



# Research informing regulation, industry and community

## Why do houses burn down?

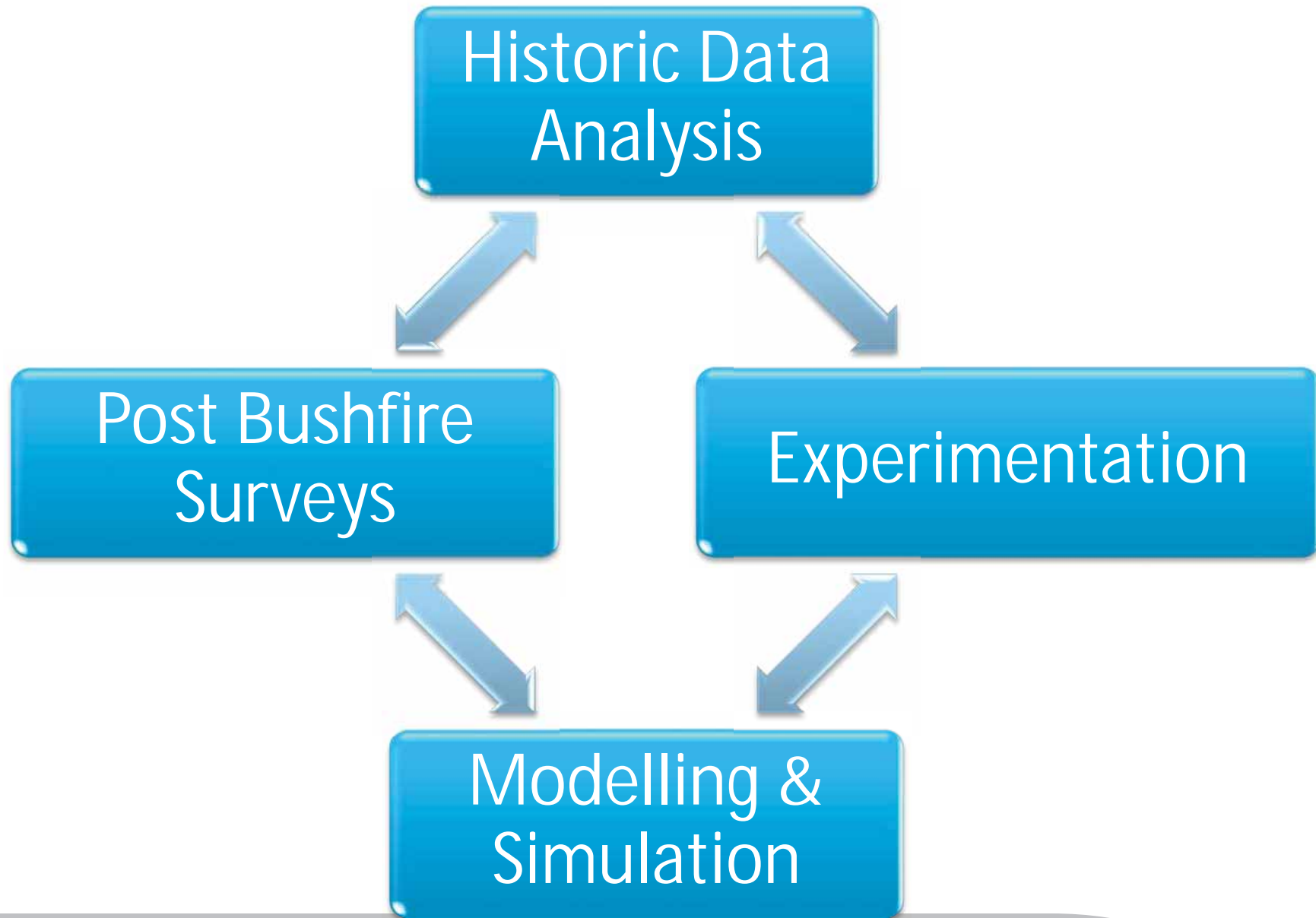
Justin Leonard | Research Leader – Bushfire Urban Design

18 September 2015

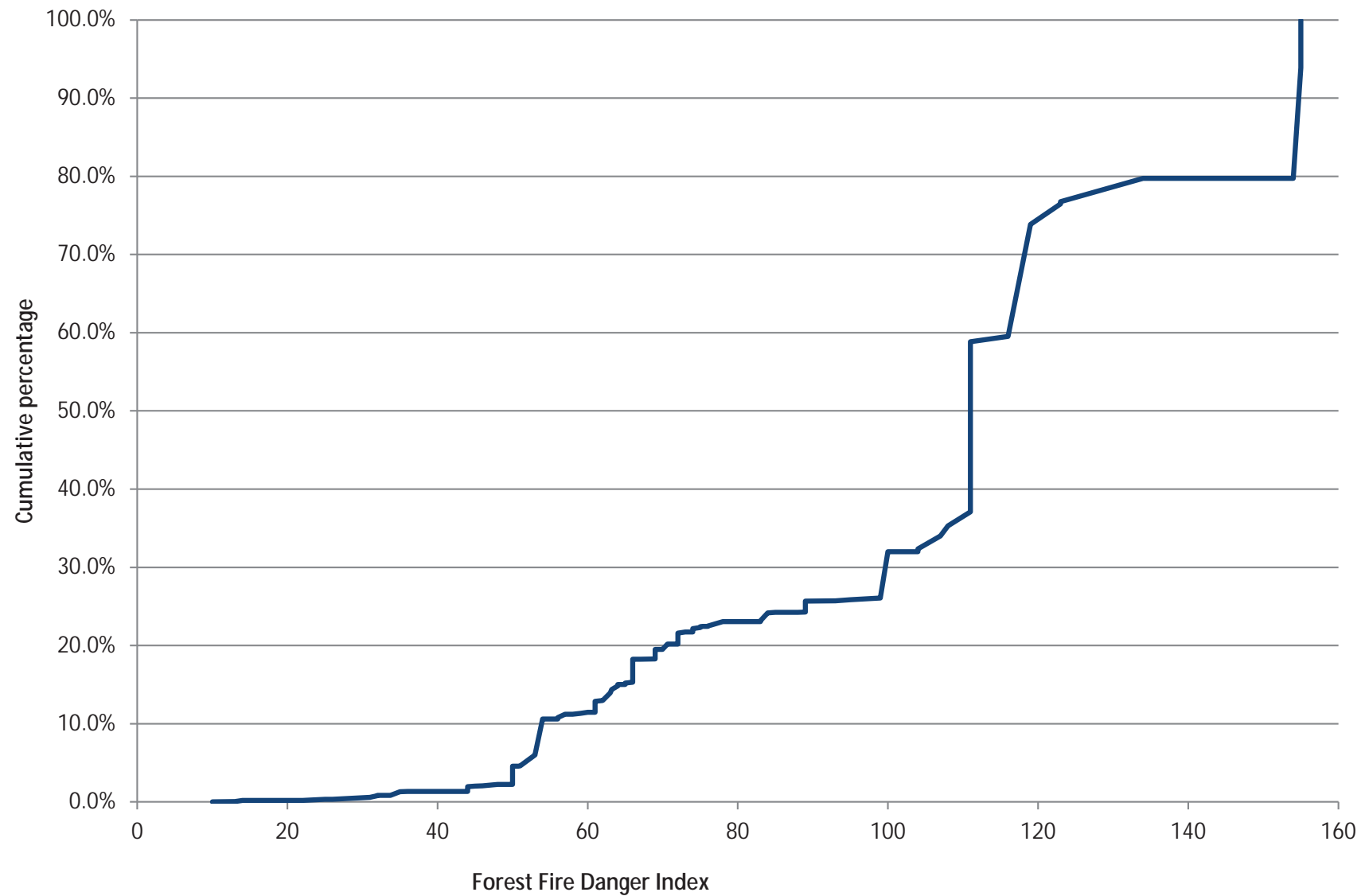
[www.csiro.au](http://www.csiro.au)



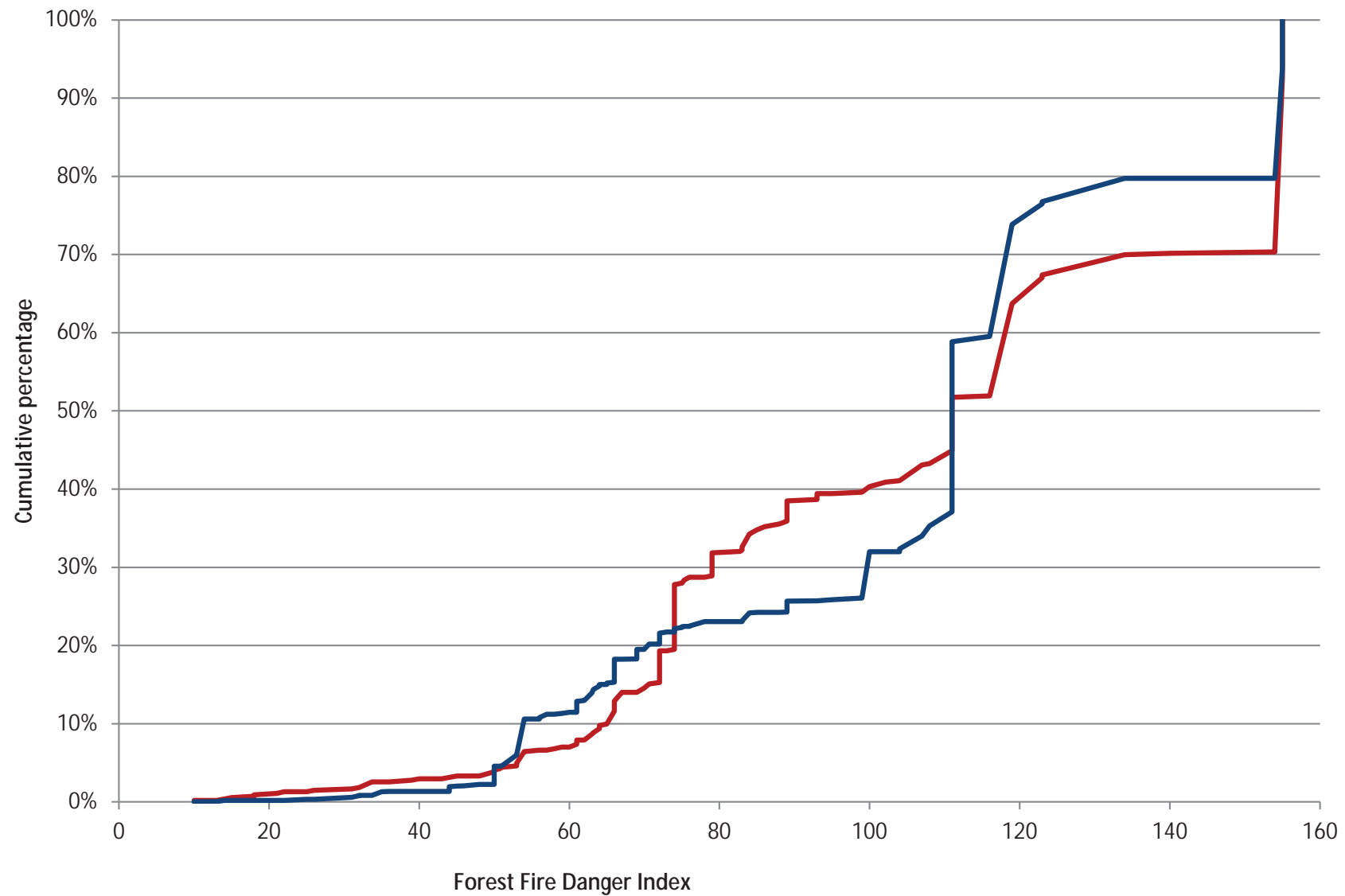
# What have we been up to?



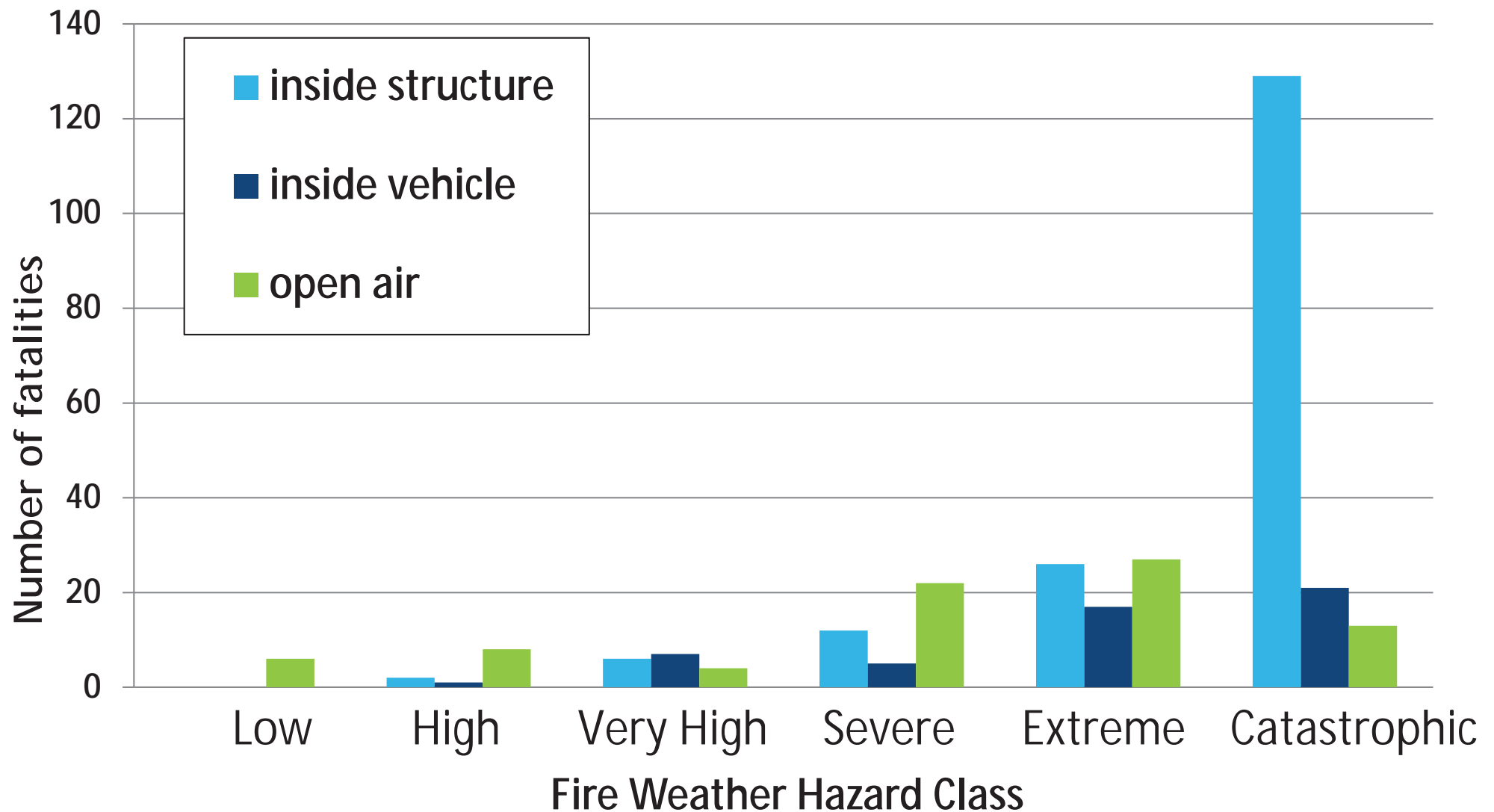
# House Loss and Fire Weather



# House Loss, Life Loss and Fire Weather

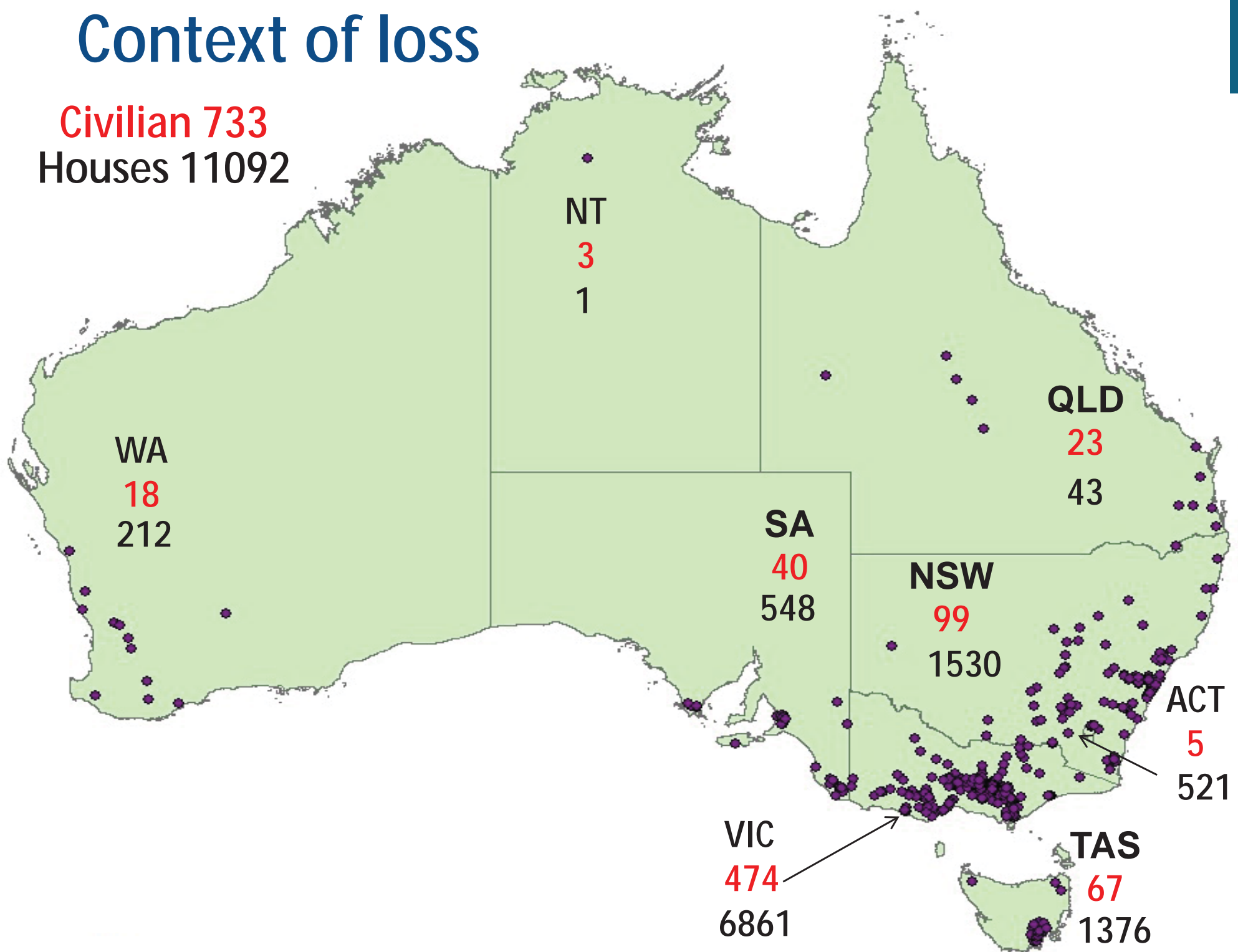


# National Fire Danger Ratings Research – Life Loss & Weather



# Context of loss

**Civilian 733**  
**Houses 11092**



# Different fire Intensity

## Different emphasis on cause of loss

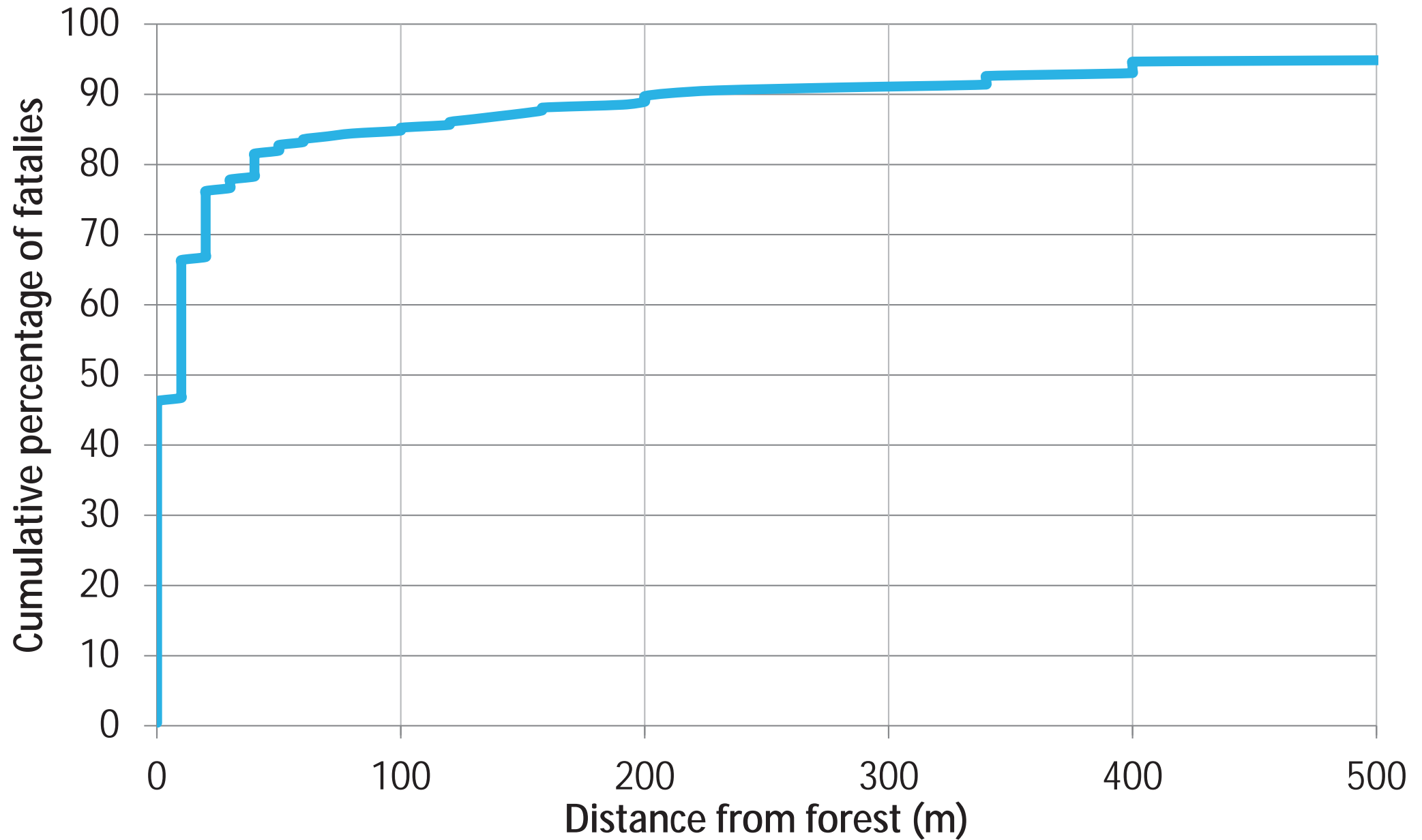
	Canberra 2003	Victorian fires 2009
Embers and some radiant heat from surrounding objects	34%	33%
Embers only	49%	19%
Predominantly radiant heat	5%	5%
Flame contact from bush vegetation	2%	13%
Other	1%	2%
No direct bushfire attack	7%	7%
Unknown	2%	22%

# Vulnerability to Embers (Sydney 1994)

<b>Mechanism</b>	<b>Items ignited</b>	<b>Ignitions</b>
embers only	Timber decks	13
	Eave fascia boards and or gutters	9
	Timber window frames	6
	Rough saws western red cedar cladding	5
	Timber door frames	4
	Exposed timber beams (eave structure)	4
	Timber shingle roofs	2
	Timber stairs	2
	Coir door mat	2
	Plastic roof panel	2
	Bitumen roof membrane	1
	Canvas awning	1
	Toilet roil (ember entry through unscreened window)	1



# Life loss and distance to forest



# Specific urban edge example



Photo: ESB ACT,

Observations: Malcolm Gill





# Stage two – fire spread due to urban elements



Photo: ESB ACT



Photo: Malcolm Gill





# Openings

Embers attack on door



# Openings

## Embers attack on window

# Opening

Typical unprotected vent,  
a potential ember entry point



CSIRO MIT Bushfire Research



Common entry point  
for embers















# Vulnerability to Fence Radiation + Embers (Sydney 1994)

Ignition Mechanism	Items ignited	Ignitions
Embers with fence radiation assisting or causing opening	Contents via broken window	2
	Timber window frame	2
	Timber door frame	2
	Eave fascia boards and or gutters	1
<i>total</i>		7









## Brush-wood fence impact on houses













Timber deck

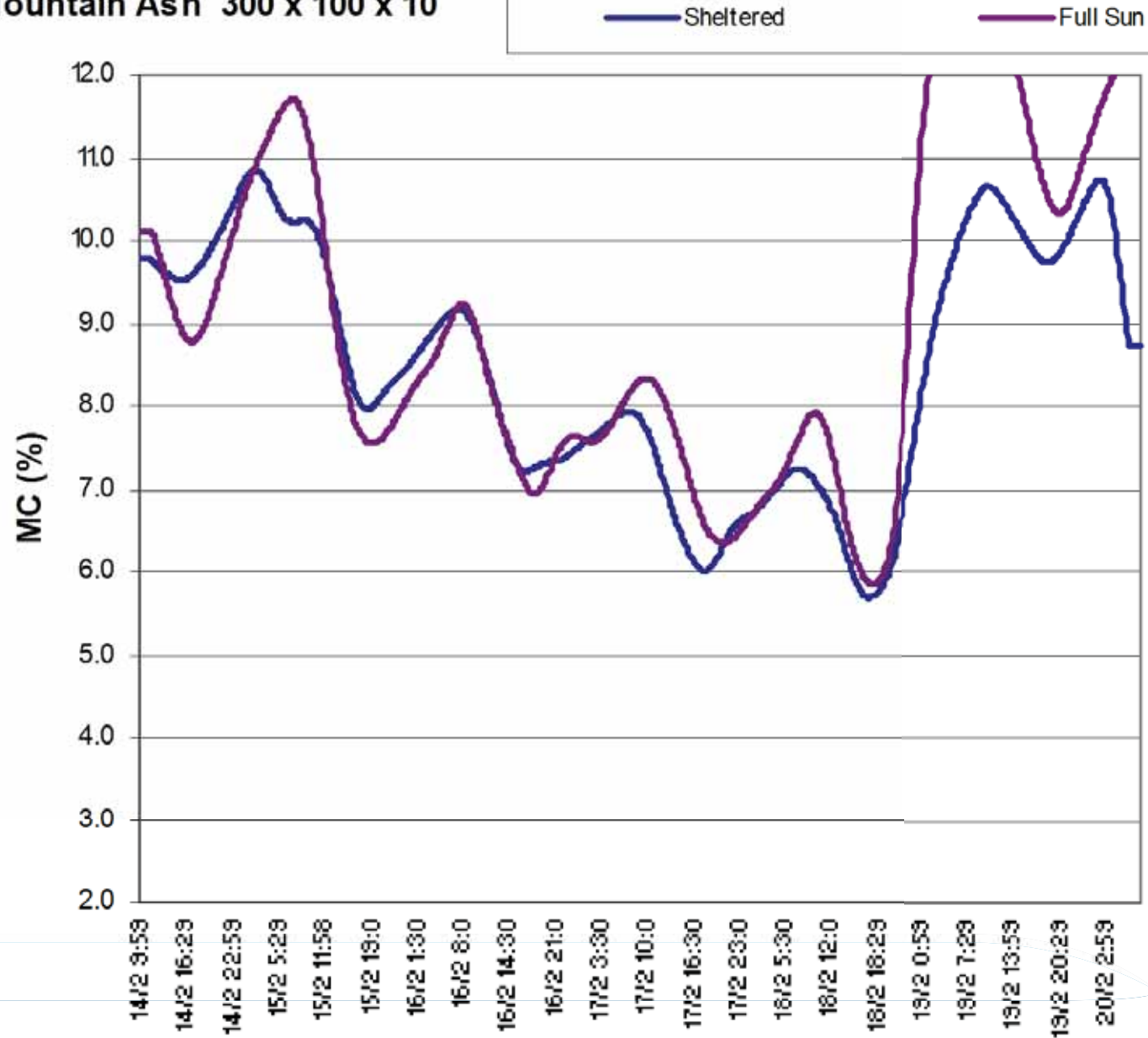


# Embers attack on stairs



# Timber Decking in Bushfire Conditions

Mountain Ash 300 x 100 x 10



















# Vulnerability to Adjacent House Radiation + Embers (Sydney 1994)

Ignition Mechanism	Items ignited	Ignitions
Embers with adjacent house radiation assisting or causing opening	Eave fascia boards and or gutters	5
	Timber window frame	4
	Contents via broken window	2
<i>total</i>		<i>11</i>

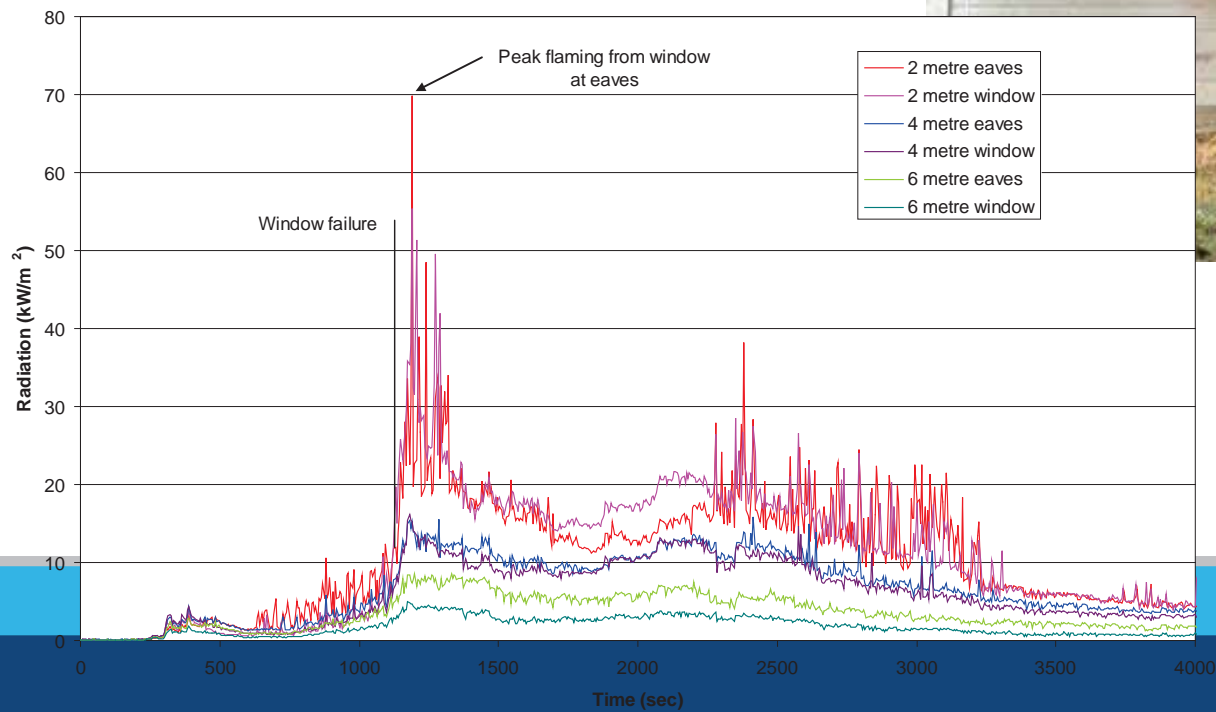




# Quantifying house to house spread



Radiation emitted from house



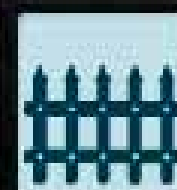
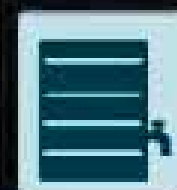
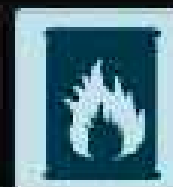








BushFire House Surveyor 1.0.94



Cancel Editing

Refresh Features Layers

Sync Now







# Thank you

**CSIRO**

Justin Leonard  
Bushfire Urban Design

t +61 3 9252 6353  
e [justin.leonard@csiro.au](mailto:justin.leonard@csiro.au)  
w [www.csiro.au](http://www.csiro.au)

LAND & WATER FLAGSHIP  
[www.csiro.au](http://www.csiro.au)

