation values
- Damage and suppression costs
- Firefighter experience and training
- Forest health benefits



After Florec et al. (2016)



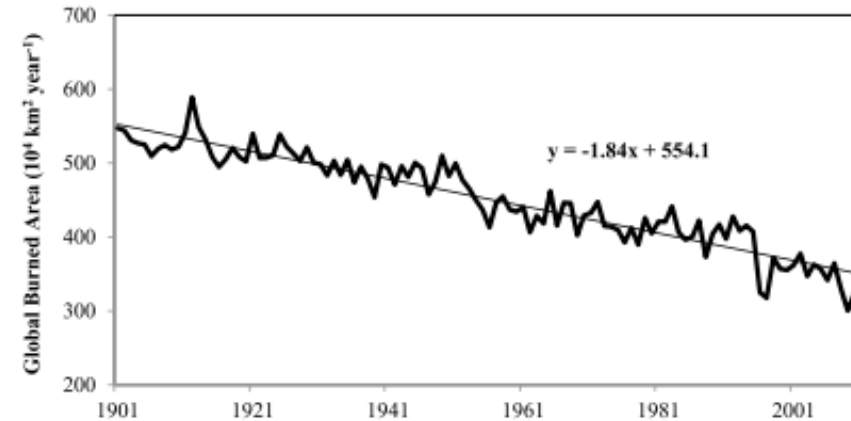
Annual trend in area burnt by prescribed fire and wildfire in forests and associated ecosystems in sw WA. Blue line is 8% annual target





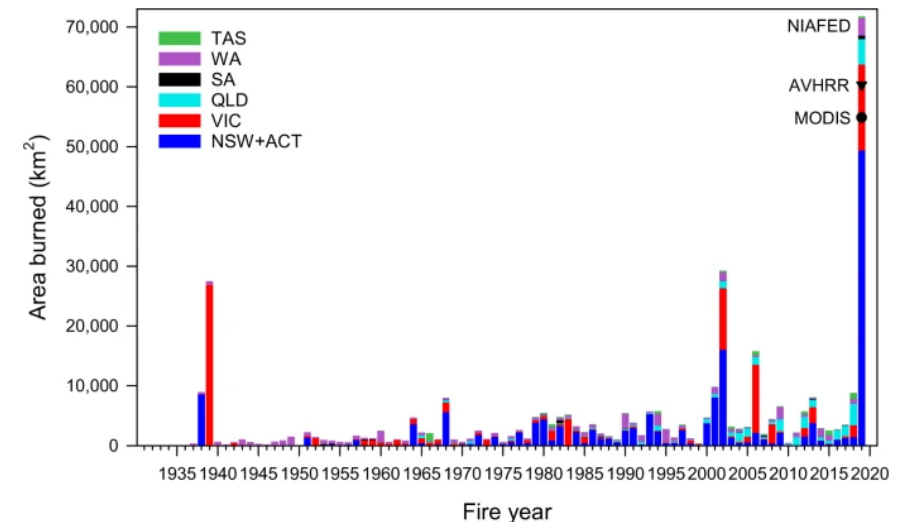
Prescribed burning & climate change

- Globally, downward trend in area of bushfire
- Australian forests: upward trend in area of bushfire
- Drivers
 - **climate change and associated extreme weather events**
 - **fuel management**
- Will the climate 'change back'? When?
- Multi-scale fuel management is more critical now than ever



Yang et al. 2014

Fig. 3: Wildfire burned area by states and territory in forest ecosystems for the 1930 to 2019 fire years.



Canadell et al. 2021



Acknowledgments

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