Can we prevent bushfires? Issues and challenges

@MSSIMelb #bushfires

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Dr Paul Read

www.sustainable.unimelb.edu.au/climate-conversations

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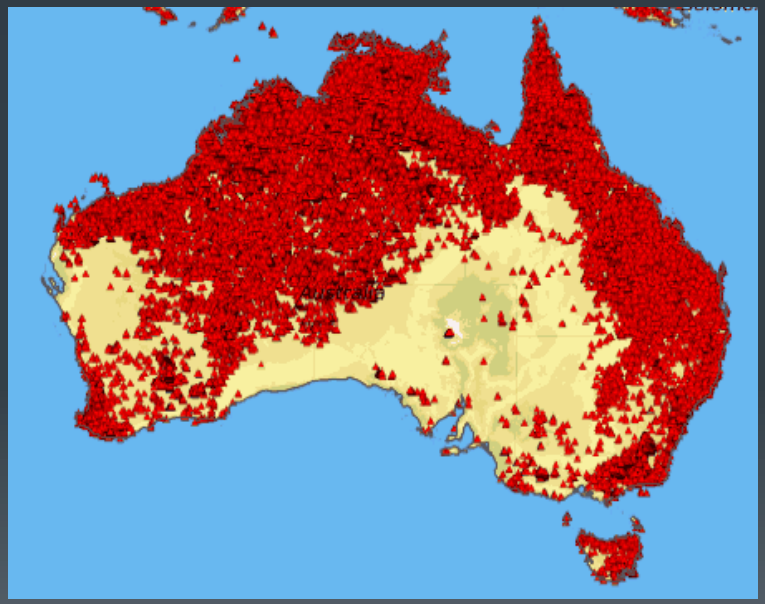
- “As with many of our climate change responses, the response to bushfire is still operating in the old world paradigm: the narrow scale of response
- the siloed responses
- the exclusion of the community
- the failure to utilise many possible preventative measures

The additional fire risks associated with climate change have not been factored in planning legislation nor decision-making.

- Janet – overview
- Paul – a taste of neuropsychology, community response to reporting arson
- Alan – the role of planning in prevention
- Questions/Discussion

We are living with a very high risk of bushfires

- 45,000 to 60,000 bushfires annually in Aust.
- Growth in occurrence and intensity predicted by IPCC
- Temperature rising and number of days of extreme heat & rainfall has declined in SE Aust over past 20 years.
- Fire season now from October to March/April
- Victoria could, on average, have a 'Black Saturday' (400 fires) level event every two or three years (The Climate Institute 2016)
- Not just an Aust/n problem
- California – 80,000 evacuated in past weeks



Bushfires 1997-2008

Alaska 19 August – 54 fires

Temperatures for August day 15C to 22C, night 4C to 10C

Blue: local <10 acres

Green: moderate: 10 to 250 acres

Yellow: large: 250 to 2500 acres (1-10 km²)

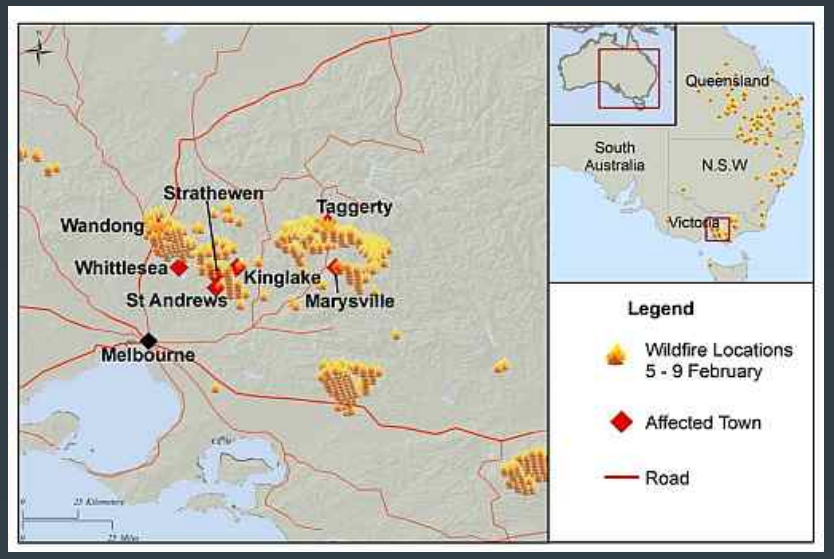
Red: very large: >2500 acres (10 km²)

Mega-fires are occurring

Old MacArthur Forest Fire Danger Rating

High	12 to 25
Very high	25 to 50
Extreme	>50

- Developed so Black Friday fires (1939) had a rating of 100
- The rating on 7 February 2009 for a number of sites in Victoria reached unprecedented levels in the range 120 to 190 and some sites were over 300
- Very hard to extinguish – very high temperature (46.4C), low humidity (5%), very windy (100km/hr), drought (driest start to the year on record).



Black Saturday:

- 173 people died
- 2,029 homes, 61 businesses, 5 schools, properties, small towns, lost
- 400,000 hectares of land destroyed
- 30% homes destroyed had no insurance
- 8,150 insurance claims made of $1.2 billion as of 5 March 2009

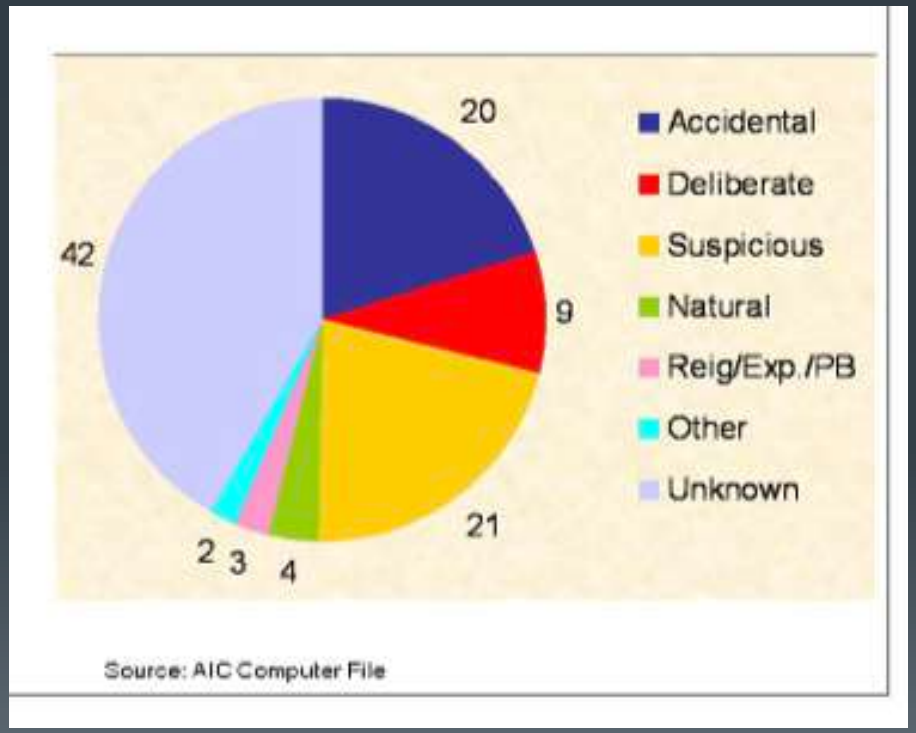
Little is known

- A lack of integrated data between responsible agencies eg. 'official' statistics don't differentiate between a structural fire and a bushfire
- The uncertain reason why some fires occurred – not investigated
- The lack of reporting of many fires as they did not escalate to a major fire
- A lack of research in Australia and internationally e.g.
  - how many fires?
  - cost of the fires?
  - characteristics and behavior of those who light bushfires – especially those who aren't caught?

Black Saturday 2009

“The majority of bushfires in southeast Australia are caused by human activity” Munich Re

- Approx. 80% caused by human activity:
  - Arson
  - Fire-setting
  - Reckless fires



Others which could be added

- power lines, lightening strikes (risk up 5 to 6% with every 1°C rise in temperature)
- Cool burns
- Human interference with natural forests

Climate change sitting behind so much of this!

Who are the people lighting fires?

- Mainly male. About 40% are aged 15 to 20 years, 30% are over 30 and about 10% are children up to 14 years.

- Children/youth – UK data
  - ~65% curiosity
  - Delinquency – 30-40% repeat offence
  - Delinquent, deviant, aggressive behaviour; excitement/defiance/power; depression, history child abuse & neglect, dysfunctional family
- Adults
  - engage in anti-social and criminal behavior
  - feel they have been wronged and seek to extract revenge
  - have an interest in fire and use fire to relieve stress
  - ‘cry for help’

Few convictions for arson

- Max penalty for arson in Vic. is 15 years imprisonment
- A low number of arsonists who are caught and convicted (historically, less than 1%)
  - Few are identified and charged with the offence (inc. slightly this year)
  - Few who are charged are found guilty (22 people in Vic in 2013-4)
  - Few who are found guilty receive a custodial sentence
  - 7 people given a Community Correction Order
- No specific treatment for arson in prison
- 10% have an increase in arson activity after jail (o'seas data)

What is arson? Where does culpability for fire begin and end?

Failure to respond to cc; inappropriate land-use change (e.g. forest clearing); reckless fires?

Failure to account for climate change in legislation - case-study - Arthurs Seat sky-lift.

- In Arthurs Seat State Park
- 34 gondalas
- Assessment of risk in my opinion has not taken account of cc and increased risk e.g.
  - A fire may take only 8 minutes to travel from the bottom to the top of the hill
  - 30 mins to an hour to get a fire-fighting aircraft to area
  - How will people be evacuated from the gondolas?
  - Who will take responsibility for the public and local residents?

Assessment by CFA

Location	Likelihood of fire	Consequences	Risk
Arthur Seat Escarpment	Almost certain	Catastrophic	Extreme

Recognise the risk to humans and the environment

Arthurs Seat State Park

Rare and endangered birds:

Grey Goshawk, Great Egret, Cape Barron Goose, Swift Parrot, Barking Owl, Powerful Owl, Nankeen Night Heron, Lewin's Rail, Freckled Duck

Regionally significant birds:

Wedge-tailed Eagles, the Peregrine Falcon and the Southern Emu-wren

Peregrine Falcon

Fires and clearing of peate forests, Kalamantan, Indonesia

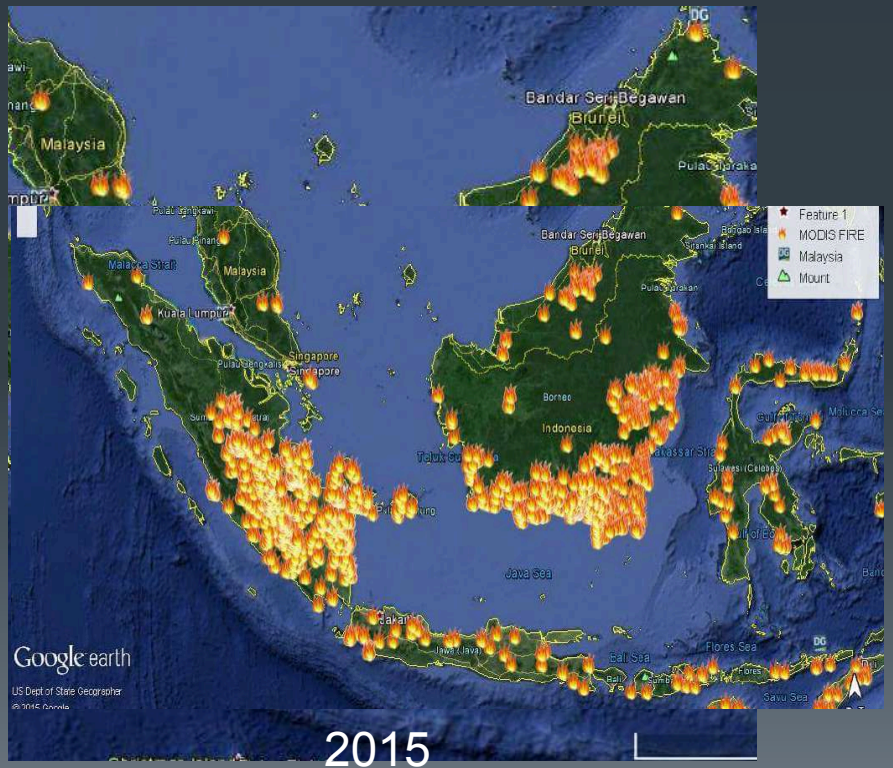
How should this activity be defined?

Deliberately lit fires – global markets for palm oil, pulp wood, timber and small-scale agriculture

Severe haze 1997, 2006, 2015, 2016 – Indonesia, Malaysia, Singapore, Aust.

100,300 premature adult deaths in 2015, 37,600 in 2016

(Koplitz et al. 2006 Env. Research Letters)



Solutions

1. Greatly step-up the response to the risk of bushfires in line with the greatly expanded risks of occurrence and impact that bushfires now present. Bushfires have changed characteristics in relation to their frequency, heat and extent.

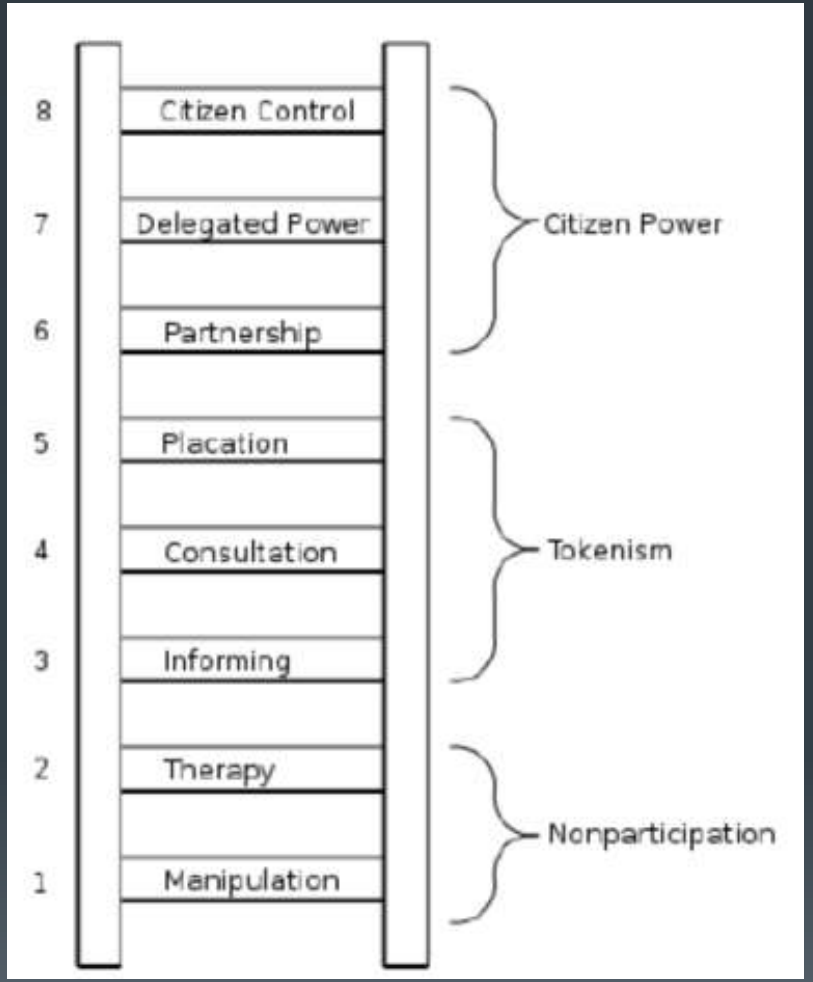
2. We are too reliant on one form of prevention – environmental modification, whereas a whole platform of responses is needed.

- Social disadvantage in outer suburbs with high youth unemployment
- Fires are commonly lit on edge of urban areas
- Our growing inequality has severe consequences

Greater involvement of the community in bushfire prevention

- Post 2009 Royal Commission – ‘shared responsibility’ ??
- Tokenism?

- Local knowledge of fire risk
- Local knowledge of risky behaviour 0 report to Crime Stoppers
- Supporting vulnerable people in the community
- Mentoring at-risk children
- Assisting on total fire-ban day: patroling, blocking access to high fire-risk areas



Armstein’s Ladder of Participation

Solutions

3. Improvement of our knowledge base to enable evidence-based decisions
4. Improved data integration – including with human services
5. An agency on bushfire prevention be established, which enables the elevation of the response to a level equivalent to the risk. With wide representation, resources and authority to establish preventative measures.

- ‘At risk’ children taken to the beach for the day
- Situational prevention - understand patterns in time and place for fire-lighting e.g. 3.30 to 6pm weekdays & weekends - closing access, better lighting

Good things happening

- Many fewer people are dying in bushfires in Aust.
- The issue of arson is getting a little more attention
- VicPol is starting the process of improving data collection and data integration
- Crime Stoppers has been very supportive of research in arson.

4 years of research has led to significant improvements in reporting rates

- A program of place-based coordinated prevention of bushfire arson in Gippsland - GAPP

ARC 2 year research project

Working with Crime Stoppers Victoria and Prof Jim Ogloff – Swinburne University to:

- Continue the work on the facilitators and inhibitors of community reporting crime
- Understanding the etiology and associations with arson, leading to improved prediction of locations of arson behaviour
- Exploring the process of improved data sharing and integration (police, fire, human services)
- Exploring whether the GAPP model has scalability across Australia

No we can't fully prevent bushfires but we can make improved inroads into reducing the number and intensity of bushfires

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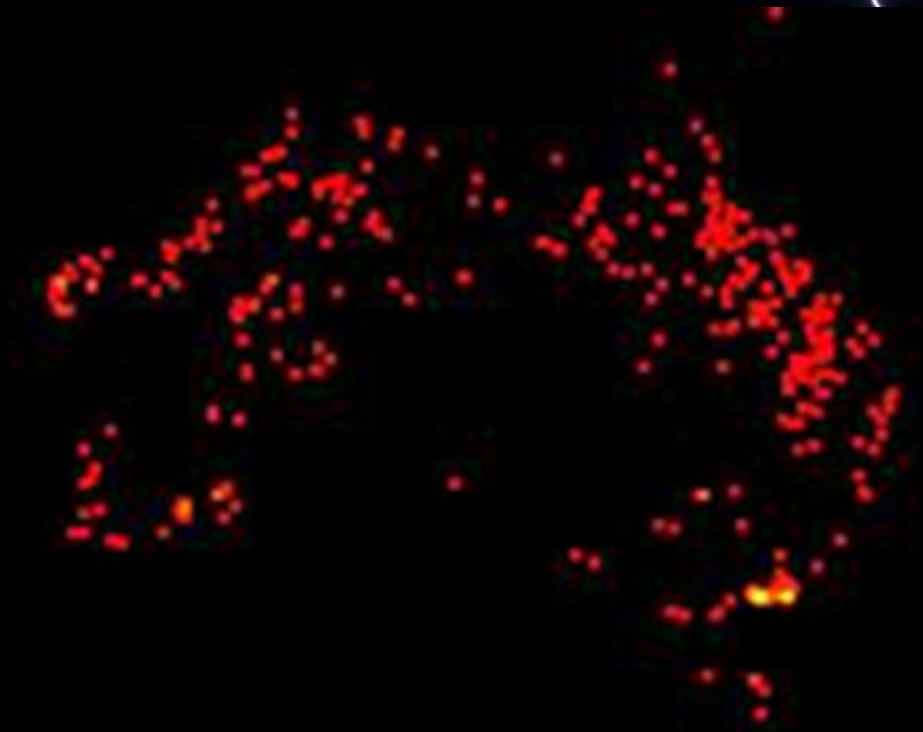
CLIMATE + ARSON
INTERACTIONS
and new ideas

Dr Paul Read

Analysis of 113,000 bushfires from 1997-2009

13%
lightning

40 %
DELIBERATELY LIT



47 %
accidents

(*Collins, Price & Penman, 2015*)

40 %
2008 - 2013

ARSON

The Pyromaniac ?

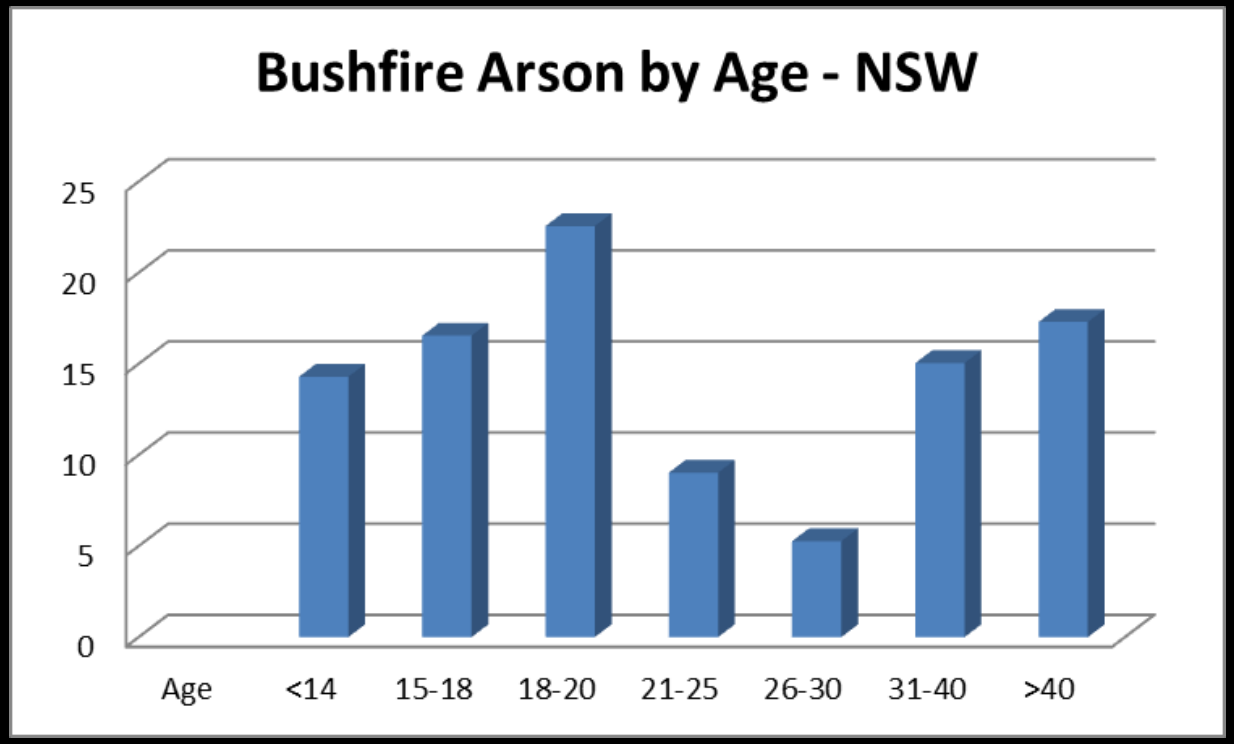
1%

10%

Incarceration

Myth # 2

27 Year Old Male



10% convicted arsonists female

And using a bigger sample

27 SA schools, N=2956, Age 13

- Self-reported firesetting 11% of all boys 3% of all girls (here 19% of 'young' fire-setters are female)

- 1/3 firesetters psychopathic
- 1/3 have made suicidal plans
- c. 20 times more likely to have extreme APD
- c. 7 times more serious drug-use
- c. 3 times more suicidal ideation

- Boys 3 times and girls 7 times more risk-taking
- Boys 6 times more sexual abuse
- Girls 8 times more academic failure

Martin *et al* (2004)

How do children become arsonists?

▶ Download audio

Monday 21 October 2013 7:06PM

Today, police have charged two boys, aged 11 and 15, in connection with a bush fire last week which burned around 5,000 hectares of bush near Newcastle airport last week.

Two girls, aged 12 and 13, have been charged on allegations of starting a fire in Sydney's west on Friday.

As fires are raging across New South Wales, RN Drive spoke to Dr Paul Read about why

Monday to Friday 6pm

Presented by Waleed Rebecca Huntley

IN THIS PROGRAM

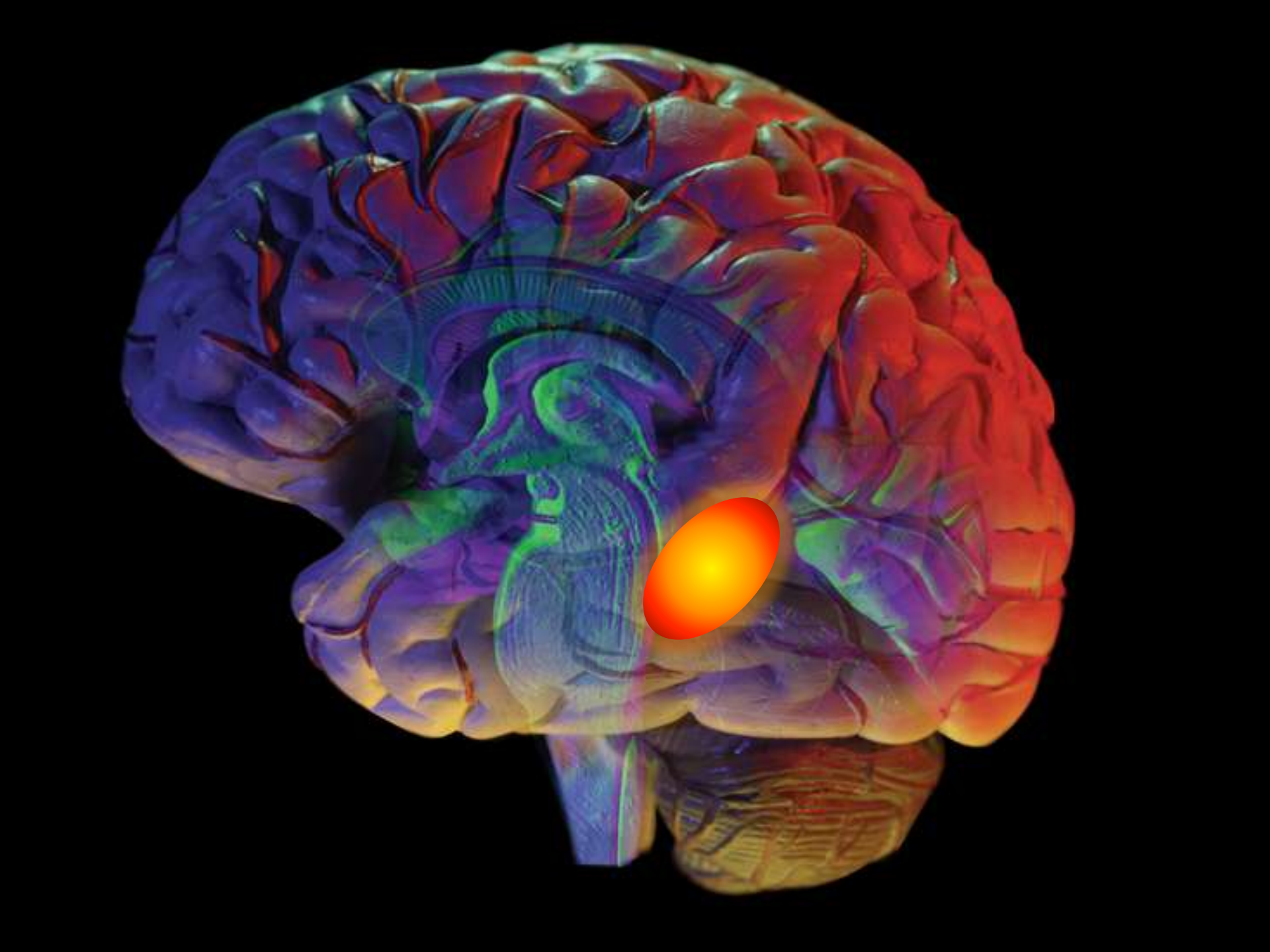
RN DRIVE 21.10.2013 - Mon 2013

Download

NSW Fires: Scenes of de

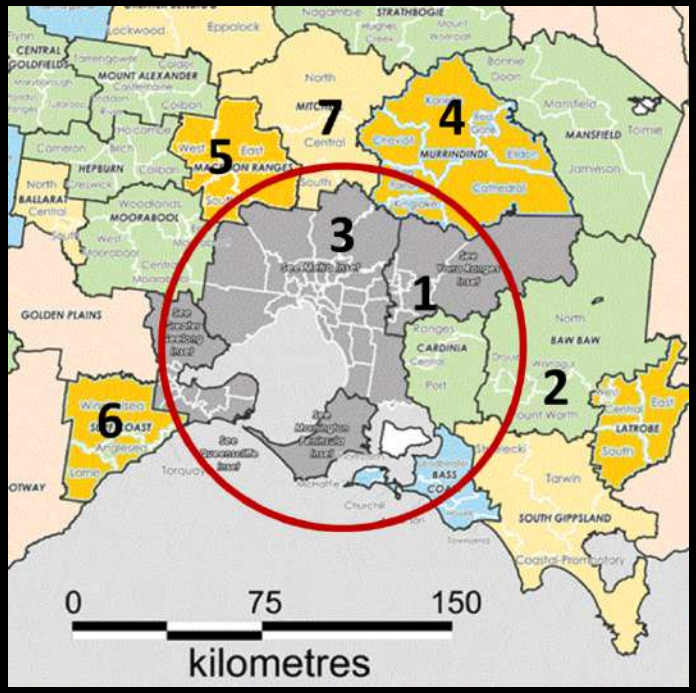
6:11 PM

The psychological impa



Why fire?

We can't and maybe shouldn't profile arsonists, but we can profile community risk and intervene – we have a duty of care to prevent harm



BUSHFIRE = BUSH + FIRE

FIRE-PRONE AREAS ARE USUALLY DISADVANTAGED, ON THE OUTSKIRTS

- Suicide (Distress 11 v 14)
- Drug use ?
- Academic failure (13 v 21)
- Family violence (2 v 6)
- Sexual abuse ?
- Paternal alcoholism ?
- Parental neglect (9 v 16)
- Childhood depression ?
- Low income +66% (Prestemon, 2005)
- Poverty rate (time series, *ibid.*)
- Low education (Bryant, 2008)
- Low employment (Bryant, 2008)
- Peaks 3-6 pm (AIC, 2007)
- Night-time fires on weekends (AIC, 2007)

IGNITION RISK ANALYSIS NEEDS A NESTED HIERARCHICAL REGRESSION MODEL (with levels based on effect sizes)

Four Old Theories

1. Economic Cost-benefit
2. Psychological Fear Model
3. Sociological Context
4. Socioecological Model

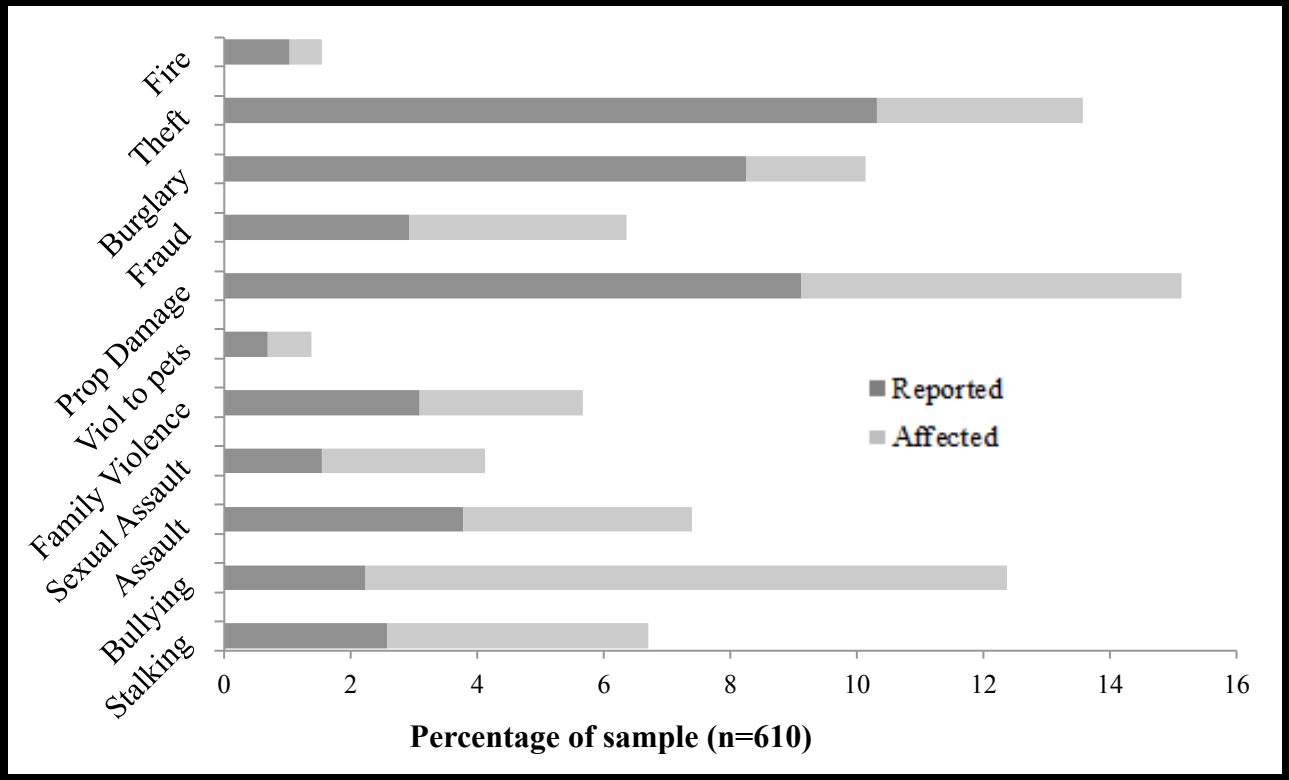
Now replicated in UK, Netherlands & Australia

Victim, perpetrator, place, neighbourhood, culture, reporting routes, insurance, policies, trust in police/judiciary, especially social cohesion and poverty

One New Theory (2012-)

All of the above are actually nested in a socioecological context

People most victimised least likely to report



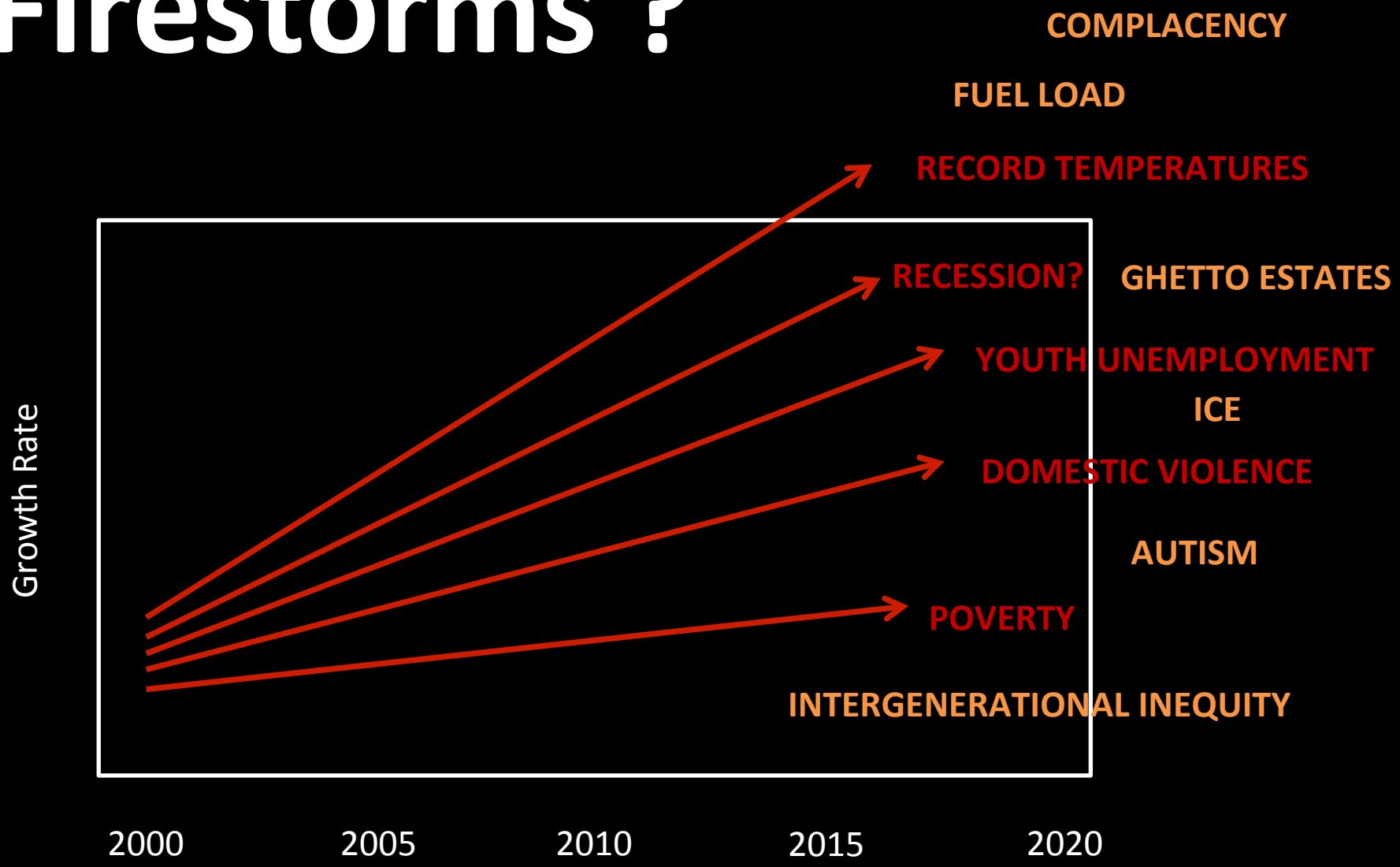
Almost half victimised at least once (43%)
One in 10 not enough food
One in 50 homeless

Averaged across crimes, half remain unreported:

50% family violence
62% sexual assaults
Men report more than women

With arson, 23% always report; another 21% want prevention and treatment, especially for children

Firestorms ?


COMPLACENCY
FUEL LOAD
RECORD TEMPERATURES
RECESSION?
GHETTO ESTATES
YOUTH UNEMPLOYMENT
ICE
DOMESTIC VIOLENCE
AUTISM
POVERTY
INTERGENERATIONAL INEQUITY
Growth Rate
2000
2005
2010
2015
2020

Dealing with the Inevitable: Towards Adaptive Learning for Bushfires

Alan March – University of Melbourne

Disasters

The result of catastrophic events:

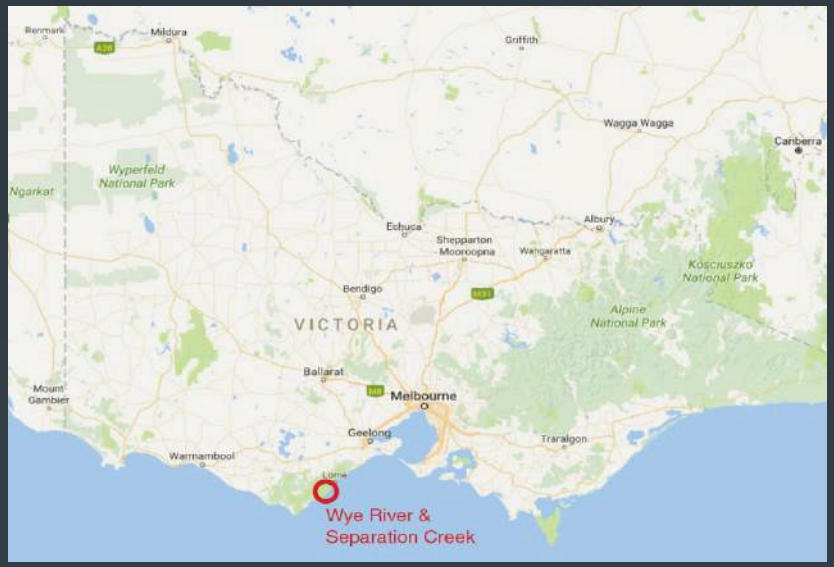
- a hazard overwhelms a system beyond its capabilities,
- significant losses
- non-functioning of system permanently or for a significant time

Disasters in human settlements

A result of the complex interplay between:

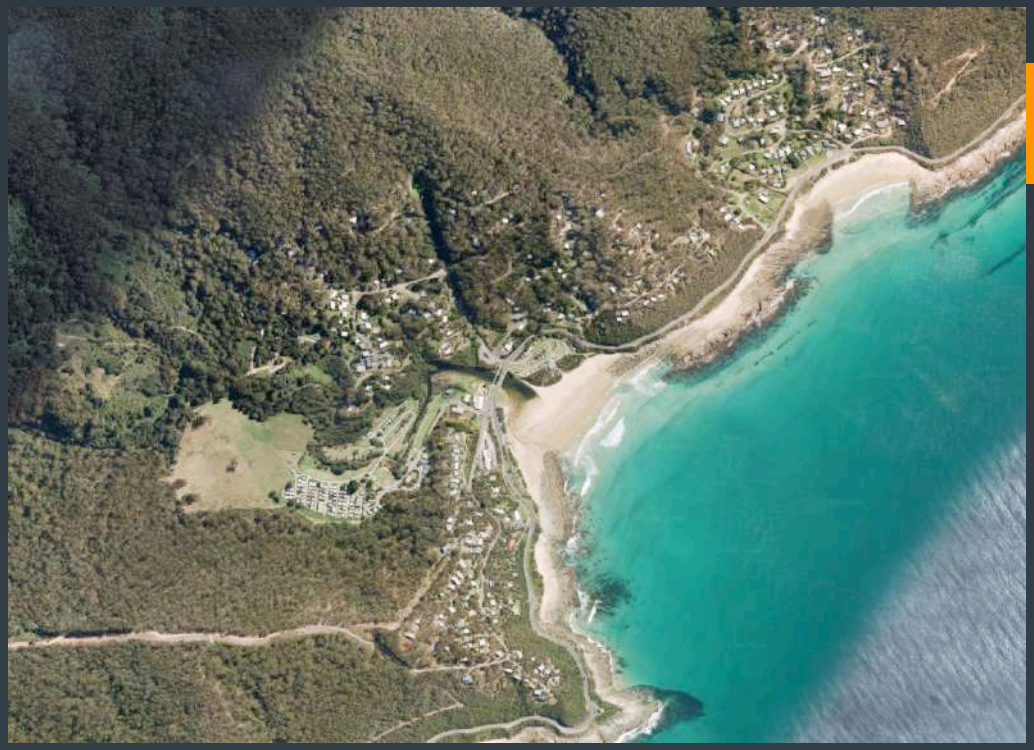
- the existing **physical forms** of places, including natural and human made elements,
- the particular **hazards** faced, and
- the **capabilities of people and services** seeking safety in the face of potential threats

Wye River & Separation Creek



- Scenic coastline / popular tourist destination
- Significant seasonal population variability 168 – 1600+

- Two towns merged / lower density “edges”
- Extensive bushland to north east through south west
- Road access only via Great Ocean Road



Christmas Day 2015 Fire

- Very warm December 2015
- Cape Otway Ranges fires ignited by lightning on 19 December 2015.
- Evacuation siren sounded at 11:30am on the 25th
- Fire weather conditions “Very High” - Forest Fire Rating Danger Index of 49 at 4:30pm

Response of Emergency Services

Orderly and well orchestrated

- Considerable water bombing (18 aircraft)
- Local fire crews
- ~ 50 four wheel drive fire response trucks
- Five tankers in lower areas

Progress of fire

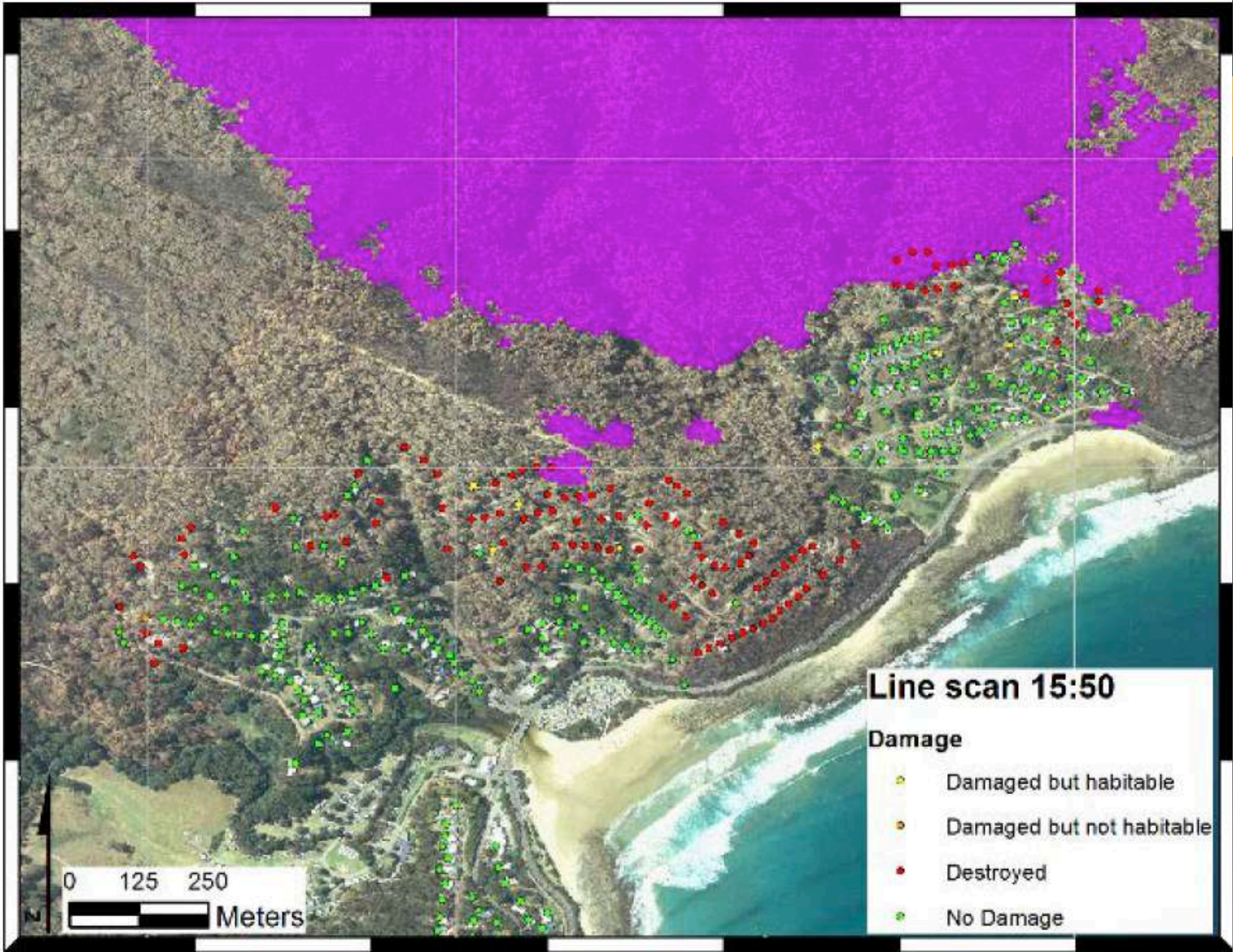
Key finding in CSIRO – CFA Report

Ember attack into the towns

Progressed upslope away from the coast through the dwellings

Mass forward spotting made prediction difficult

(Leonard et al., 2016: 23).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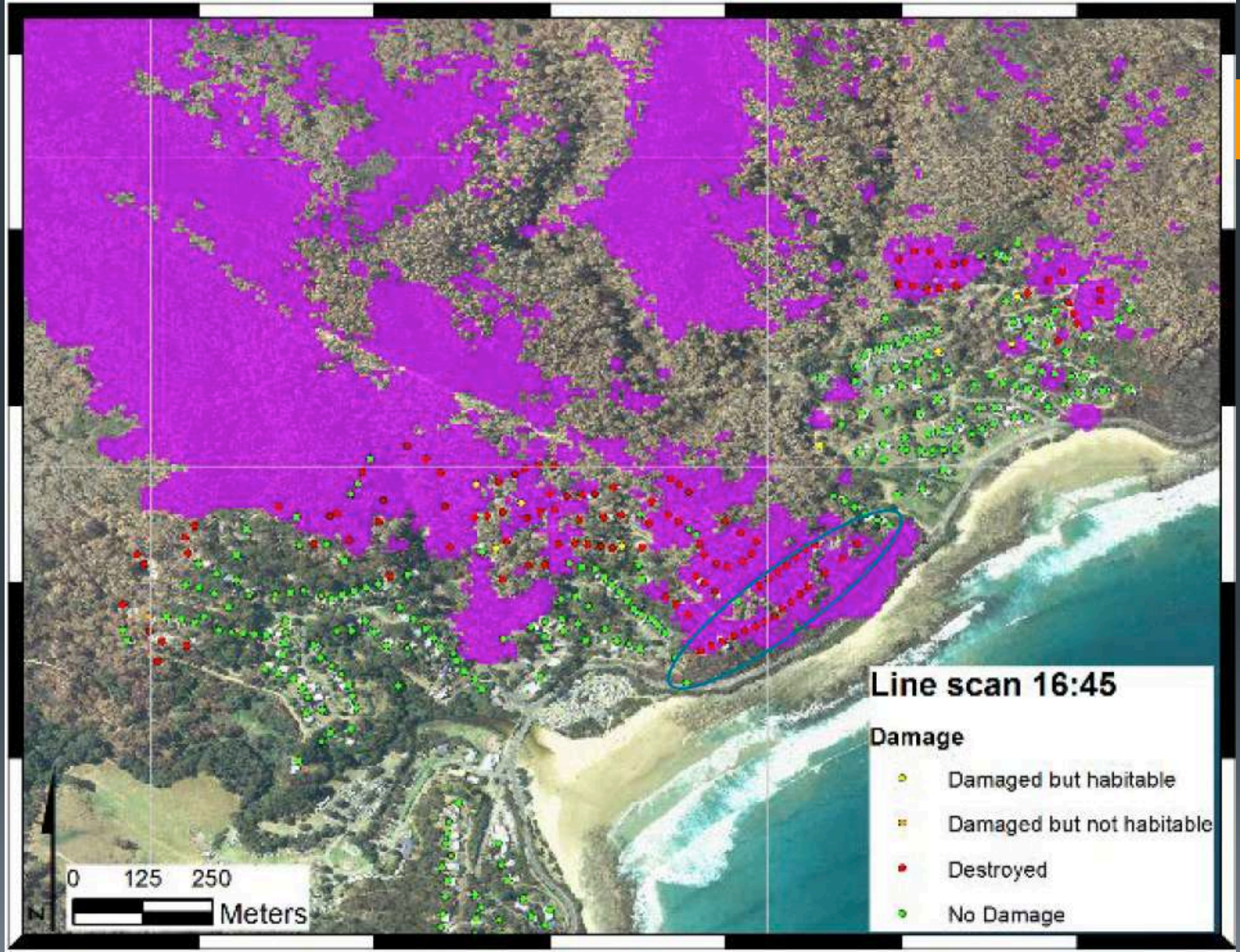
Damage
Damaged but habitable
Damaged but not habitable
Destroyed
No Damage
0 125 250
Meters
N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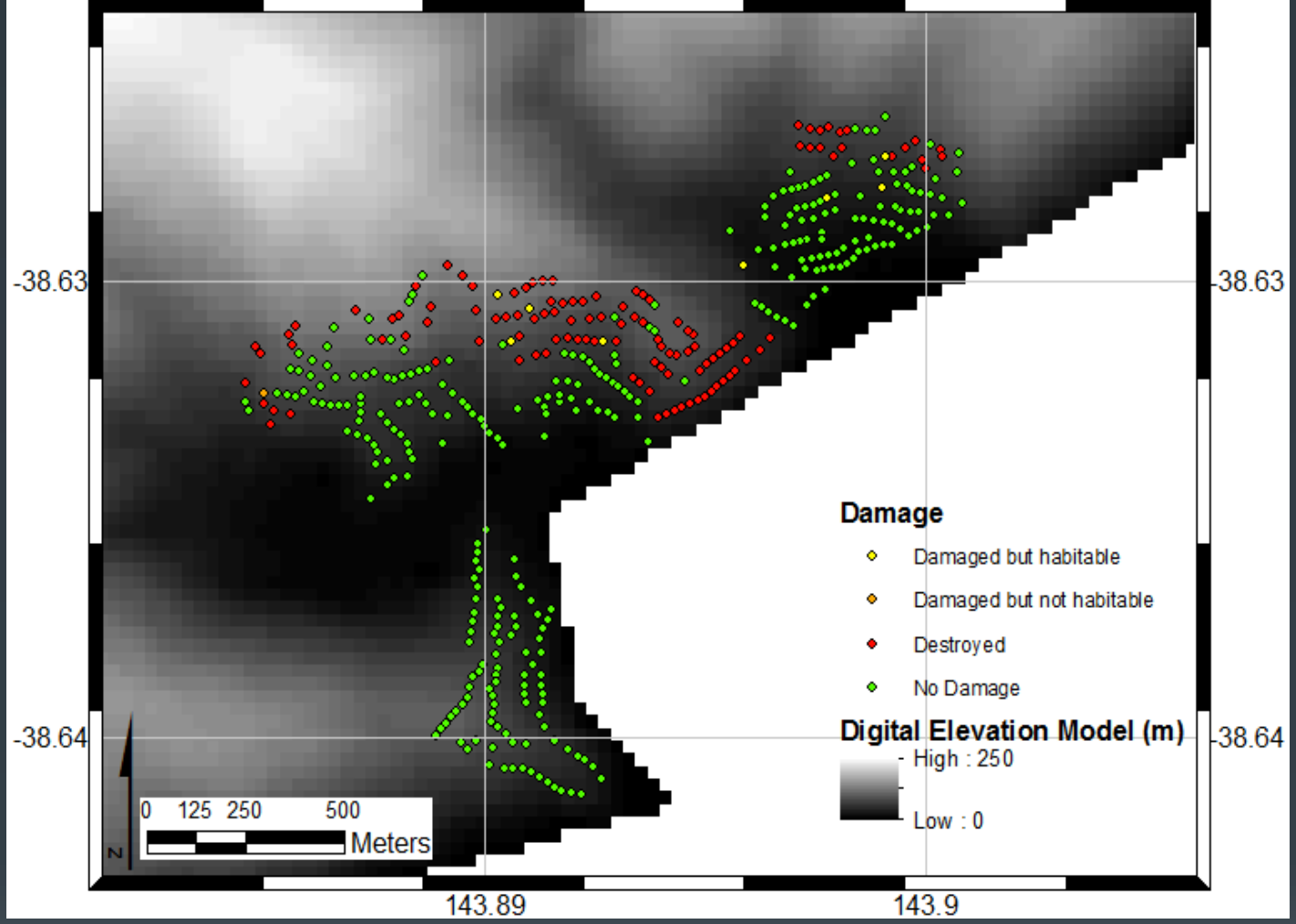


Outcome

- Primarily houses on elevated land were destroyed
- No deaths
- 116 dwellings lost (of 506 total)

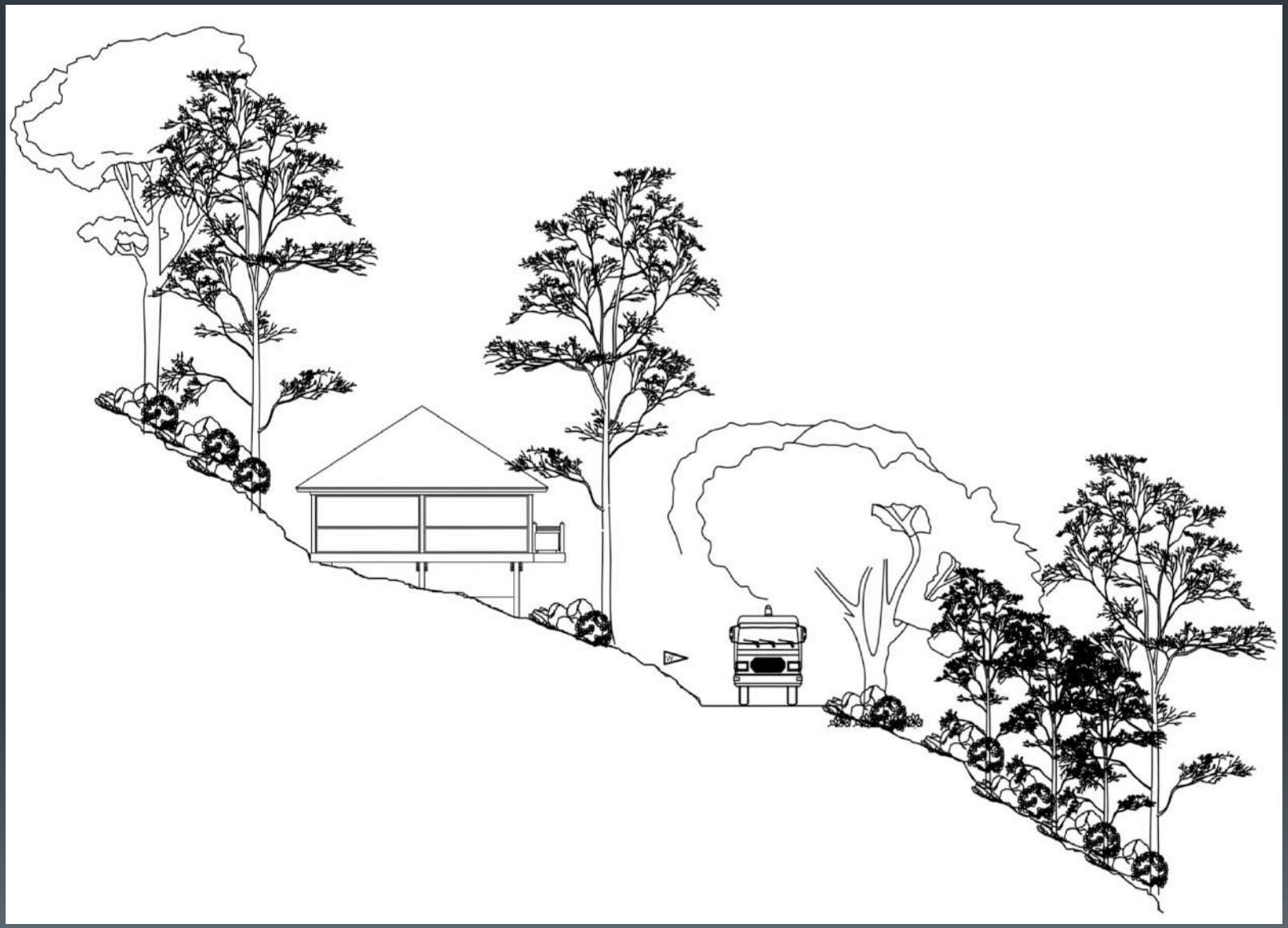
What went wrong?

What can we learn?

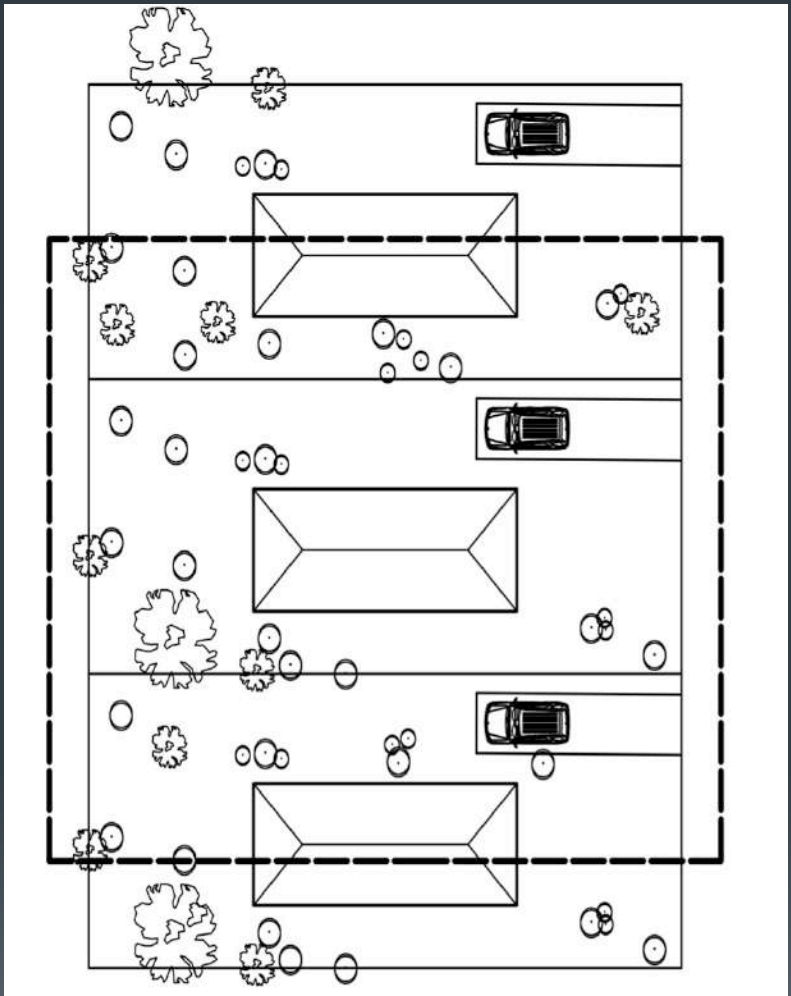
Houses in vegetation that is very receptive to ember ignition

Steep slopes

Houses close together



Challenges of active defence in topography



BAL Ratings that ignore houses in proximity

Poor maintenance, use and design

Existing structures

Human Behaviour and the Nature of Occupancy

Where Next?

Towards Resilient Adaptation?

People

Working with targeted and different people

Coordinated and ongoing education, research, training

Challenge of absent owners

Governance, regulation and processes

Adaptive learning rather than falling back on existing procedures

Need ways to iteratively update risk profiles after changes

Need wider program to examine factors in deeper detail, and act

Physical structures and settlements and environment

Need mechanisms in place *prior and after* event to allow return to or improvement of functions

Resilience

[T]he ability of an urban system – and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales – to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and **to quickly transform systems that limit current or future adaptive capacity**"

(Meerow, Newell, & Stults, 2016: 45).