



bushfire&natural
HAZARDSCRC

THINK LONG TERM

The costs and benefits of prescribed burning
in the south-west of Western Australia

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Australian Government
Department of Industry,
Innovation and Science

Business
Cooperative Research
Centres Programme



THE UNIVERSITY OF
WESTERN
AUSTRALIA

Or how on Earth did I get to do a PhD on the economics of prescribed burning?

BACKGROUND

MYSELF



MYSELF



MYSELF

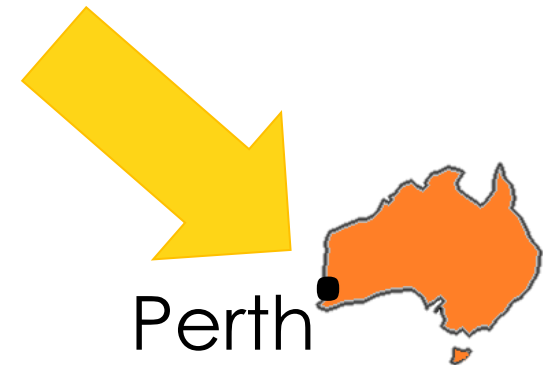


MYSELF

I'm an economist

Bushfire CRC

Economics applied to bushfire management
(focus: prescribed burning)



FINDINGS AND IMPLICATIONS

(3 things)

- Substantial benefits long-term prescribed burning program
 - Short-term analysis provides unreliable information
- Residual risk
- Best value for money
 - Need more information



THE PROBLEM

- Large, intense wildfires
- Significant social, economic and environmental impacts
- Suppression expenditures increasing



THE PROBLEM

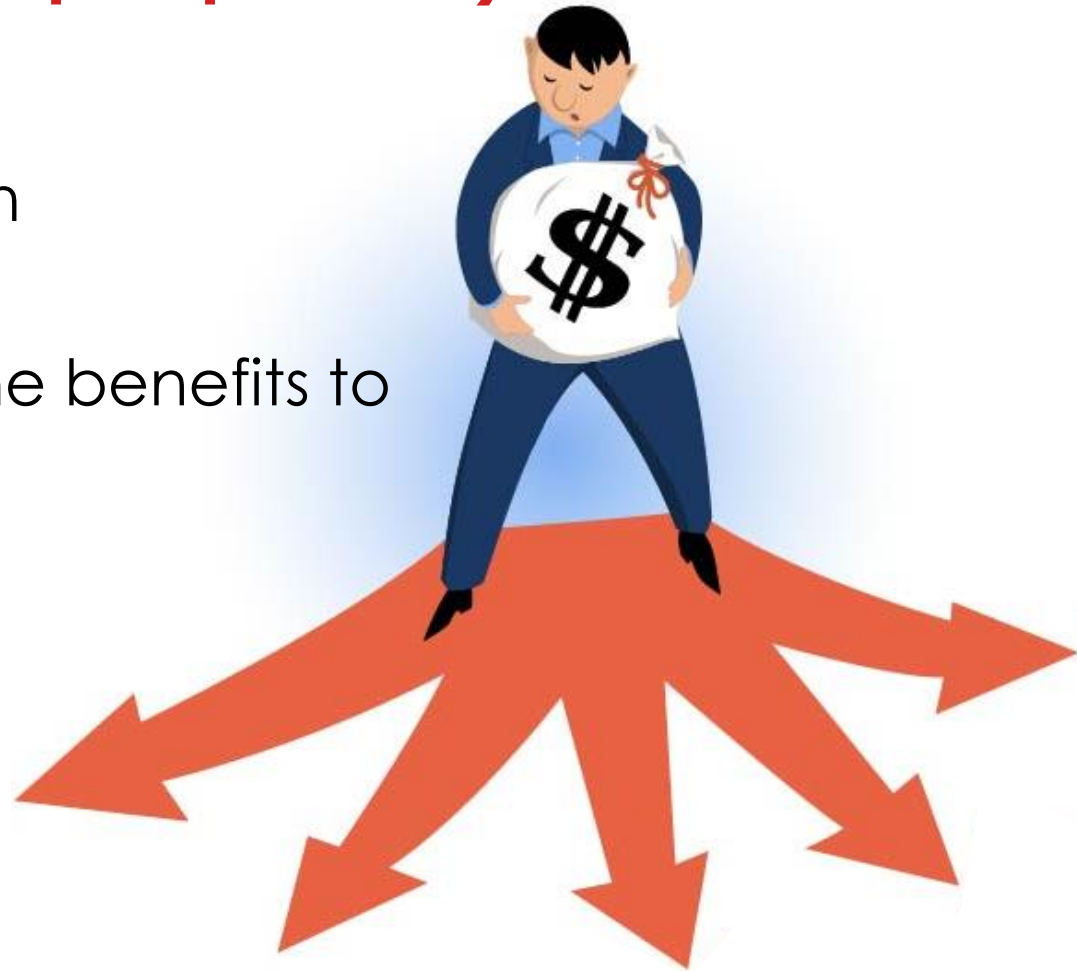
- Debate on prescribed burning
- What level of investment?
- Economic analysis still rare



THE PROBLEM

(from an economic perspective)

- Resource allocation
- How to maximise the benefits to society?
- Highest returns



WHAT'S OUT THERE ALREADY

➤ Prescribed burning

- Estimating costs of PB (US)
- What influences these costs (US)
- Estimating the benefits of PB (US)

➤ Suppression

- Estimating costs of suppression (US)
- What influences these costs (US)

➤ Damages

- Total damages of individual fire events (US, Canada, Australia)
- Impact of bushfires on intangible things (US, Canada)

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➤ Damages

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?

RESEARCH QUESTIONS

- What level of prescribed burning minimises the sum of management costs and damages?

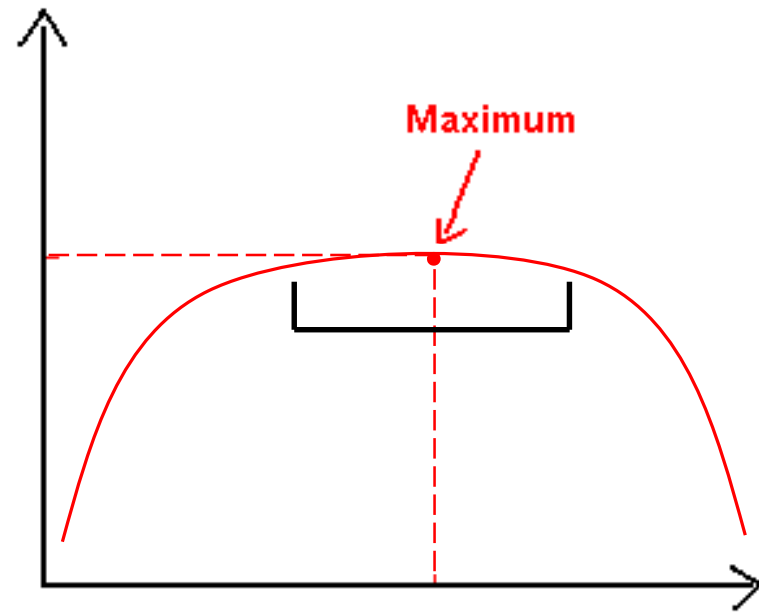
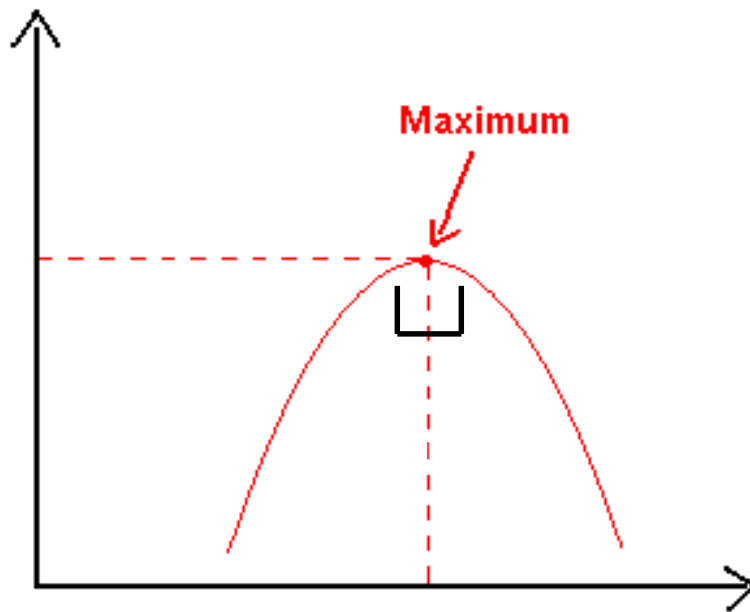


Minimise

Prescribed burning costs **+** Suppression costs **+** Damages

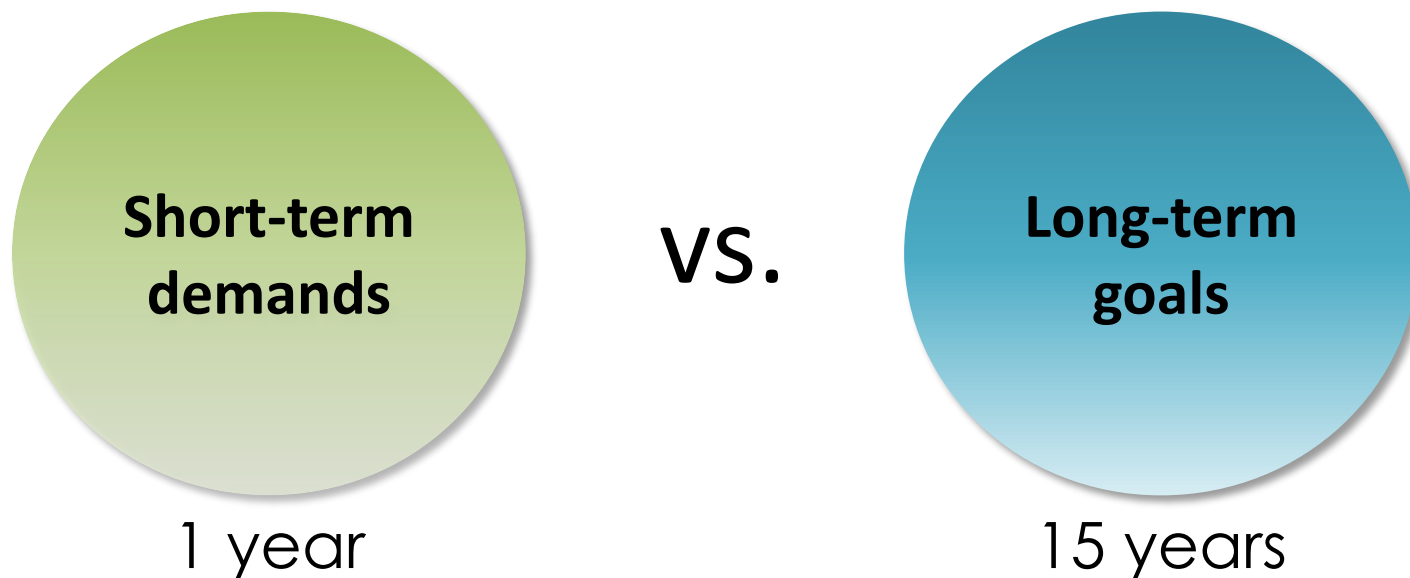
RESEARCH QUESTIONS

- Is the optimal level clear-cut, or is there a range of levels that are close to the optimal point?



RESEARCH QUESTIONS

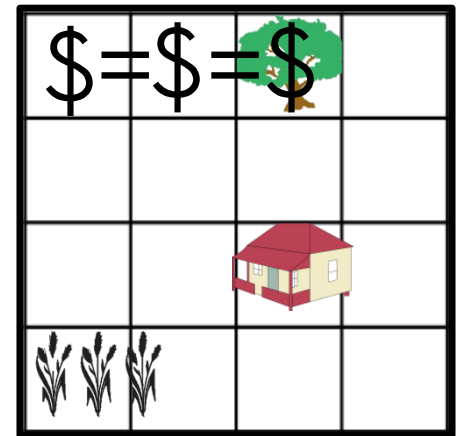
- What difference does it make to plan for the short-term or for the long-term?



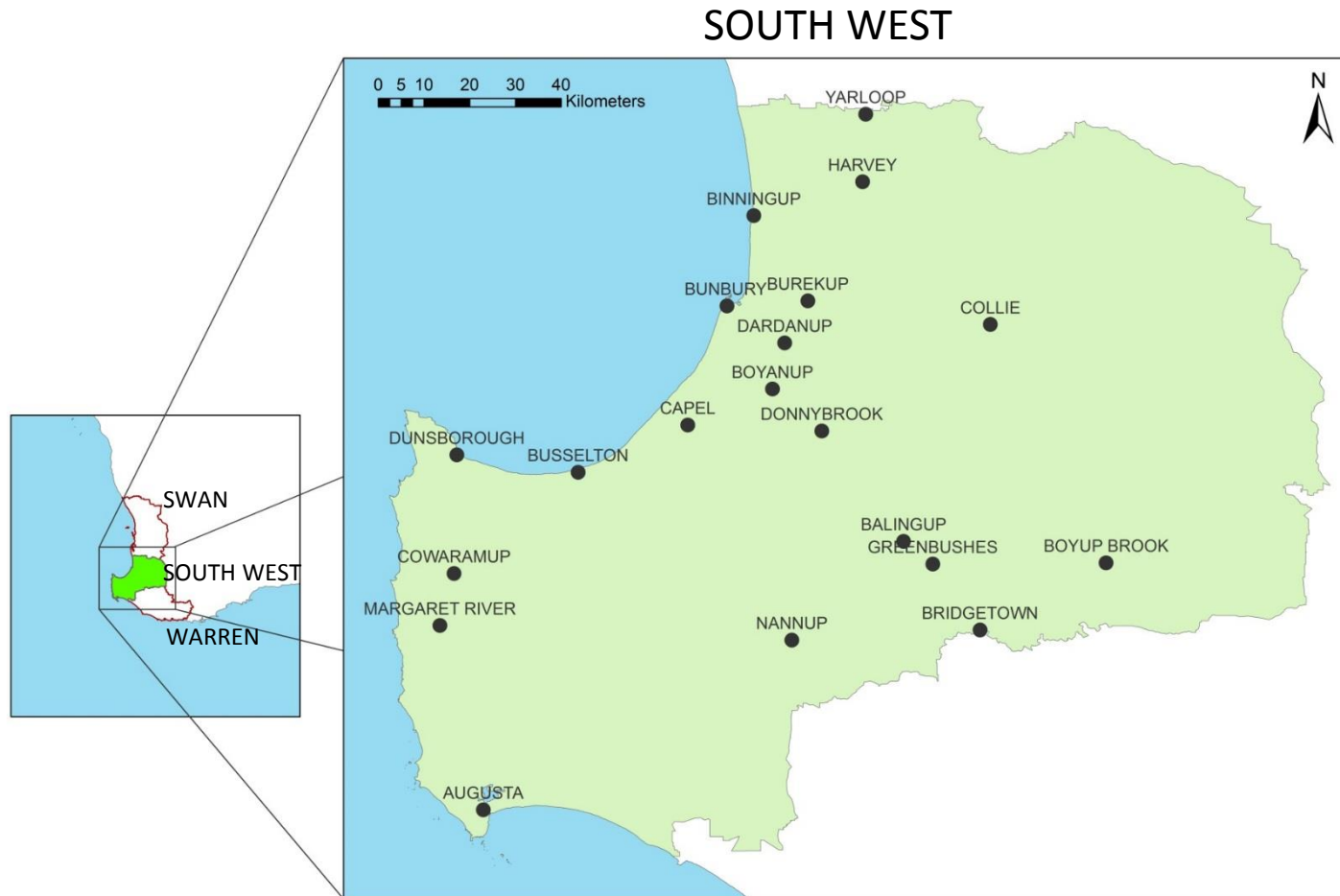
WHAT I DID

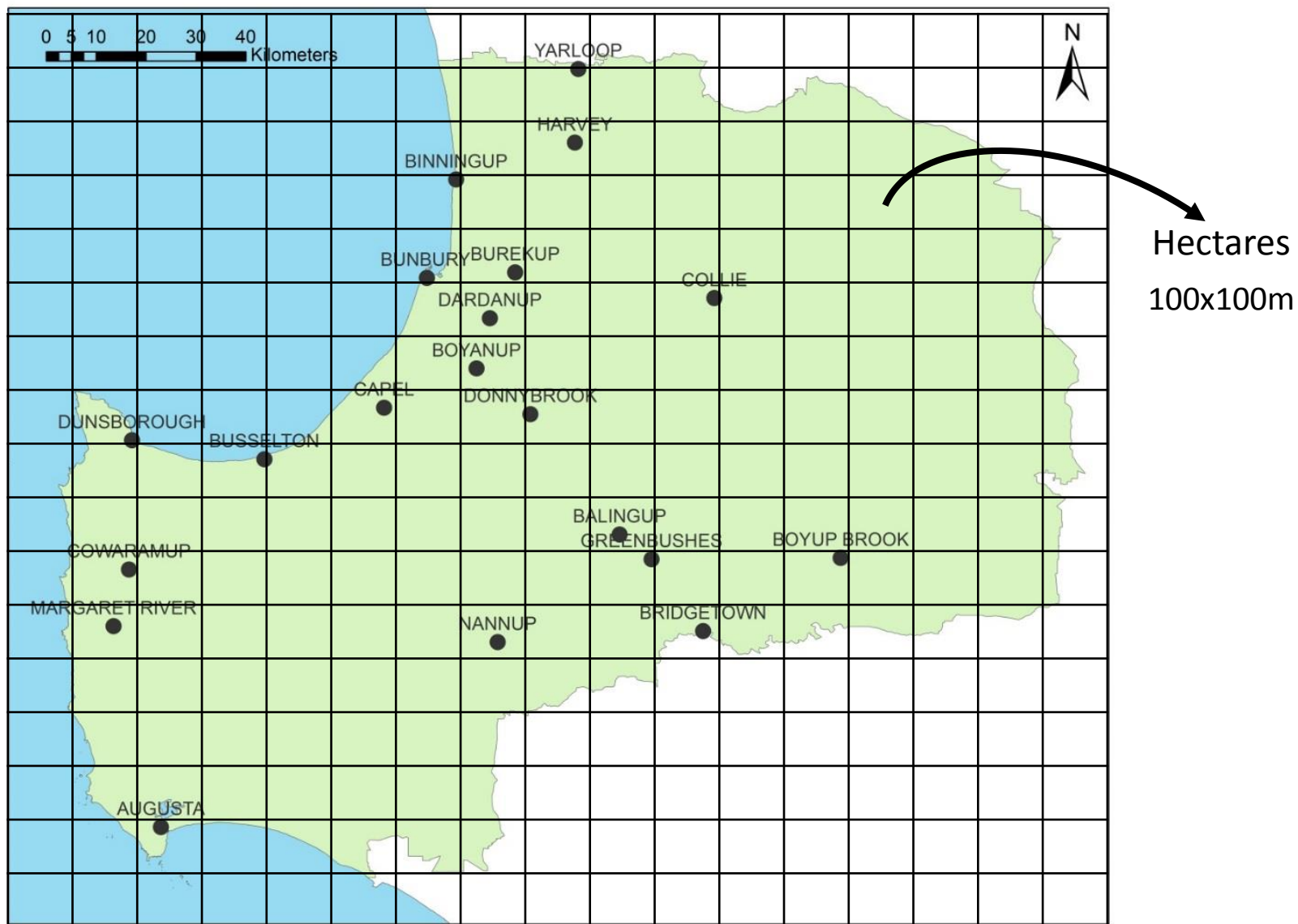
METHODS

- Modified an existing economic model
 - Different values for different assets in the landscape
 - Varying prescribed burning costs/ha
- AUSTRALIS bushfire simulator
- Geographic Information Systems (GIS)



CASE STUDY AREA

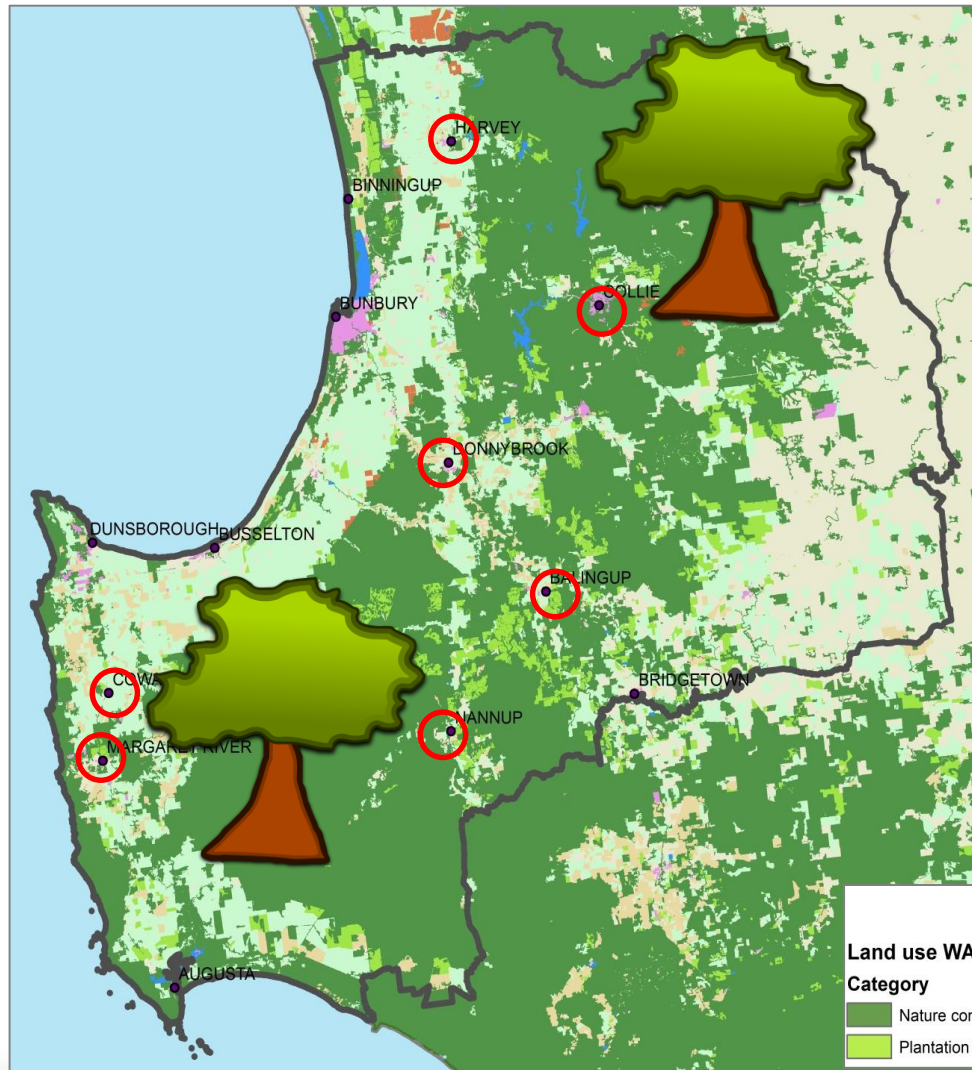




LAND USE

People
Human assets

Forests =
Flammable
vegetation

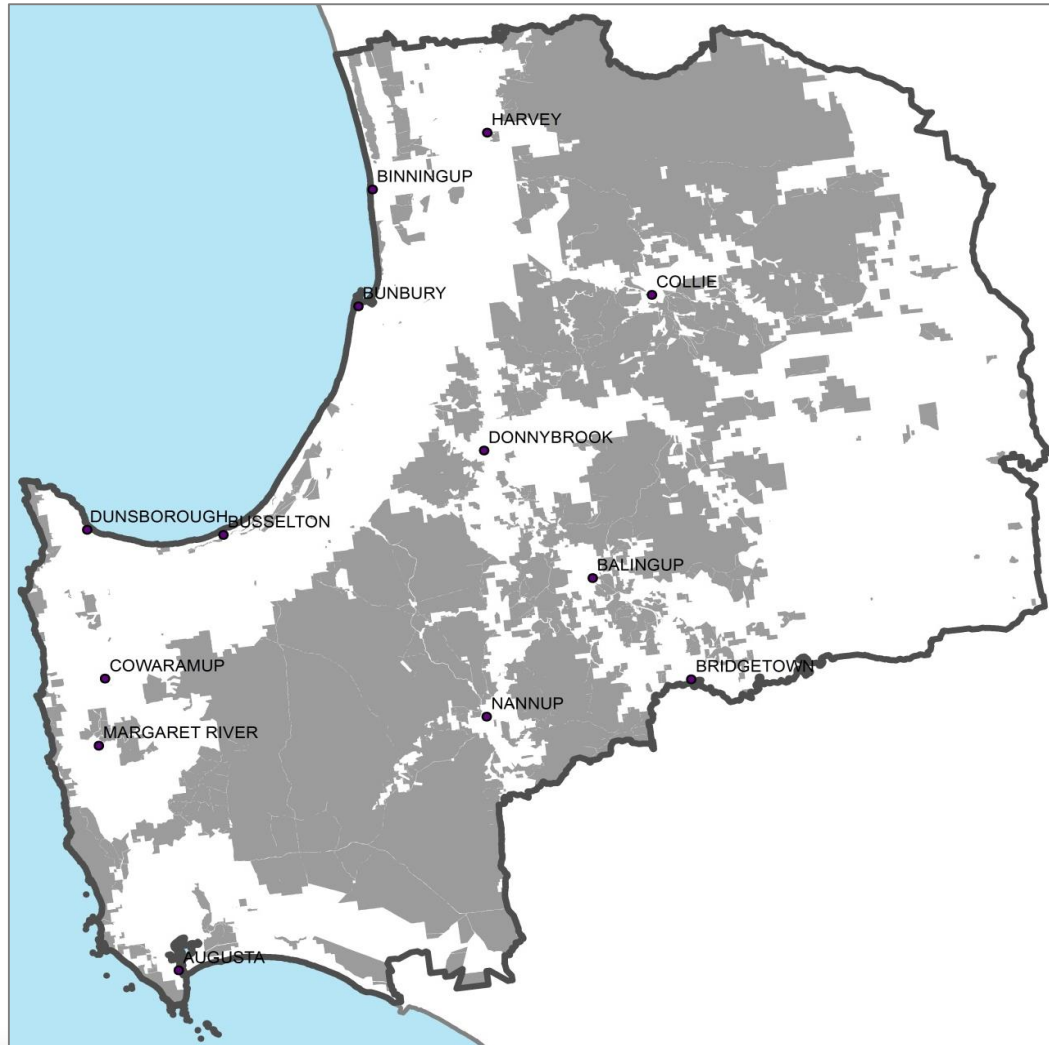


Biodiversity



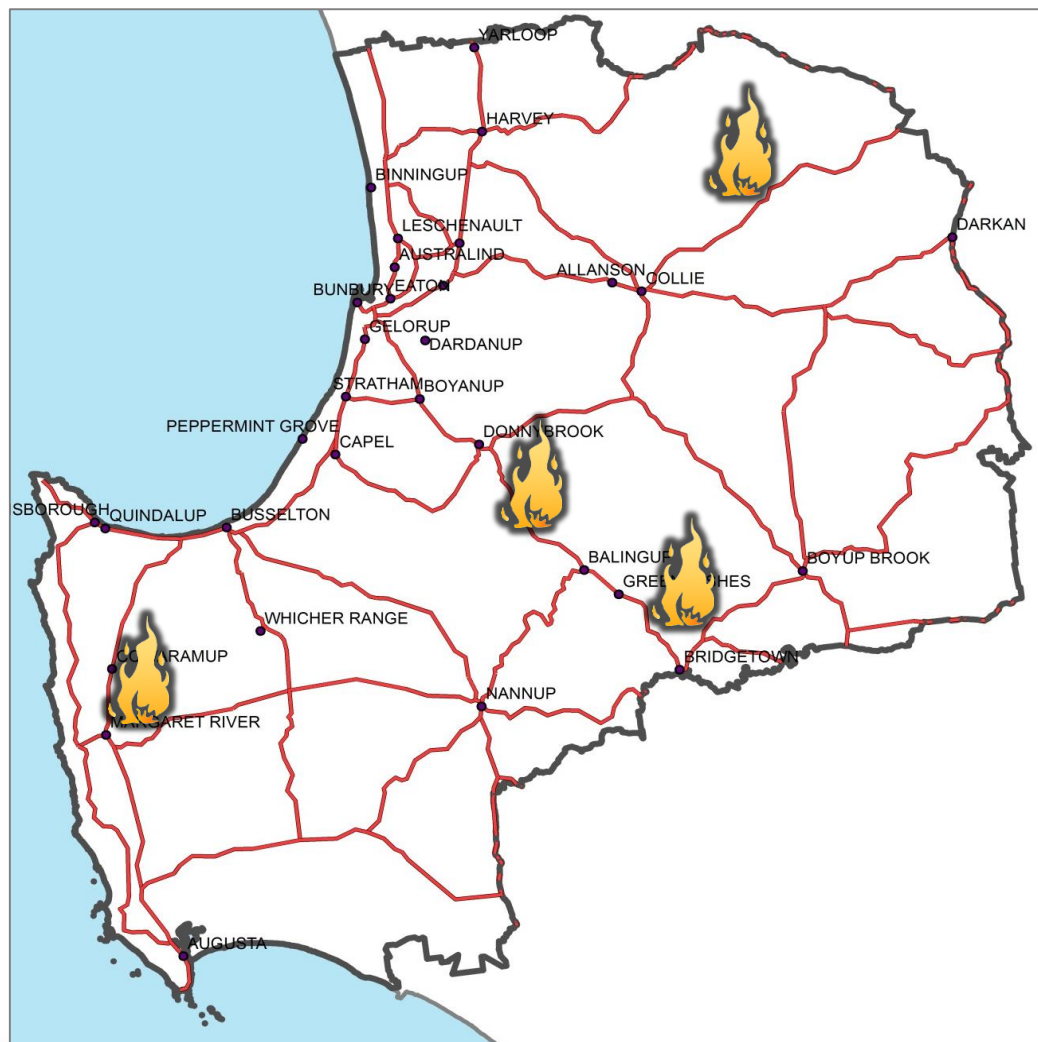
WHERE PRESCRIBED BURNING IS APPLIED


DPaW
managed
land

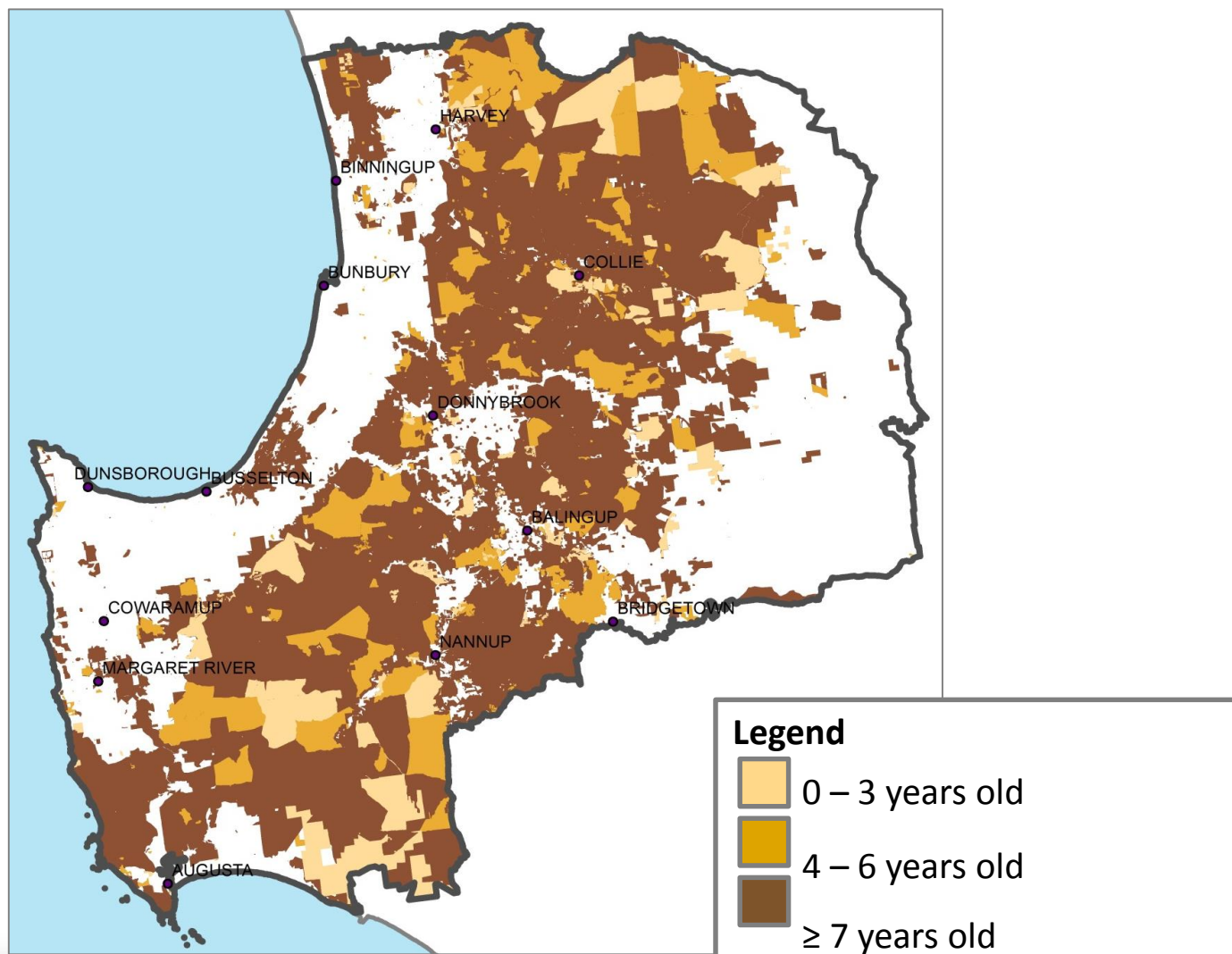


FIRE IGNITIONS

Roads
and
towns



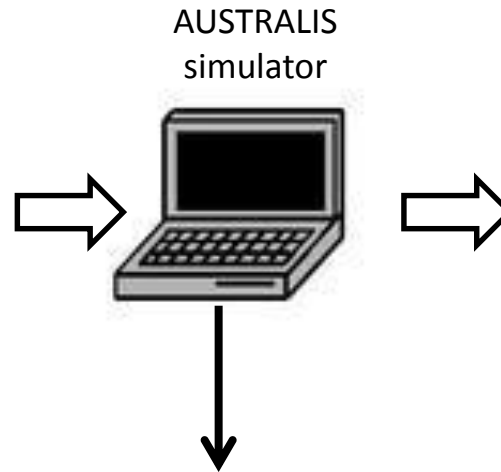
FUEL AGE



METHODS

Inputs:

- Prescribed burning strategy
- How many bushfires
- When and where to fires ignite
- Weather conditions
- When to stop the fires



AUSTRALIS
simulator

Outputs:

- Area burned
- Intensity

Simulated 121,000 fires

AUSTRALIS Simulator:

George Milne and Joel Kelso

Computer Science and Software Engineering, UWA

RESULTS

BRAIN RESET



5 – 7 minutes

12 – 15 minutes
A decade ago

BRAIN RESET

DON'T

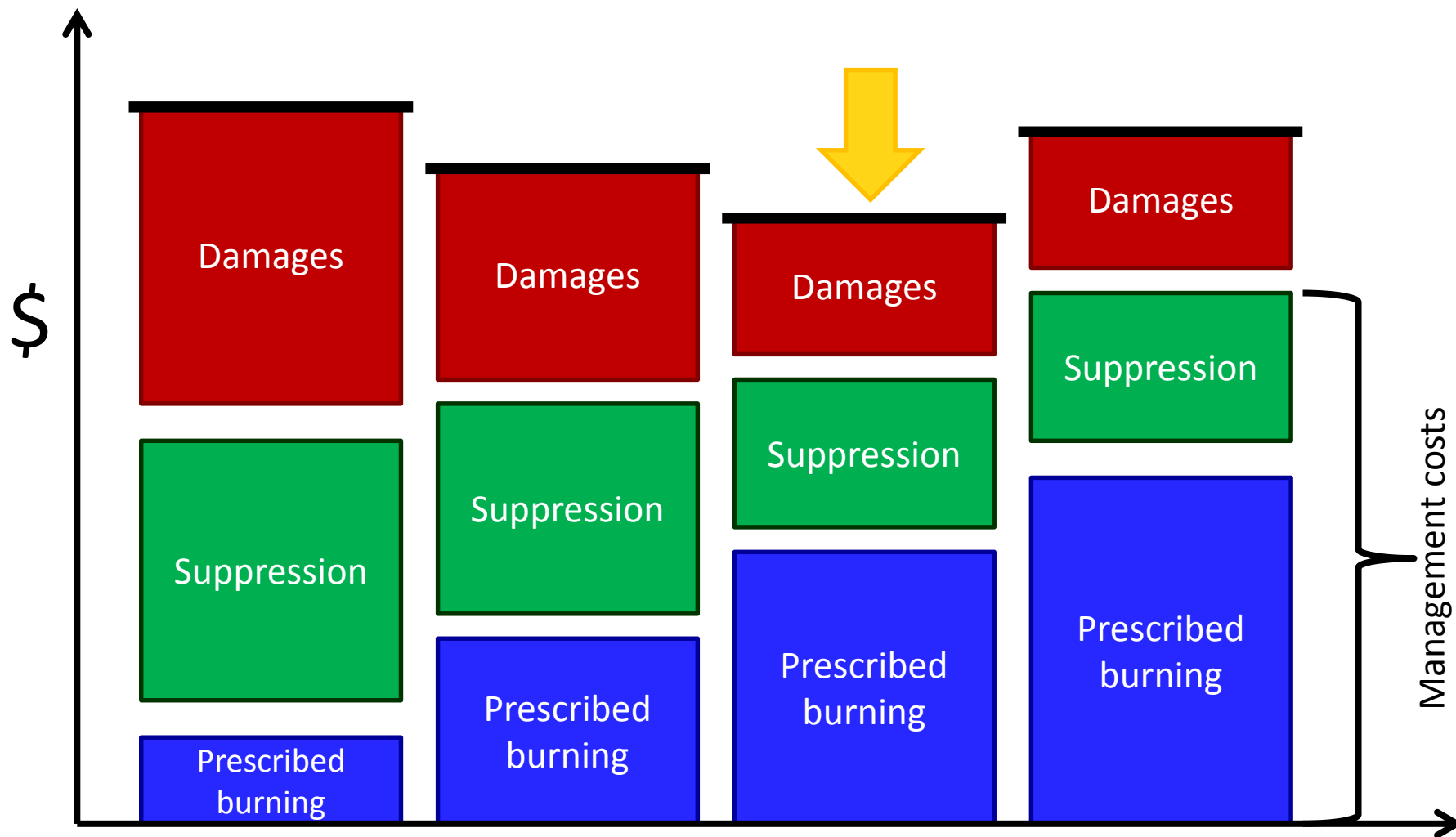
WORRY

BE

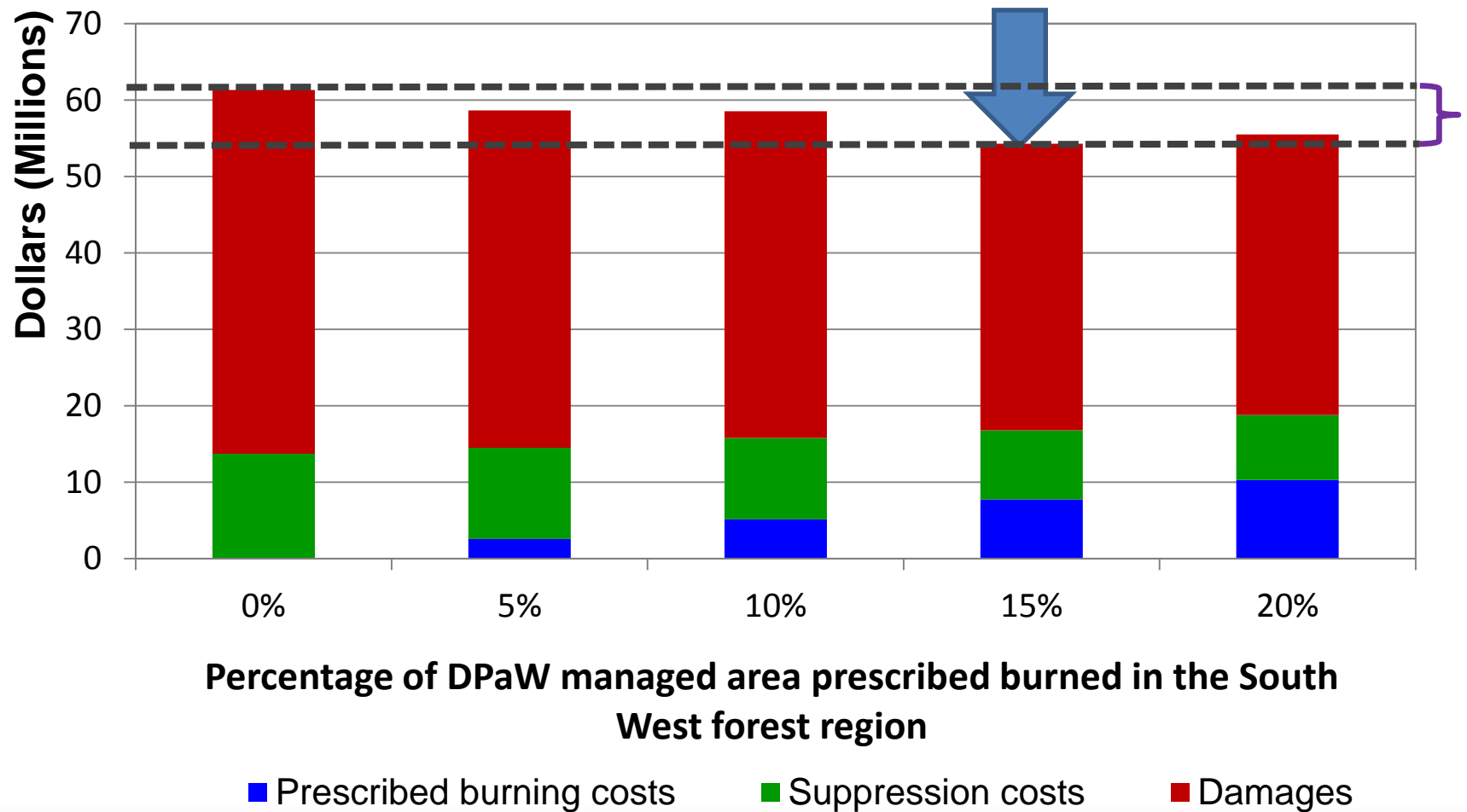
HAPPY

RESULTS

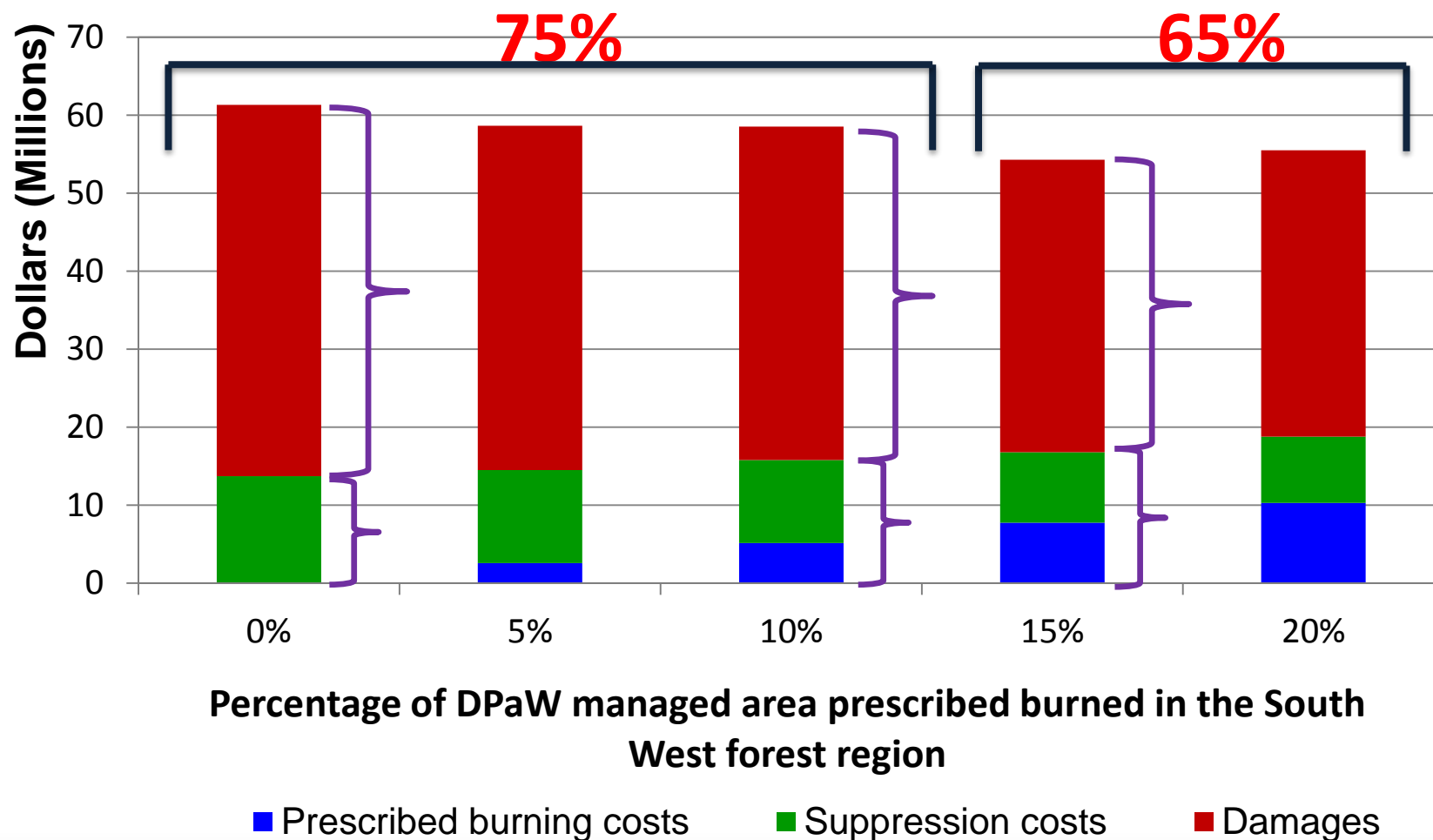
WHAT THE RESULTS LOOK LIKE



SHORT-TERM ANALYSIS



SHORT-TERM ANALYSIS



SHORT-TERM ANALYSIS

Annual investment



=

Average annual benefit



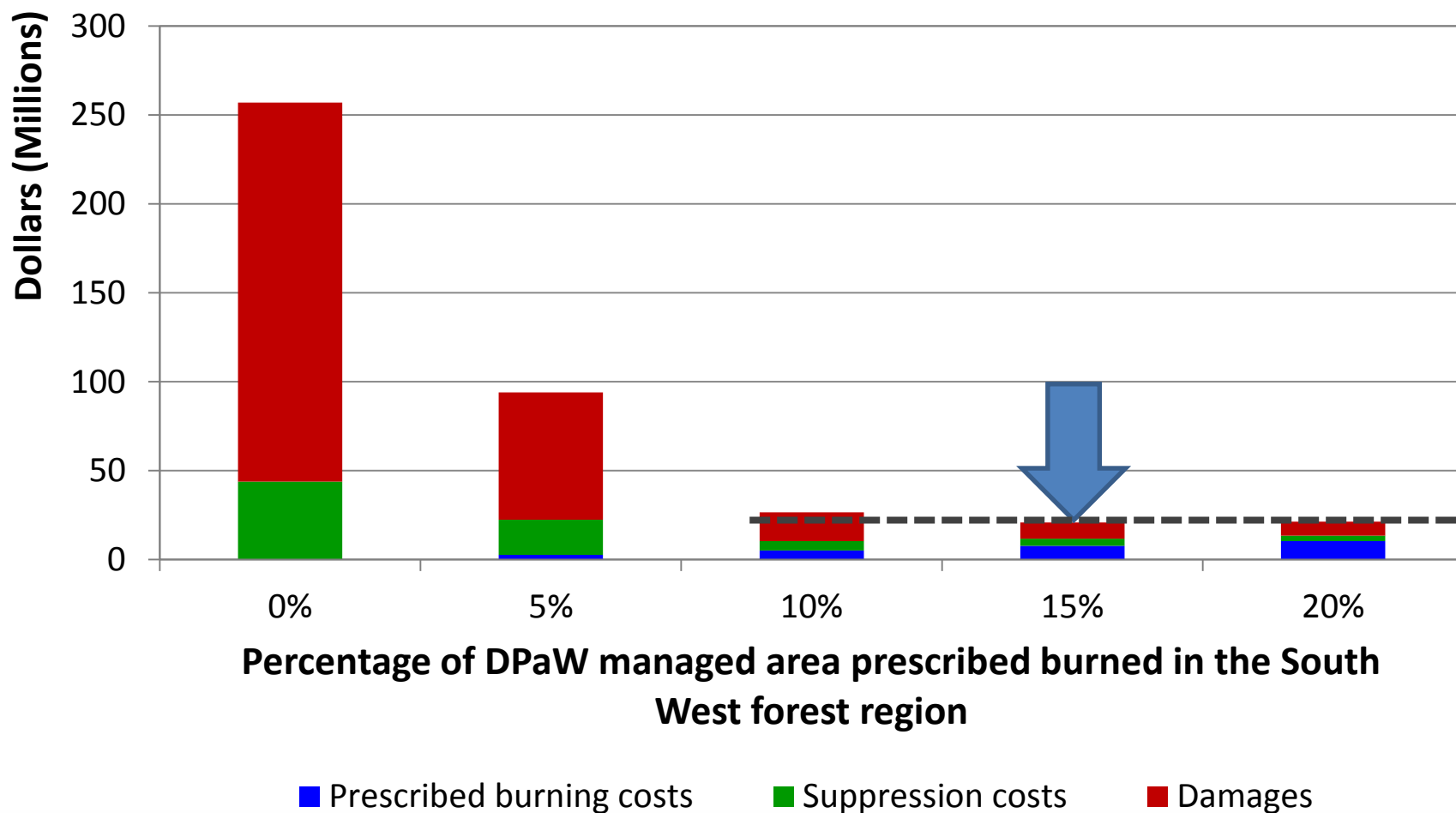
AU\$1

to

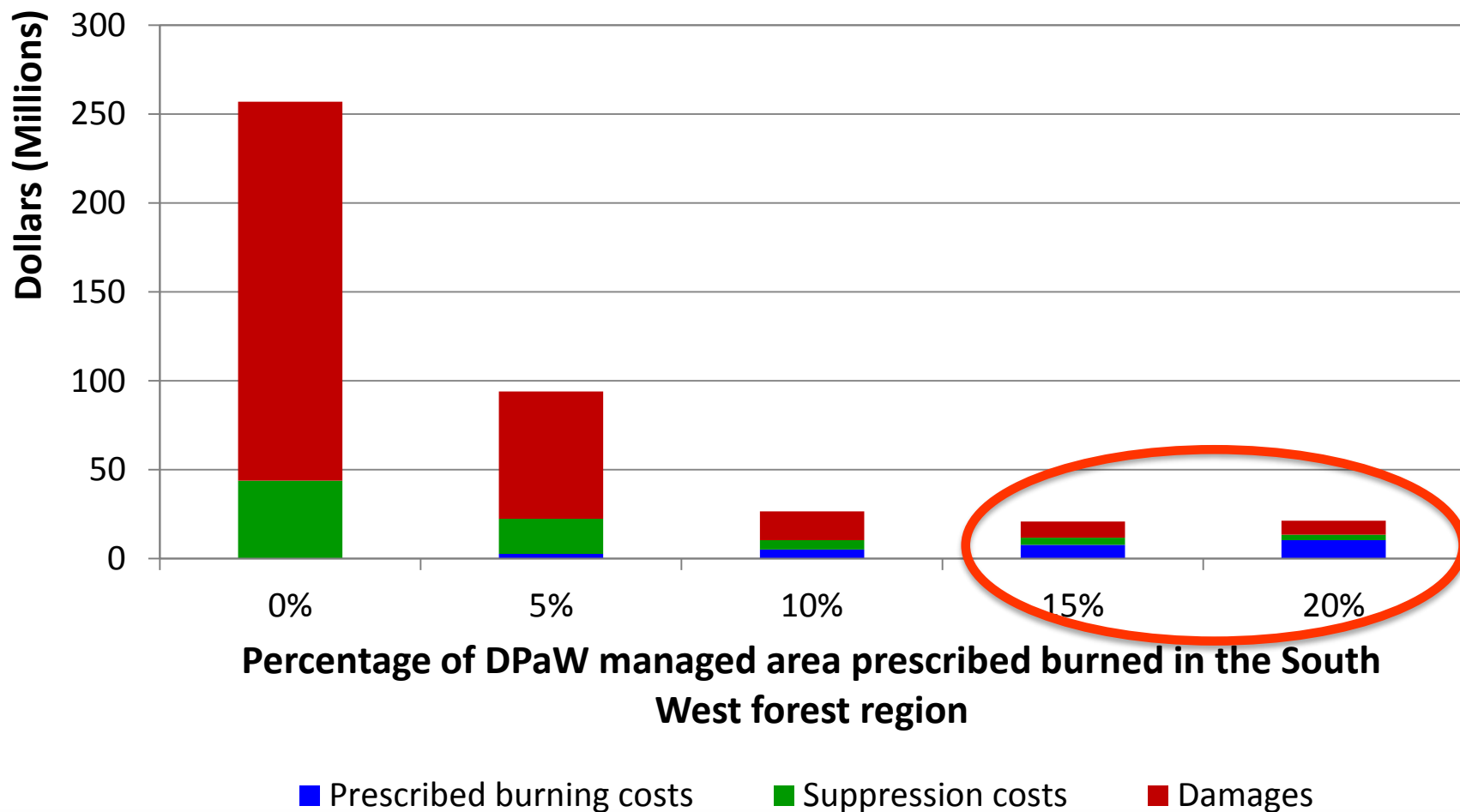


AU\$2

LONG-TERM ANALYSIS



LONG-TERM ANALYSIS



LONG-TERM ANALYSIS

Annual investment



Compared to doing nothing

Compared to current levels AU\$6

=



AU\$10

to

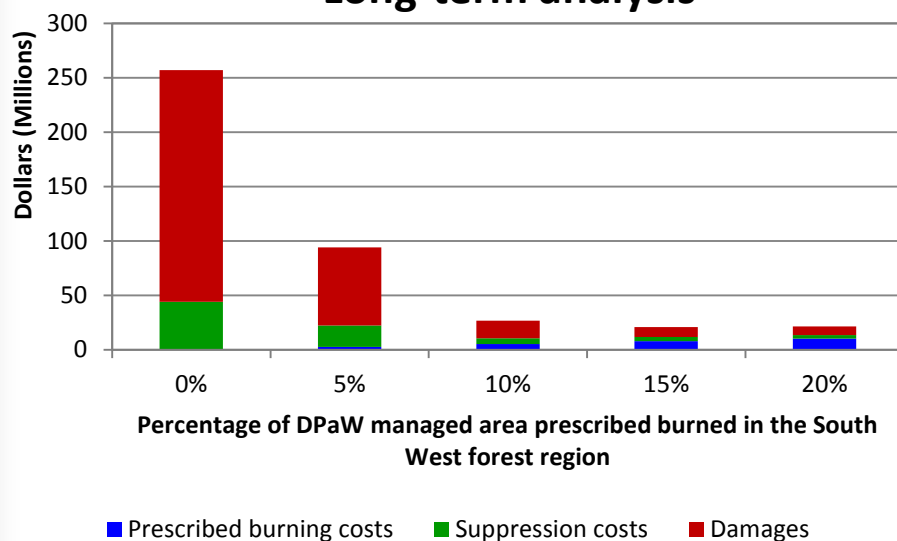


AU\$47

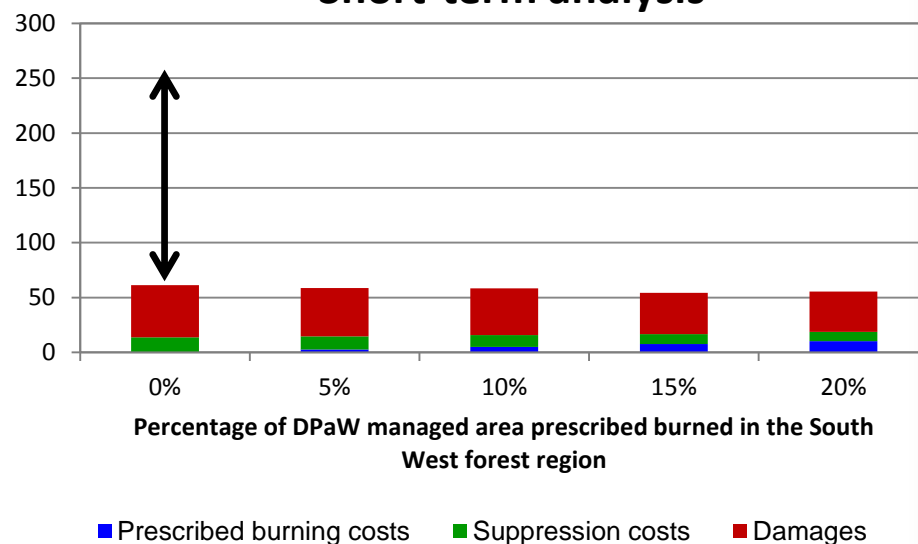
AU\$16

COMPARISON

Long-term analysis



Short-term analysis

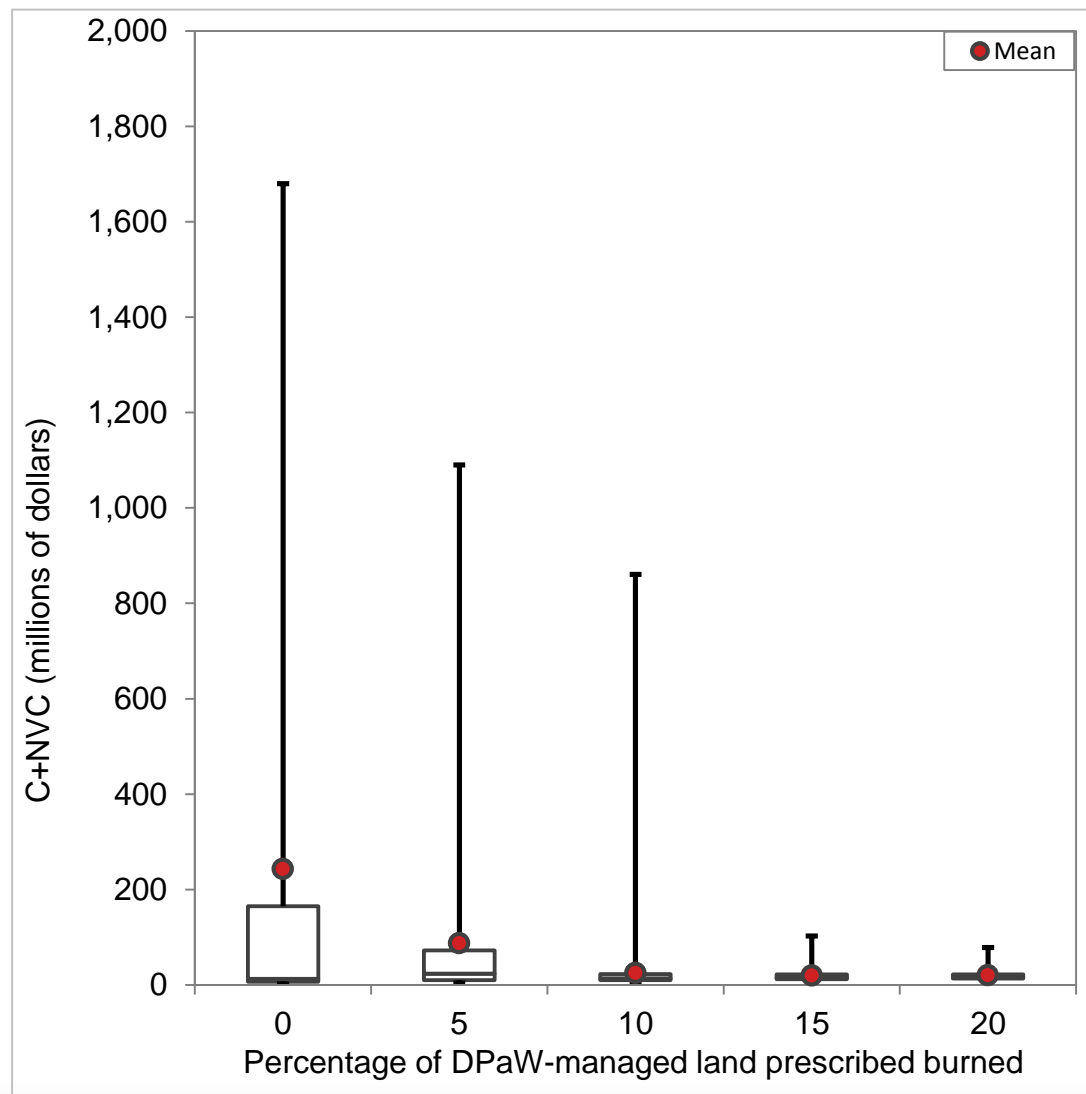


RESULTS

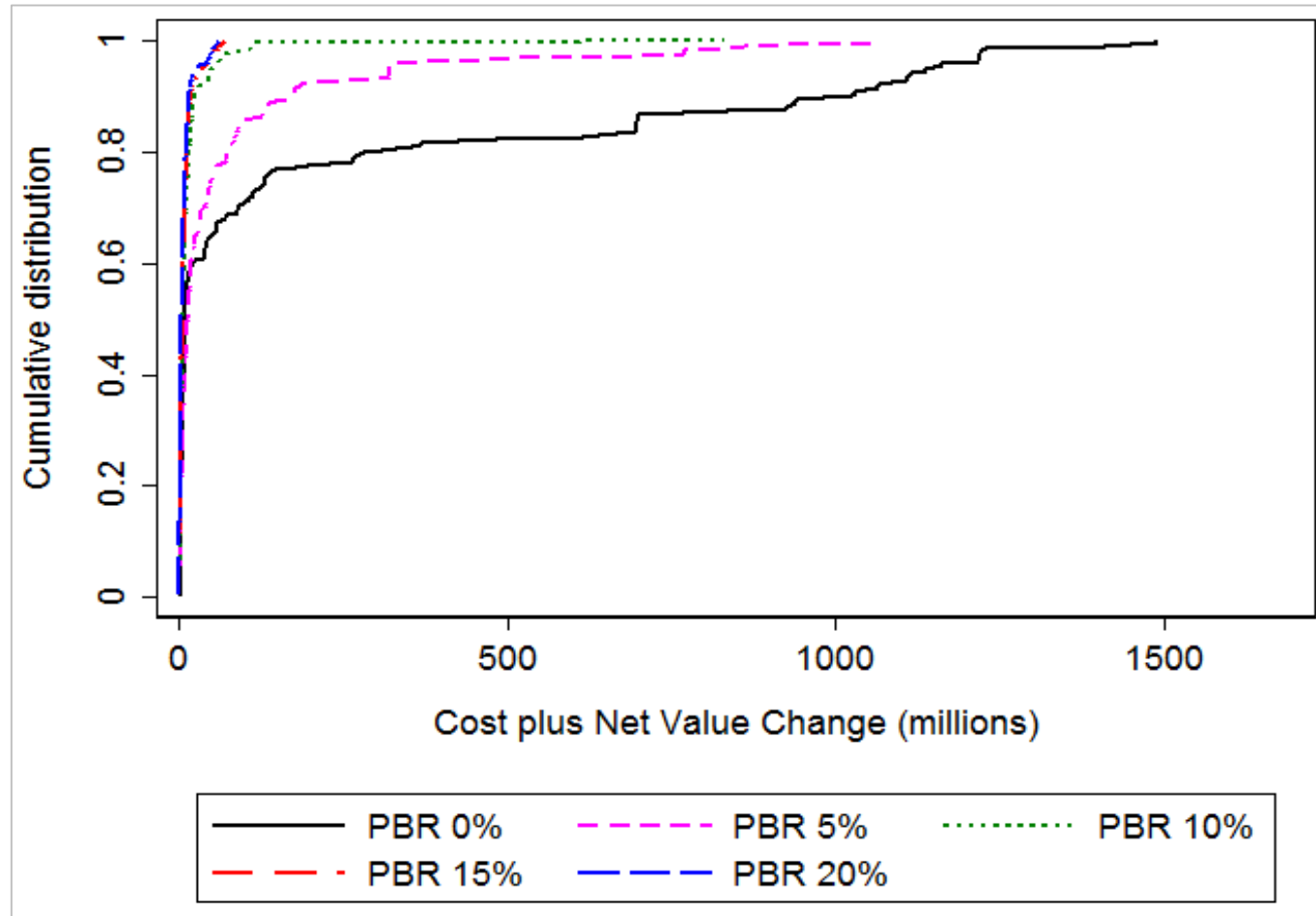
- 1) Areas burned most often: forested areas
- 2) Highest damages: urban areas



RANGE OF THE RESULTS

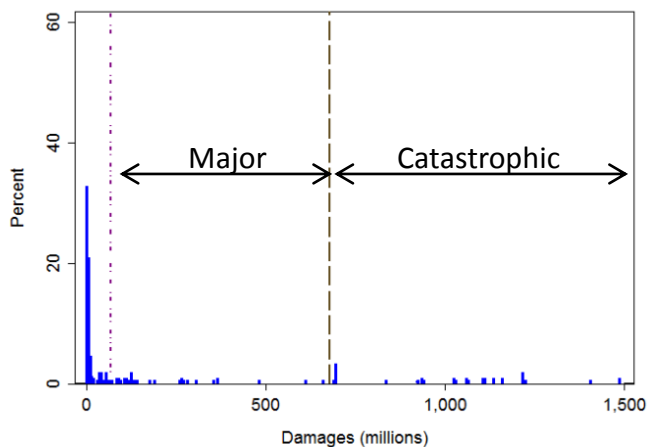


CUMULATIVE DISTRIBUTION

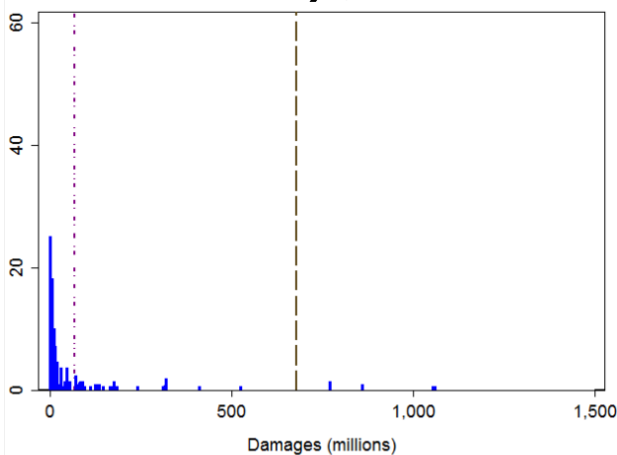


DISTRIBUTION OF DAMAGES

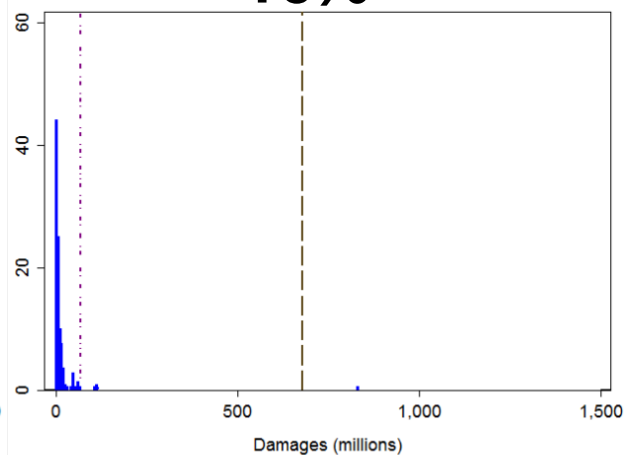
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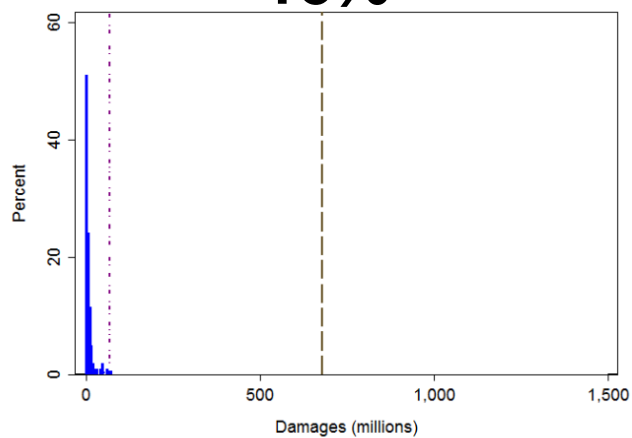
5%



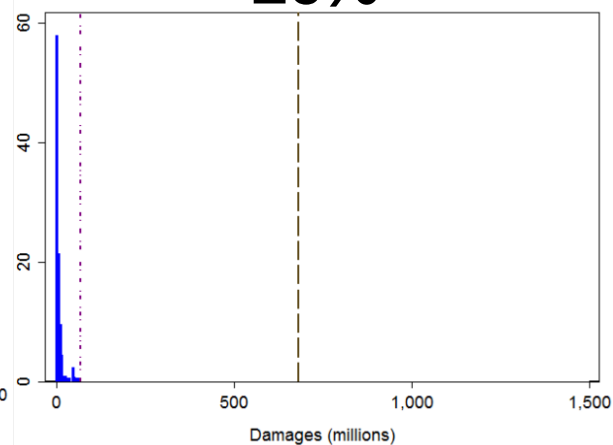
10%



15%



20%



SO WHAT DOES THIS MEAN?

IMPLICATIONS

- Long-term dynamics are very important
 - Strategic decision making must adopt a long-term perspective
 - Short-term evaluations of prescribed burning investments in the South West forest region do not provide reliable information
- In the long-term, it becomes important to maintain a minimum level of prescribed burning
 - Optimal prescribed burning rates derived from the model are high

What can you do with this information?

SO HOW DOES THIS HELP YOU?

WHAT TO DO WITH THIS INFORMATION

- Identify options where we get the best value for money
 - For prescribed burning
 - Also for other fire management activities
- Clear-cut best option or wide range of options close to the optimum
- What are the results sensitive to?
 - Identify areas where we need better information to improve decision making
 - Identify tipping points (when do we change a decision?)

Lots to do...

WHAT NEXT?

WHAT NEXT

- Different spatial arrangement of the treatments (including prescribed burning in private land)
- Evaluate other management options
- Policy and fire events impact on people's behaviour



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WHAT NEXT

- Different spatial arrangement of the treatments
 - Generates different benefits (and also different costs)
 - Damages decrease more rapidly...
 - ...but prescribed burning costs increase more rapidly
 - Need better information on prescribed burning costs per ha in different locations
 - Results are sensitive to prescribed burning costs per ha
 - Importance of developing risk based approaches to prescribed burning
- (including prescribed burning in private land)
- Mount Lofty Ranges, South Australia
 - South-west Western Australia (second PhD)

WHAT NEXT

- Different spatial arrangement of the treatments (including prescribed burning in private land)
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WHAT NEXT

➤ Evaluate other management options

- Example: Economic analysis bushfire management options in 2 contrasting areas in WA
- Development restrictions → for areas where there is a large wildland-urban interface
- Prescribed burning → areas with less development



WHAT NEXT

- Different spatial arrangement of the treatments (including prescribed burning in private land)
- Evaluate other management options
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WHAT NEXT

- Policy and fire events impact on people's behaviour
 - Fire events and the housing market
 - Policy and people's behaviour (designated bushfire-prone areas)
 - Cost and benefits of education programs
 - Problem, many of the benefits are intangible
 - Important to include them
 - What is the value of intangibles (specifically for natural hazards)

WHAT CAN YOU DO NOW?

WHAT CAN YOU DO NOW?

Get in touch

veronique.florec@uwa.edu.au



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I'm Feeling Lucky

www.bnhcrc.com.au/research/economics-policy-and-decision-making/229

WHAT CAN YOU DO NOW?

Come and visit



WHAT CAN YOU DO NOW?

Lets chat later

(I'll pay for coffee)



THANK YOU

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