Lessons Identified from Victorian Bushfire Royal Commission Inquiry into Black Saturday Bushfires

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Western Australia

King Lake Fire

Presentation

- What happened on the ground
- Royal Commission Conclusions
- Recommendations
- Implications

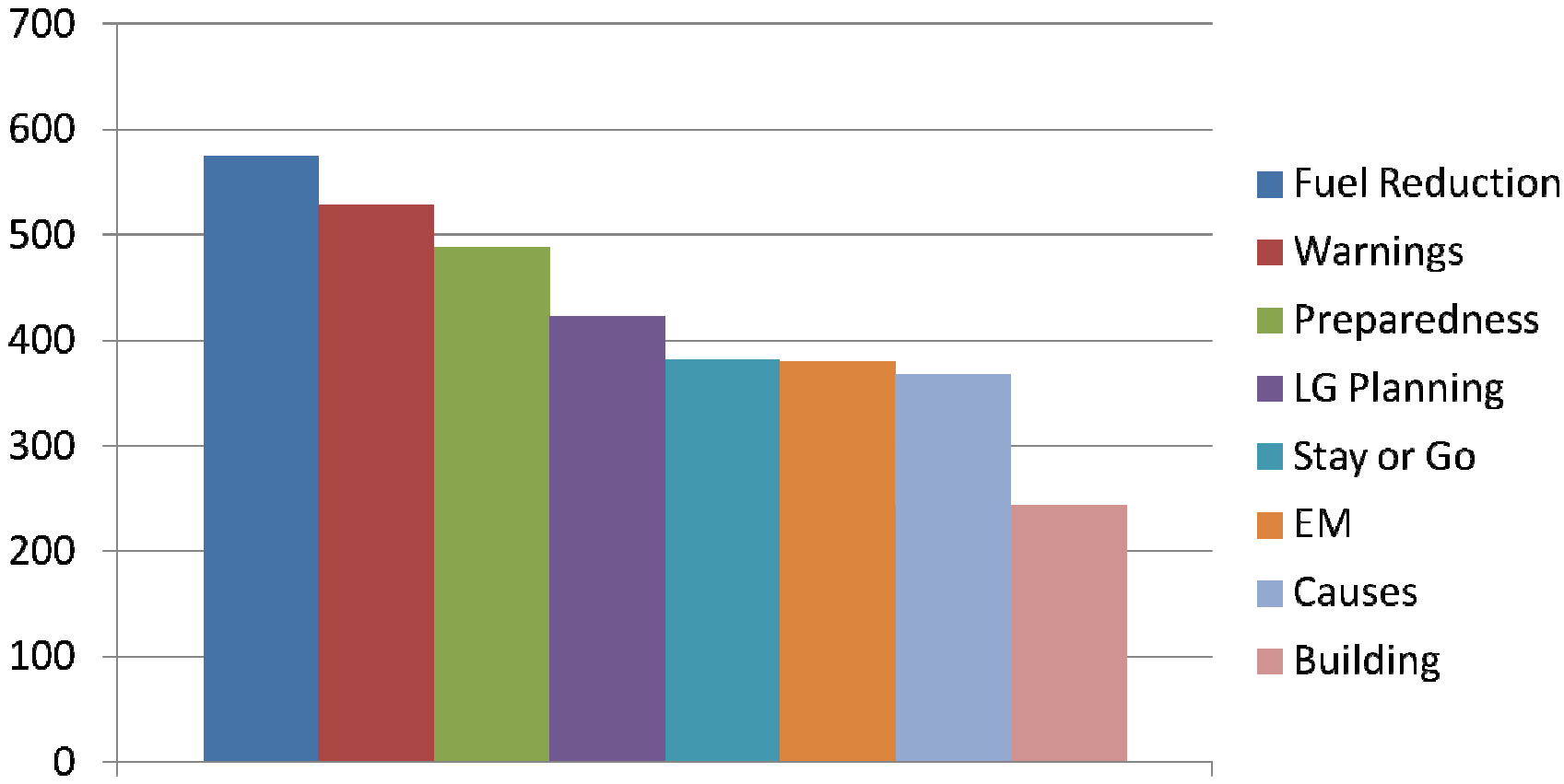
Terms of Reference of VRC

- Over 300 fires
- Unprecedented loss of life
- Investigate:
  - Causes and circumstances
  - Preparation and planning
  - All aspects of response
  - Measures to minimise disruption of supply of essential services
  - Any other matters deemed appropriate
- Make recommendations
- Interim report 17 August 2009
- Final report 31 July 2010

Community Consultations

- 26 Community consultations completed prior to hearings commencing in April
- Sought to learn about experiences and concerns in fire affected areas
- Considerable public debate as to their value and appropriateness
- Valuable source for identifying witnesses, seeing the ground and understanding issues
- Not evidence

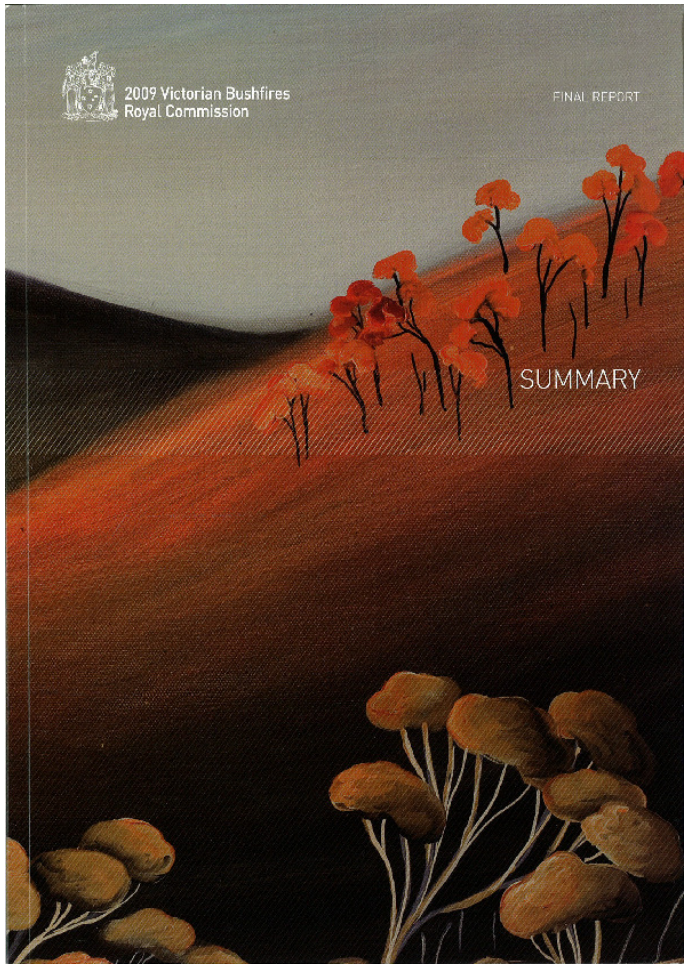
1, 700 Submissions



Hearings

- Commenced 11 May (directions hearing 20 April 2009)
- Concluded 27 May 2010
- 155 Days of hearings
- 8 days of regional hearings
- 23 days examining 173 fire related deaths
- 434 witnesses
- 20,767 pages of transcript
- 1,000 exhibits

Victorian Bushfires Royal Commission



- Final report was released 31 July 2010
- 67 recommendations, key issues include:
  - community warnings
  - policy for evacuation and refuges
  - planning regulations
  - land and fuel management

Recommendation Summary

- Victoria's bushfire safety policy (7)
- Emergency and incident management (12)
- Fireground response (7)
- Electricity-caused fire (8)
- Deliberately lit fires (2)
- Planning and building (19)
- Land and fuel management (7)
- Organisational structure (2)
- Research and evaluation (1)
- Monitoring implementation (1)
- Reflections (1)

Victorian Fire Responsibility

- Dept of Sustainability and Environment (DSE) manages fire on Public/Crown lands (7.5 Mill ha) ..with Parks Victoria
- Country Fire Authority and volunteer bushfire brigades (CFA) respond to fires on private land and Municipal lands.
- Melbourne Metropolitan Fire Brigade looks after fires in large urban centers. Some inconsistencies exist on urban fringe.
- Joint arrangements between DSE/CFA on most large rural and interface fires

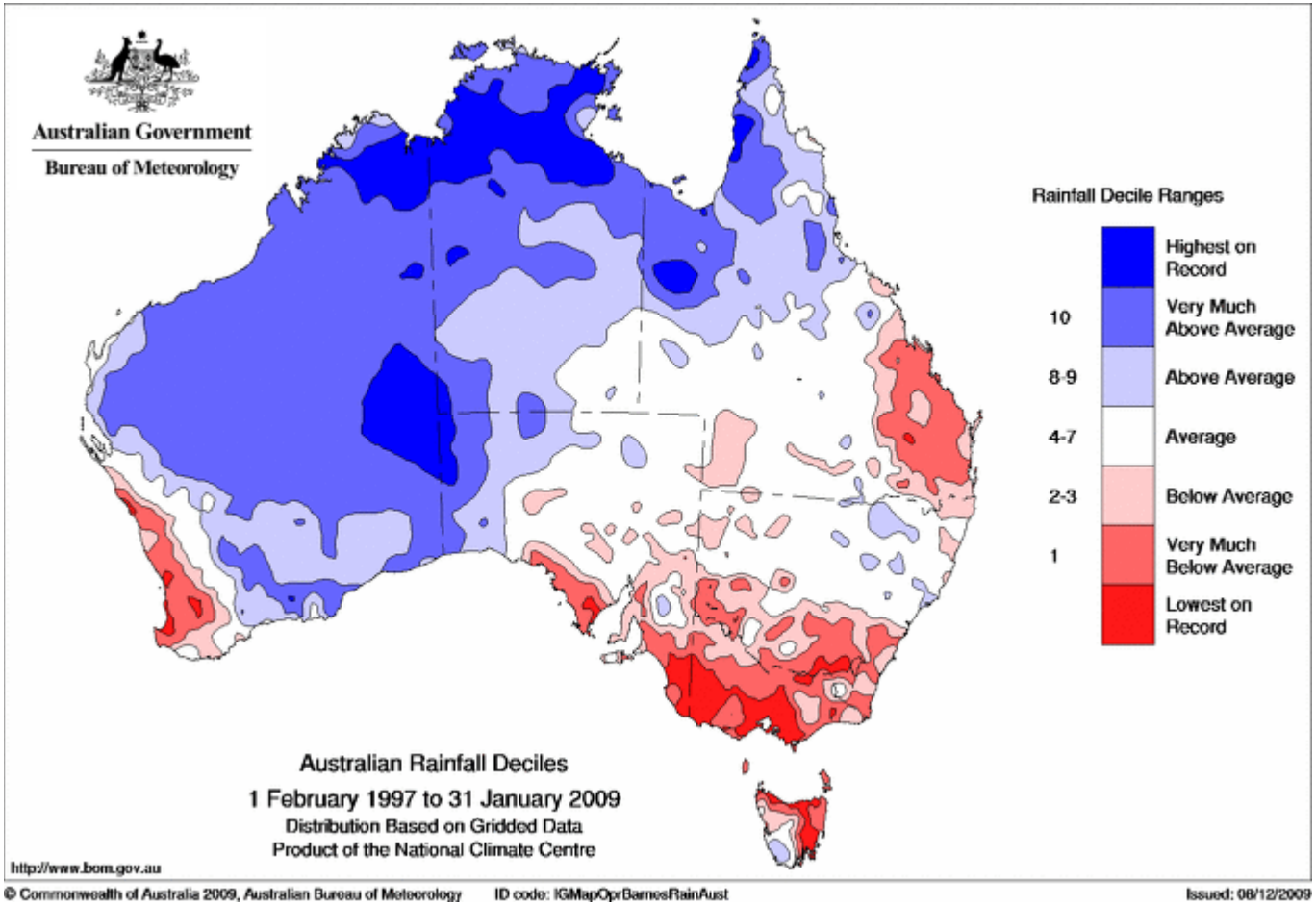
Fire Responsibilities

- Local Municipalities (Shires) required to maintain prevention, preparedness and recovery plans for residential areas. Many plans found inadequate.
- Many “Green” councils actively discourage vegetation clearing, fuel reduction and access safety measures.

Pre Conditions

- Climate - drought, rainfall, extreme heat
- Weather on the day
- Fuel loads on public and private lands
- Vulnerable communities
- Ignition sources
- Existing “Stay or Leave Early” policy

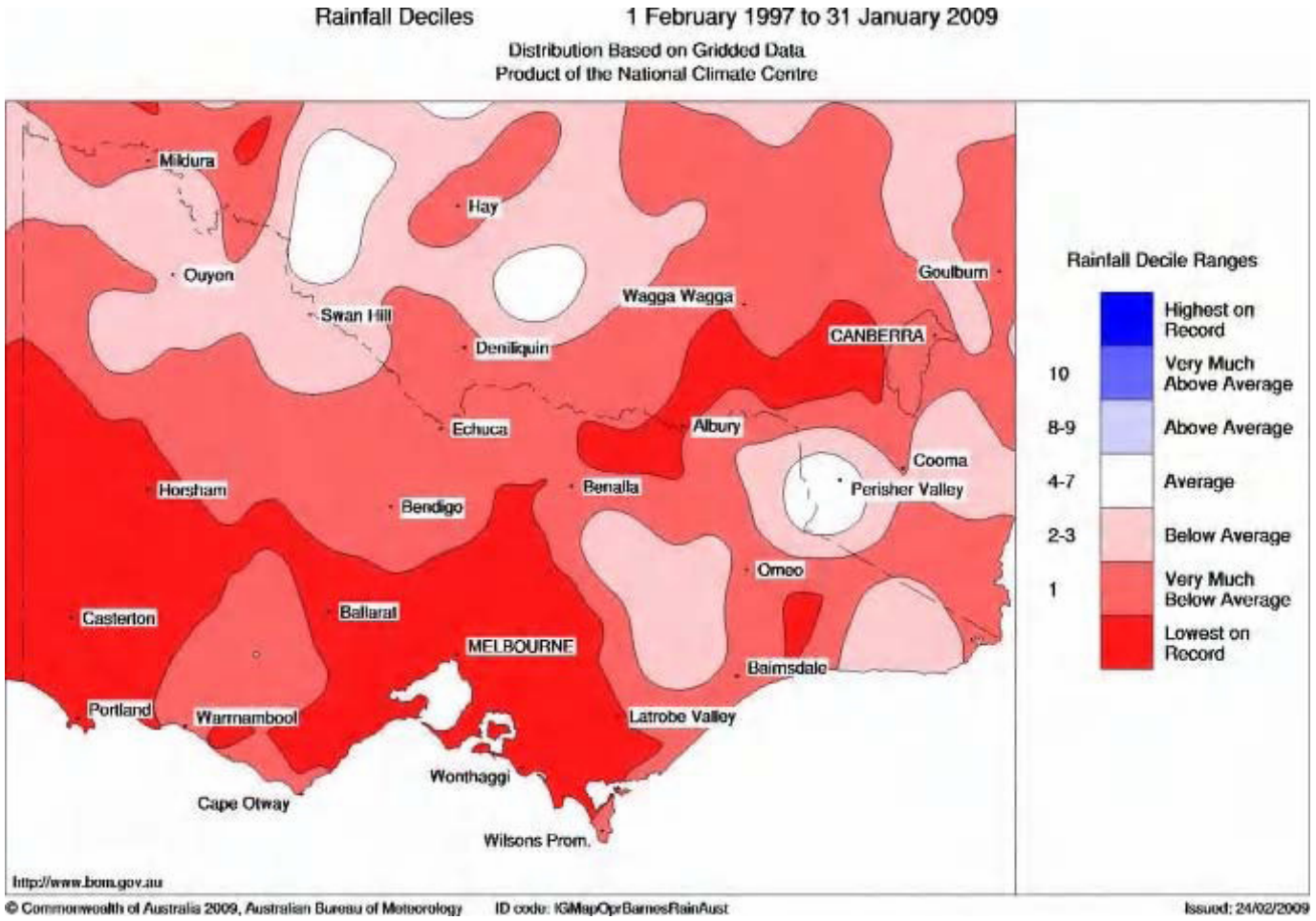
Climate: drought



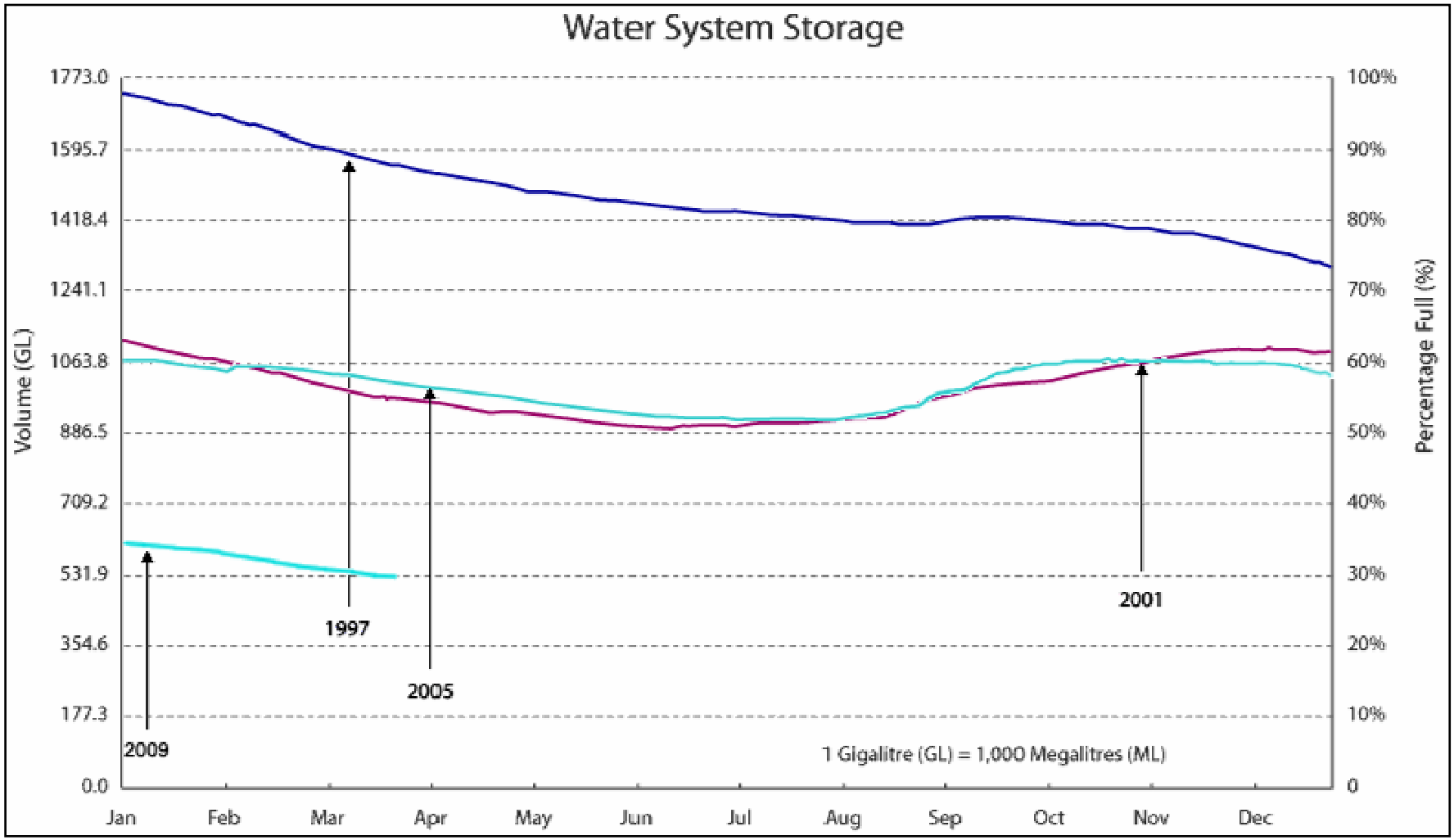
- Significant rainfall deficit since 1970s in south-west WA
- Significant rainfall deficit in south-east over last 12 years (and continuing)

Rainfall Deciles 1 Feb '97 to 31 Jan 2009

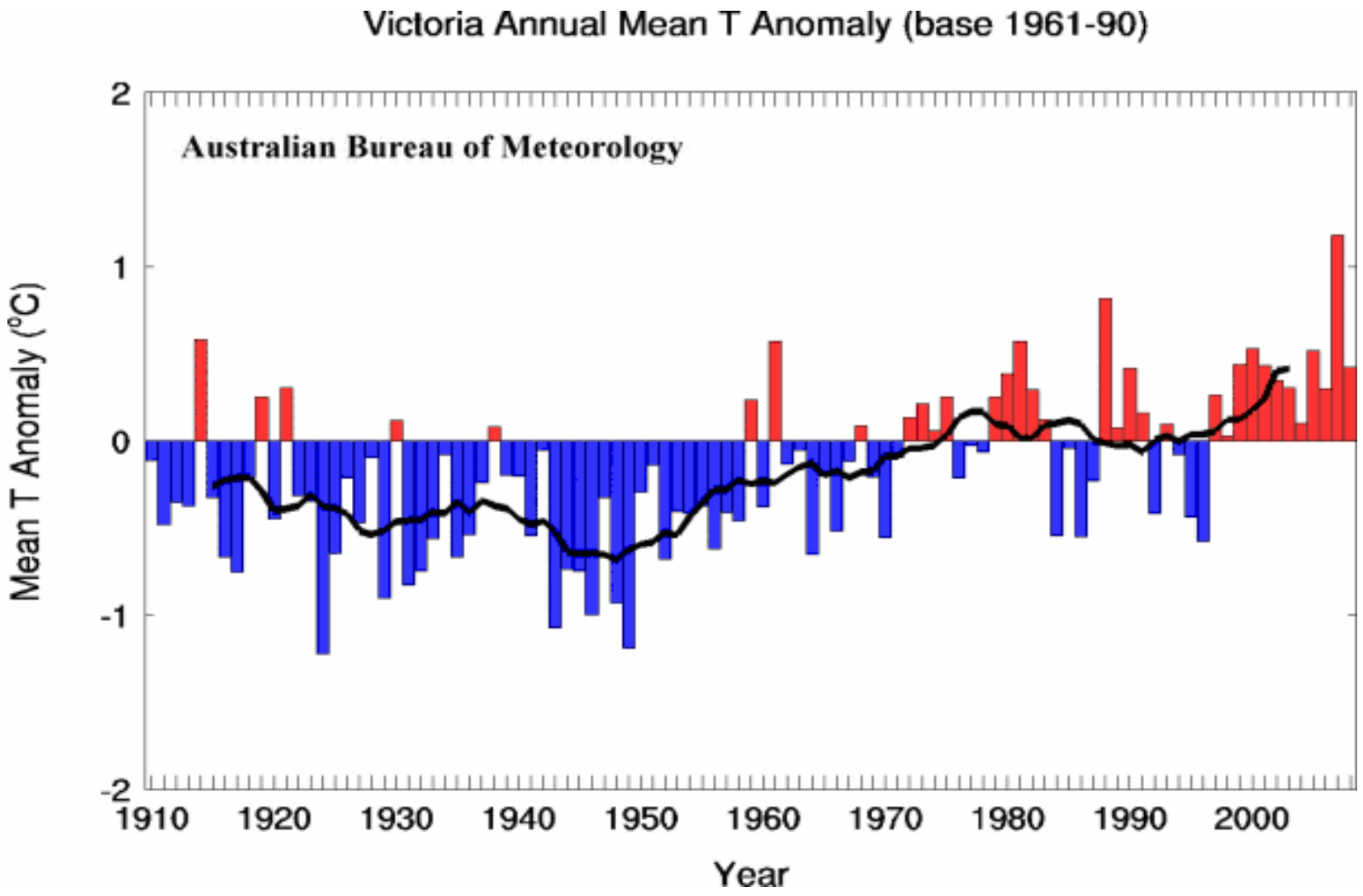
Most of Victoria Lowest on Record



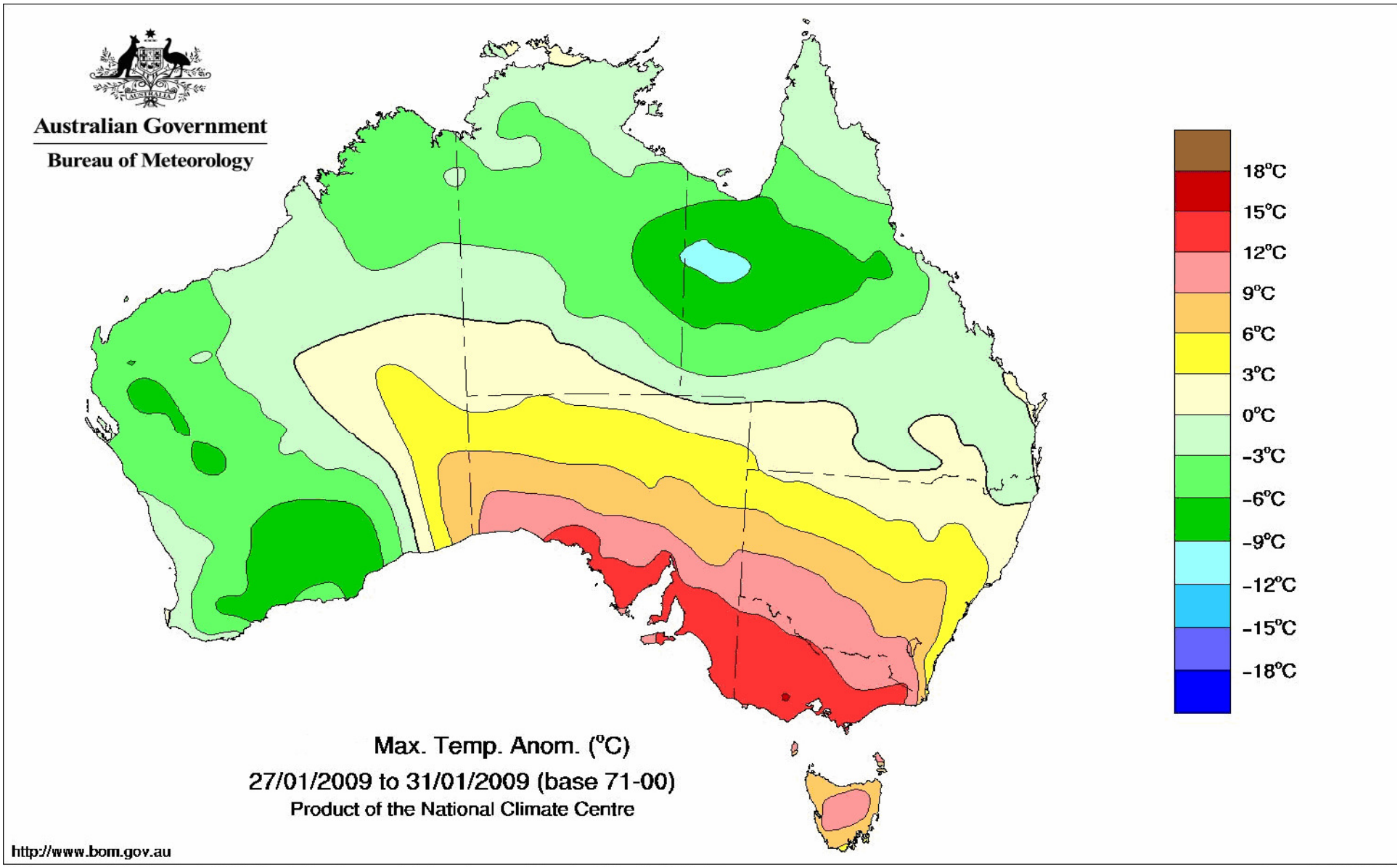
VICTORIA'S WATER STORAGE



Victorian Mean Temp Pattern 1910 to 2009



Max Temperature Anomalies 27 – 31 Jan 2009



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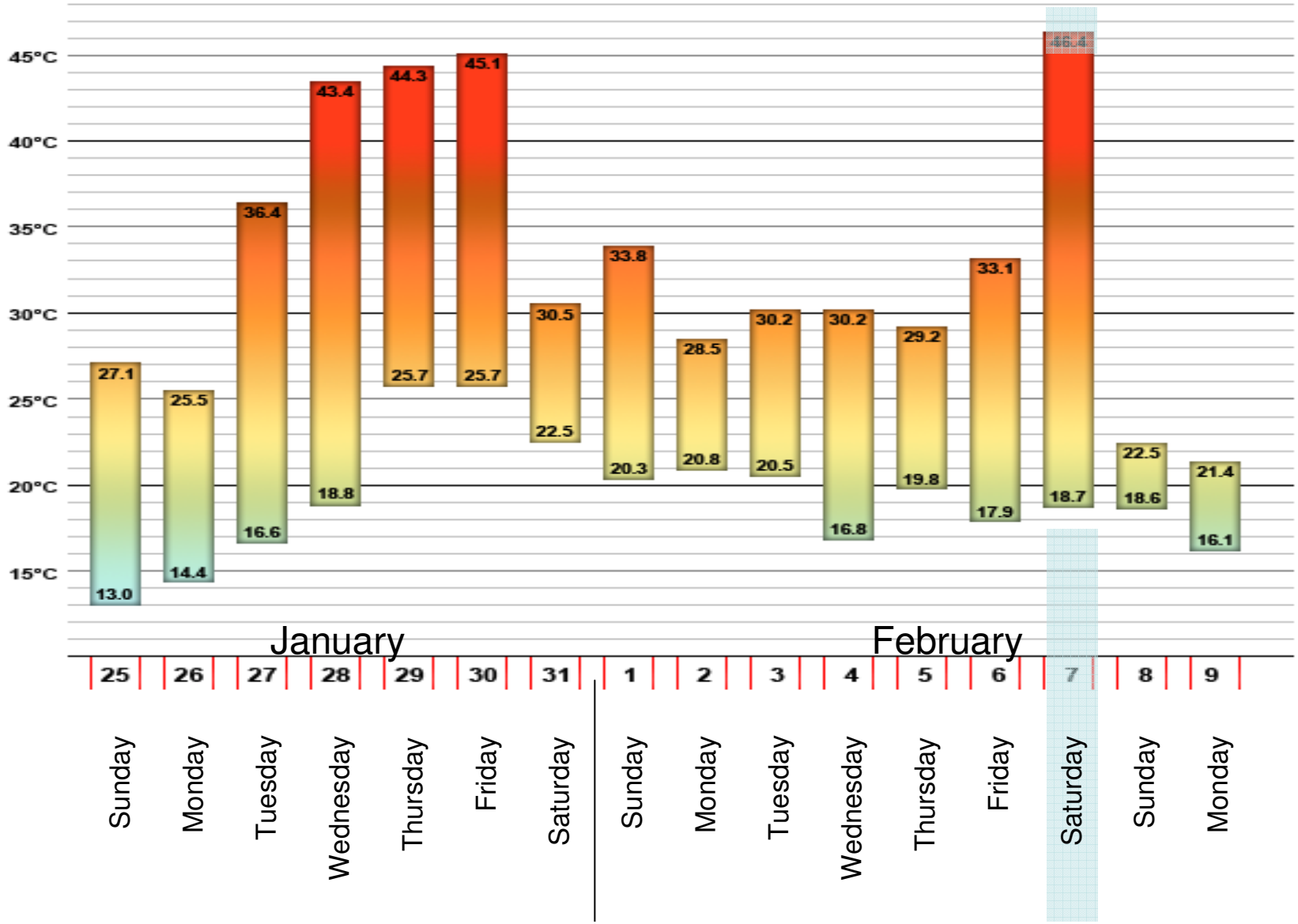
MELBOURNE CITY MIN / MAX TEMP

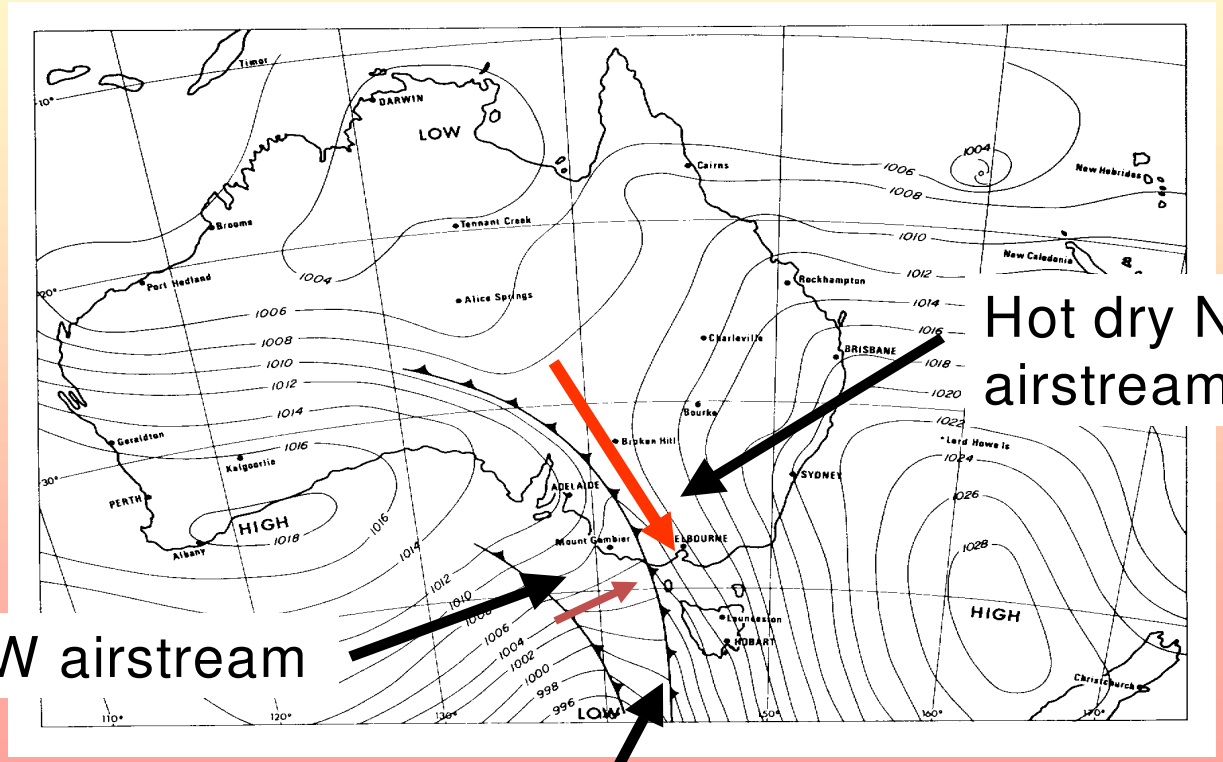


Overall climatic conditions

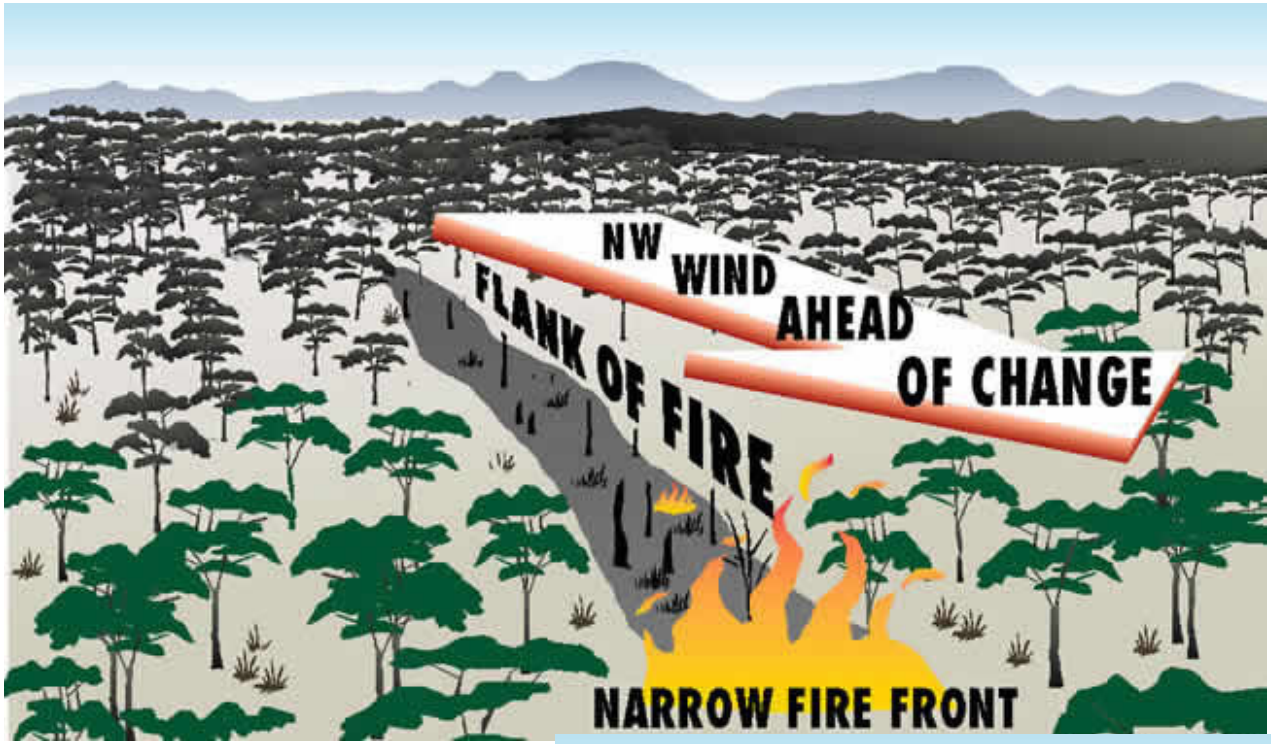
- Central Australia has warmed by between 1.5 and 2.0°C during the past century
- From 1997-2009 Victoria experienced warmer than average temperatures. The decade 1999–2009 was the warmest recorded in the 154 years of record keeping
- Melbourne and in western Victoria—had received their lowest rainfall on record
- The early part of 2009 was exceptionally dry
- In January 2009 Melbourne had three consecutive days over 43°C—a record

Typical Extreme Fire Weather Pattern in SE Australia

Cold fronts



Wind Change


NW WIND AHEAD OF CHANGE
FLANK OF FIRE
NARROW FIRE FRONT


SW WIND AFTER FRONT
FLANK BECOMES WIDE FIRE FRONT

Blow down at Murundindi fire

Massive convection column development and spotting

- Potential for significant lofting due to very deep mixed layer and strong fire convection
- Strong winds aloft
- Mass spotting was a key mechanism of spread in hilly terrain

What happened on the ground

- Actual number of fires on the day unclear
- Likely to have been over 300 reported fires although many more incident reports
- Commission looked at 15 total
- Five caused death; total 173 died.
- Kilmore- 119 deaths,232 hurt, 1242 houses
- Churchill- 11 deaths, 35 hurt, 145 houses
- Murrindindi- 40 dead, 73 hurt, 538 houses
- Bendigo & Beechworth- 3 deaths, 53, 96

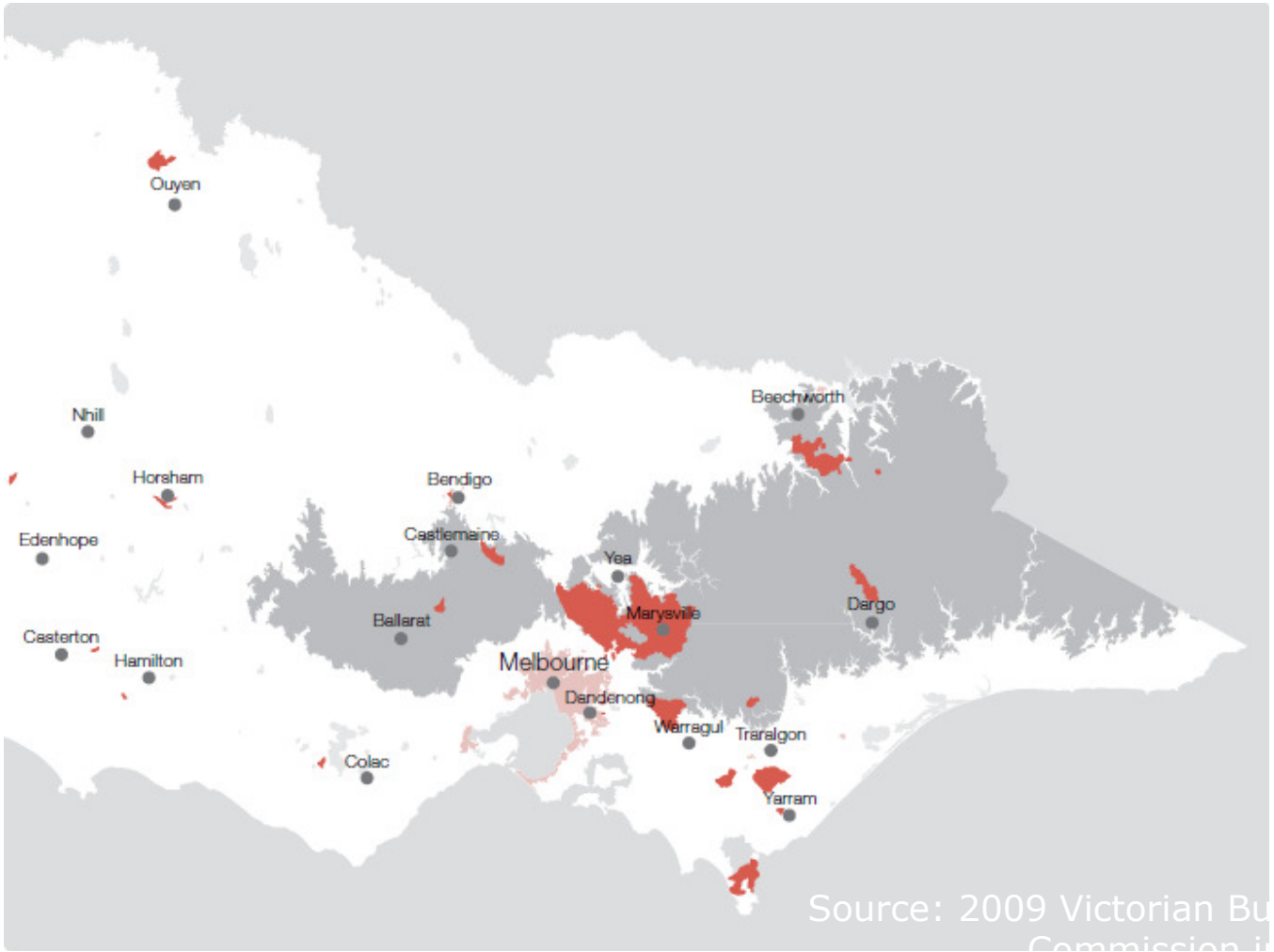
Black Saturday, 7 February 2009

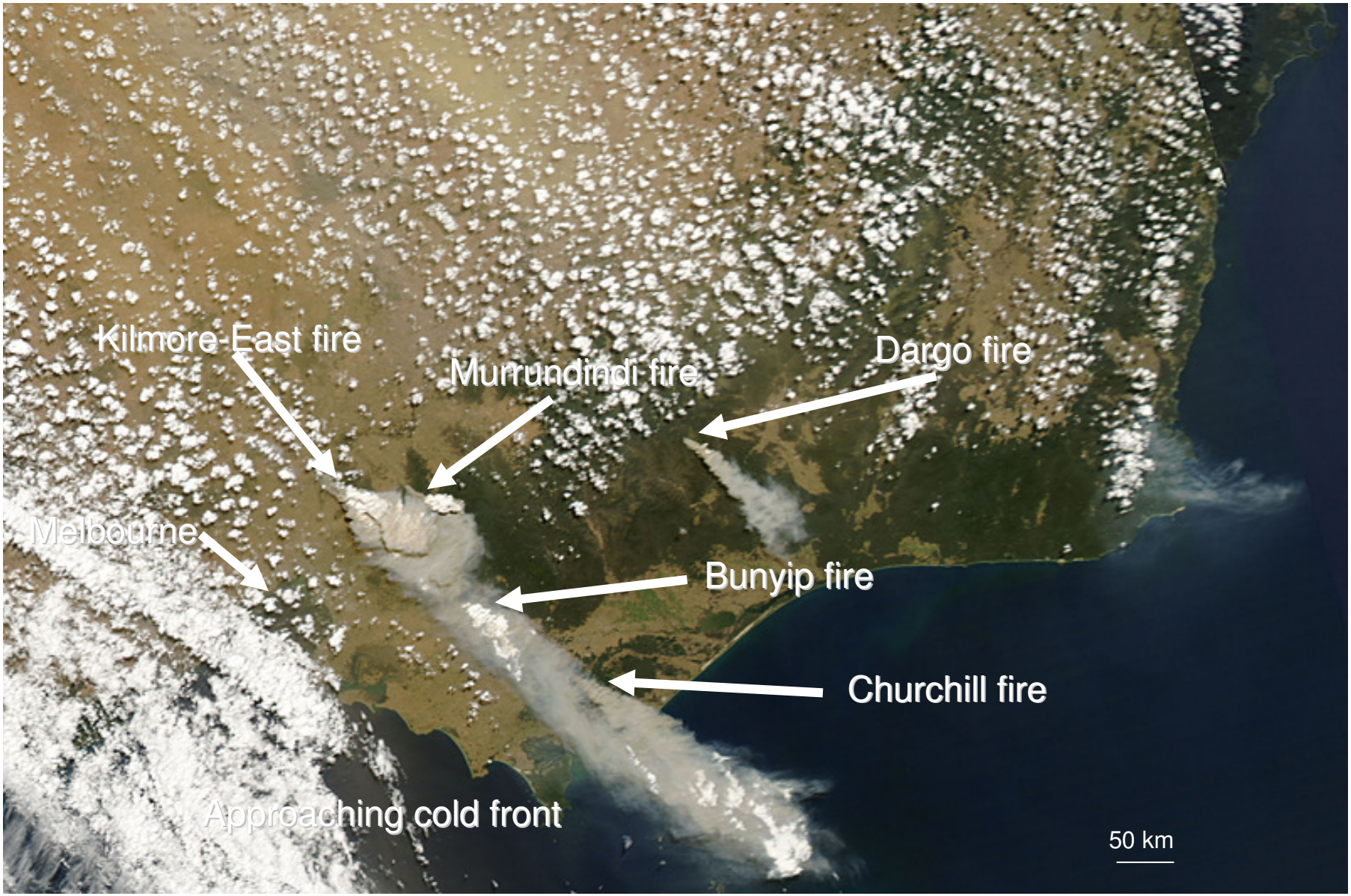
- 173 people killed
- 2059 houses destroyed
- 78 townships destroyed or seriously affected
- Thousands of people displaced
- 22,500 people registered for assistance

Ignitions

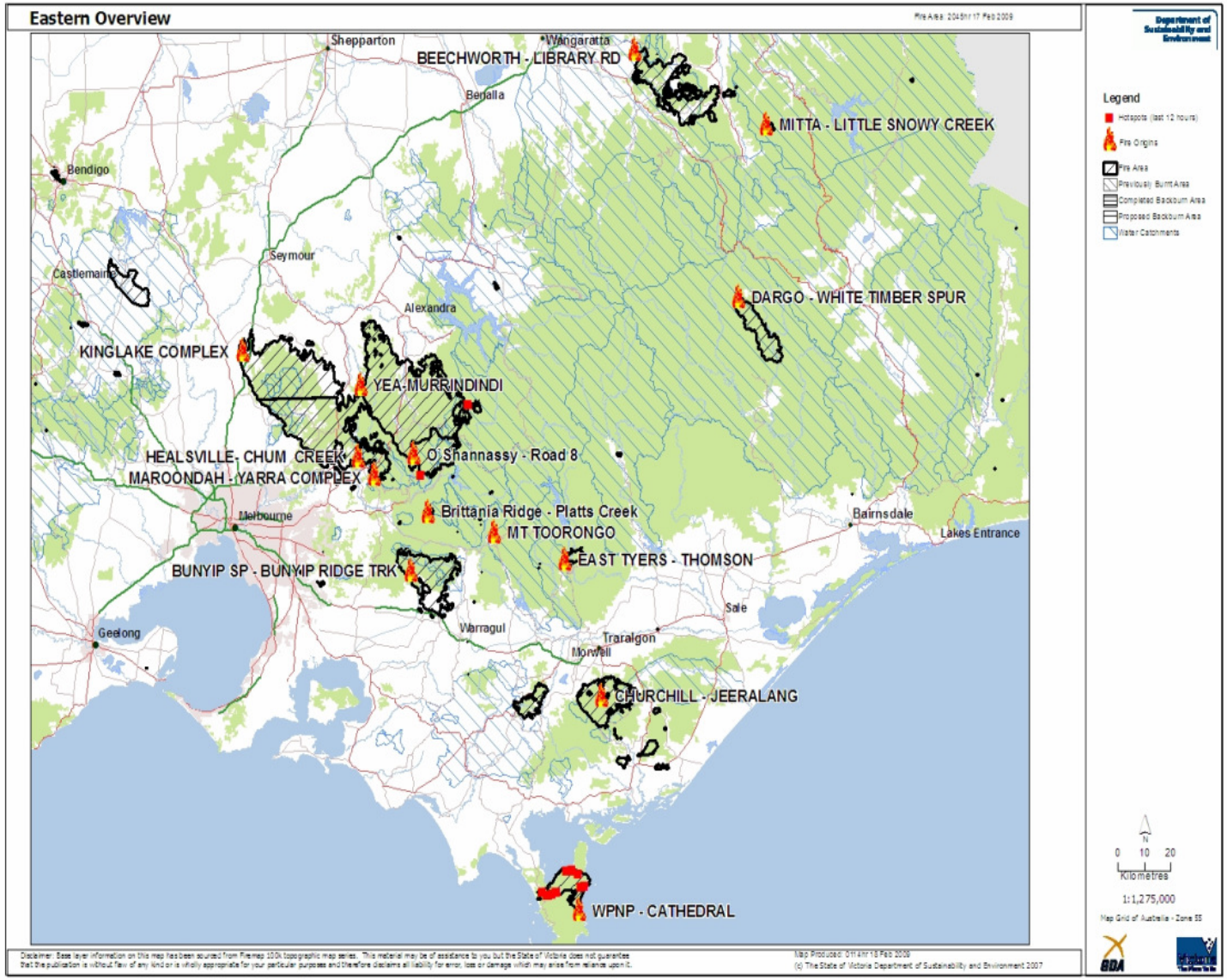
- Electricity Powerlines (E)
  - 11:49 Kilmore East
  - 12:20 Horsham
  - 12:30 Coleraine,
  - 13:15 Pomborneit-Weerite,
  - 1800 Beechworth- Mudgegonga
- Suspicious –Arson (S)
  - Delburn
  - 13:32 Churchill,
  - 14:55 Murrindindi
  - 16:20 Bendigo

Extent of bushfires Black Saturday, 7 February 2009




Kilmore-East fire
Murrundindi fire
Dargo fire
Melbourne
Bunyip fire
Churchill fire
Approaching cold front
50 km

Major Fires still uncontrolled 2 weeks later



Impacts on Water Catchments
More than 30% severely affected


Looking northwards from Melbourne towards Kinglake on the evening of 7 February
Source: unknown

Deaths

- Lack of firefighter deaths and injuries
- Vulnerable people who remained in fire path
- People defending undefendable homes
- Time from fire ignition to death averaged at 5 hours
- Time from wind change to death averaged 32 minutes and for Marysville it was 18 minutes

Professor Handmer (BCRC study)

- 69% were classed as ‘passively sheltering’ inside a building at the time of their death—as opposed to ‘actively defending’
- 38% found in bathrooms
- 44% were classed as ‘vulnerable’ because they were aged less than 12 years old or more than 70 years or because they were suffering from an acute or chronic illness or disability
- 32% lost their lives on properties whose defendability was questionable
- 14 % were fleeing the fire at the time of their death; of these, 4 % were fleeing in a vehicle and 10 %were on foot
- The fire took by surprise 30 %of those who died
- 58% had made no preparations either for staying and defending or for leaving early. A number were prepared to leave but were apparently awaiting a warning or trigger

Identified by Commission

- 113 died in or near house
- 24 died fleeing in vehicles or on foot
- 36 died in a variety of circumstances both on the move and stranded
- A number were not suitably clothed
- 32% died in late evacuations
- Many of the houses where people died were assessed as ‘undefendable’
- Bodies of water were underestimated as suitable bushfire shelters

Identified by Commission

- As many as 50% of those who died could be classed as vulnerable: Over 60 y/o; children; infirmed;
- Most Men wanted to stay in their homes and most women wanted to leave
- Being well prepared is very demanding and any fault can be life threatening
- Fire agencies have failed to sufficiently emphasise:
  - Risk of dying
  - Need for independent utilities
  - Standard of equipment required
  - Influence of surrounding vegetation
  - Criticality of large defendable space
  - Requirement for Plan B and Plan C
  - Psychological impact

VRC Conclusions - Successes

- Firefighter Safety
- The vast majority in fire footprint did survive
- Campaign fires were well managed
- Potential disaster near Dandenong Ranges averted
- Where IMT were established and ready prior to fire ignition, the fire was generally well managed
- Large (>600 ha) planned burning was effective and highlighted critical role for fuel reduction
- Emergency management arrangements at the municipal level generally worked well, albeit with IMT coordination difficulties

VRC Conclusions

- The impact of the wind change was not adequately considered or reflected in warnings
- Safety advisors generally not appointed although firefighter safety good
- AIIMS proved effective although some reversion to group control
- Information gathering and analysis varied

VRC Conclusions (2)

- There were shortcomings in resource tracking
- Record keeping was inadequate
- Handovers are critical and their effectiveness varied; in some cases they did not exist
- Many 000 calls were delayed or unanswered and many more Bushfire Information calls
- There were extensive operational communication problems including with police
- Timeliness and quality of warnings varied and were not addressed

VRC Conclusions (3)

- Planned evacuations were not considered. There were individual or adhoc actions.
- Municipal plans gave inadequate attention to bushfire
- Municipal emergency coordination centres were effective but lacked information
- Enforcement of road blocks became a frustration between police, firefighters and residents
- There was a lack of information flow from ICCs

Long-unburnt, Heavy, Flammable Fuels

Bark fuels result in Short distance saturation spot fires (< 1-2 km); and sporadic long distance 10 – 25 km spots

Low intensity planned burns

PB on Victoria Public lands 1991-2009

Ranges from 0.5 to 2 % of landscape

Dr L. McCaw post-fire study

- Beechworth, Bunyip, Kilmore East and Murrindindi fires
- While previous burns did not mitigate the immediate impacts under the most severe conditions, some prescribed burns had significantly assisted in ultimate fire containment.
- Under very severe or extreme conditions the fuels had to be quite young (three years or less) to reduce the intensity and spread of a severe fire, depending on the extent of fuel removal during the prescribed burn. In addition, the treated areas need to be large—of the order of 600 hectares or greater.
- Tolhurst made separate observations of the Beechworth fire and indicated prescribed burns and bushfires had had a significant impact on the final outcome of that fire, reducing its final area.

Effectiveness of prescribed burning Expert Panel Advice

- Fuel age and weather interact, and both are important in influencing fire severity. Extreme weather is the predominant influence on the likelihood of crown fire.
- A well-conducted prescribed burn, if large enough, can reduce intensity and speed of extreme fire 2 to 3 years after it is conducted.
- Prescribed burning reduces the number of bushfires because the take-up rate of fire in more recently fuel-reduced areas is low.
- Reduction in the rate of spread of fire will persist as a consequence of prescribed burning for five to eight years.
- The expert panel considered that size *does* matter in relation to this question. Cheney: 'The key to a burning program is wide-scale protection across the landscape.
- Panel recommended annual PB to range from 5 to 10% landscape

Land and Fuel Management
VRC Conclusions

- The current prescribed burning regime in Victoria inadequately reduces the risks associated with bushfires
- Accountability for achieving publicly recognised targets and effective implementation of prescribed burning is not evident or supported by transparent resourcing
- There is a poor understanding of biodiversity and the effects of different fire regimes on biodiversity
- There are unresolved tensions between bushfire risk mitigation and environmental conservation reflected in fuel management activities and roadside clearing

VRC Recommendations: Land and Fuel Management

DSE

- implement annual rolling target of minimum 5% on public land; improve annual reporting on prescribed burning including costs and biodiversity implications
- data collection and modelling for prescribed burning and biodiversity
- conduct biodiversity mapping identifying flora, fauna and any threatened species

Implications: Where to from here? Prescribed burning

- Is 5 % of public land sufficient, and achievable?
- No account of private land
- Apart from funding, do the skills exists
- Is there sufficient time in every year?
- Is there a political commitment to overcome community concern over smoke, biodiversity?

Recommendations:Victoria's bushfire safety policy

- The State revise its bushfire safety policy. Adopt PREPARE, ACT, SURVIVE but improve advice, enhance warnings, options and local solutions
- Amendment to Bushfire Danger Rating to include addition of EXTREME and CATASTROPHIC Danger when FDI exceed 80 and 100 (Code Red).
- Under Code Red conditions, public advice and warnings to indicate early relocation/evacuation in that even 'well prepared' houses are not safe from destructive winds and massive ember attack

Key Community Safety Messages

- Key messages across five broad areas:

1. Understanding the bushfire risk – messages about the bushfire risk, community and agency expectations and responsibilities

PREPARE — **ACT** — **SURVIVE** →

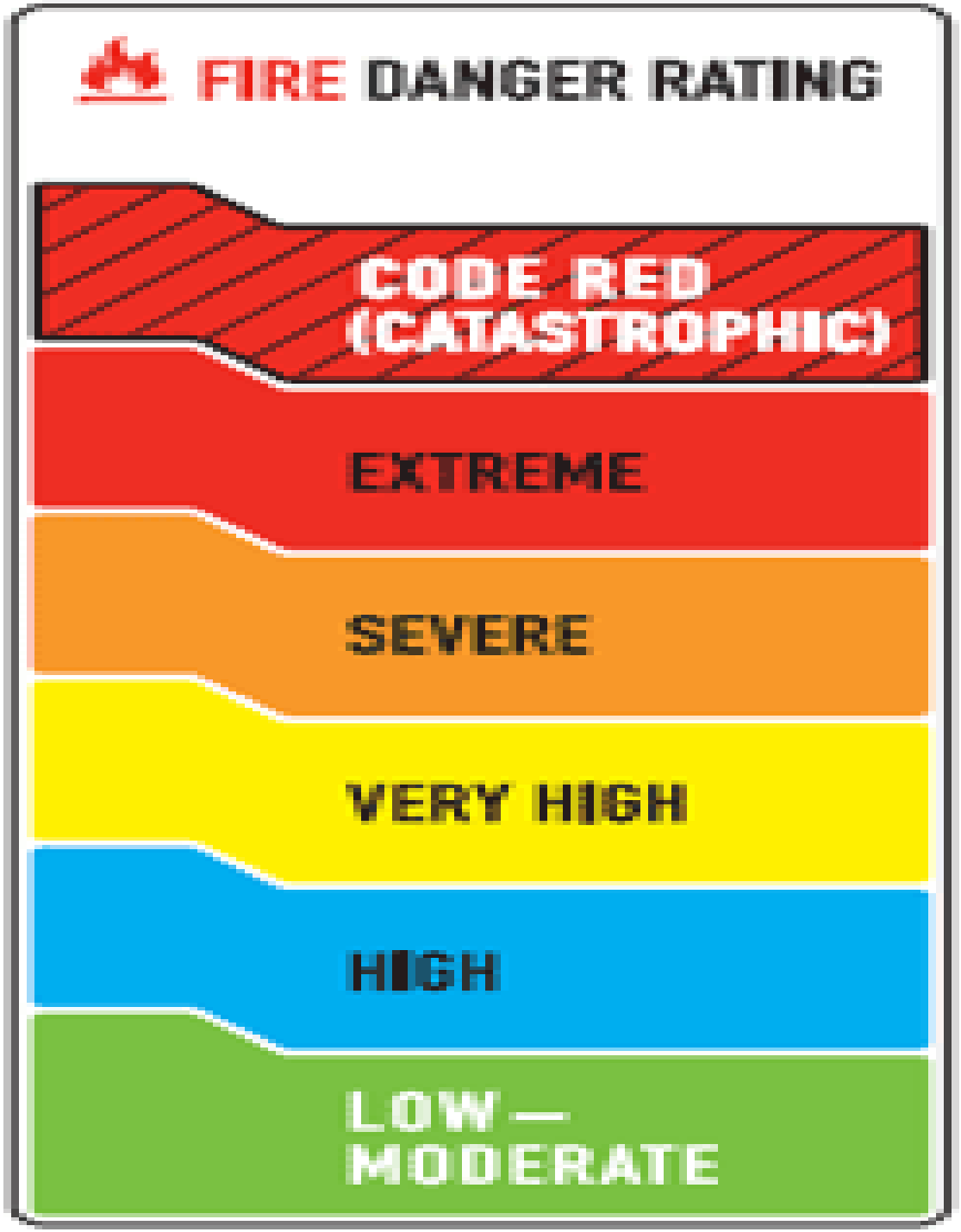
2. Personal and property preparation – messages about preparation of properties and personal capacity and readiness

3. Decision making and planning – messages about deciding what to do to deal with the threat of bushfires and making plans so that people are ready to respond safely

4. Responding to bushfires – messages about warnings and what to do if a bushfire threatens

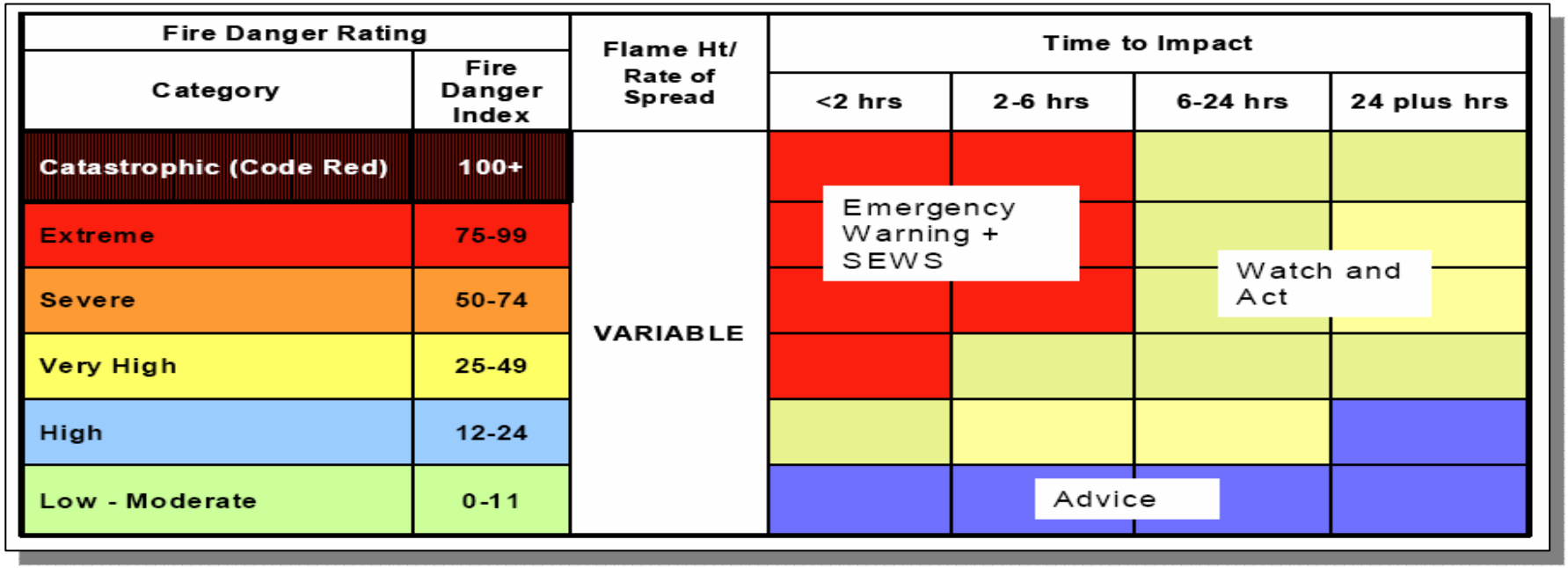
5. CFA role in supporting community – Information about the range of initiatives being implemented across many organisations to support the safety of the community

- **Revised FDR**


FIRE DANGER RATING
CODE RED
(CATASTROPHIC)
EXTREME
SEVERE
VERY HIGH
HIGH
LOW —
MODERATE

Revised Public Warning

- The Fire Danger Rating (FDR) is designed to provide the community with an understanding of the risk of a fire starting or fire behaviour if going
- FDR, combined with a 'time to impact' will trigger the type of message to be issued to the community

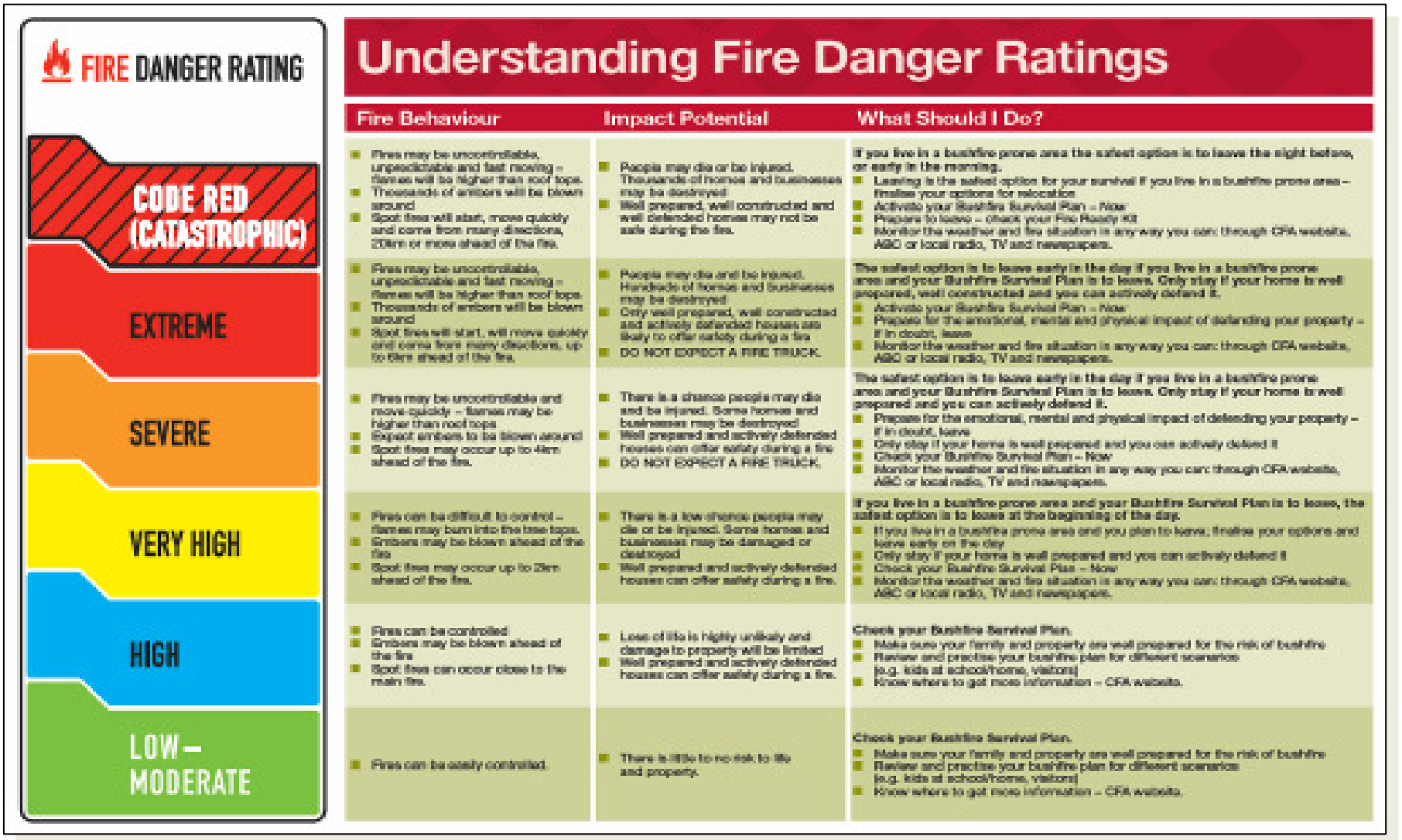


Revised Public Advice and Warnings

When bushfire warnings are issued you need to understand the level of warning. There are three levels, each increasing in importance:

- **Advice –** a fire has started – general information to keep you up-to-date with developments.
- **Watch and Act –** a fire is approaching you, conditions are changing; you need to start taking action now to protect your life and your family.
- **Emergency Warning –** you are in imminent danger and need to take action immediately. You will be impacted by fire.

Revised Public Advice and Warning



Recommended Actions

- **CODE RED (Catastrophic): If you live in a bushfire prone area the safest option is to leave the night before, or early in the morning.**
- **EXTREME and SEVERE: The safest option is to leave early in the day if you live in a bushfire prone area and your Bushfire Survival Plan is to leave. Only stay if your home is well prepared, well constructed and you can actively defend it.**
- **VERY HIGH: If you live in a bushfire prone area and your Bushfire Survival Plan is to leave, the safest option is to leave at the beginning of a day.**

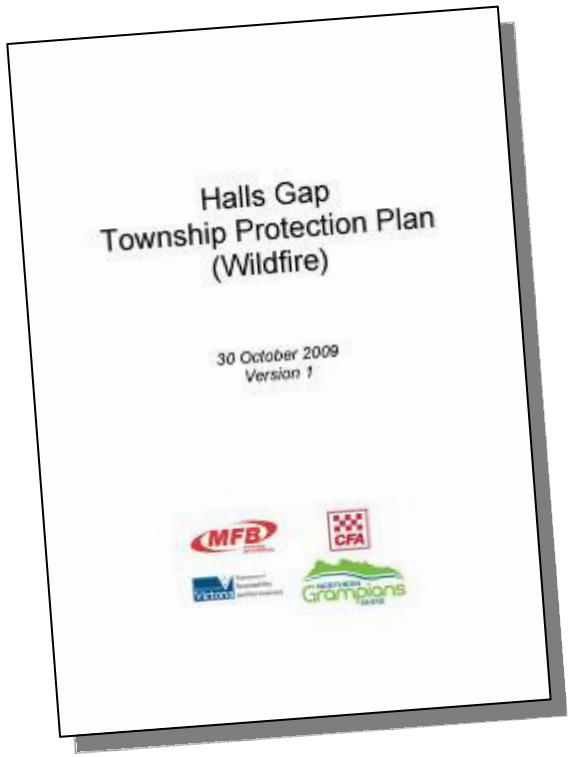
PREPARE, ACT and SURVIVE

- Further information lookup CFA website
- http://www.cfa.vic.gov.au/
- Specifically;

  http://www.cfa.vic.gov.au/residents/summer/firereadykit.htm

Township Protection Plans (TPPs)

- Identification of 52 high bushfire risk townships
- TPPs were developed within 52 high bushfire risk areas during the 2009/10 fire season
- Provides information that will enable planned and informed decision making before and during a wildfire



Recommendations
Victoria bushfire safety policies

- The State introduce a comprehensive approach to shelter options including community refuges and bushfire shelters
- The State introduce a comprehensive approach to evacuation, so that this option is planned, considered and implemented when it is likely to offer a higher level of protection than other contingency options

Neighbourhood Safer Places (NSP)

- An area or premises that may, as a last resort, provide some sanctuary from the life threatening effects of a bushfire
- The primary purpose of a NSP is the protection of human life from a bushfire
- NSP Guidelines provide a framework to identify NSPs
- Municipalities have responsibility to assess and approve NSPs
- NSPs listed in Township Protection Plans

Implications: Where to from here? Evacuations

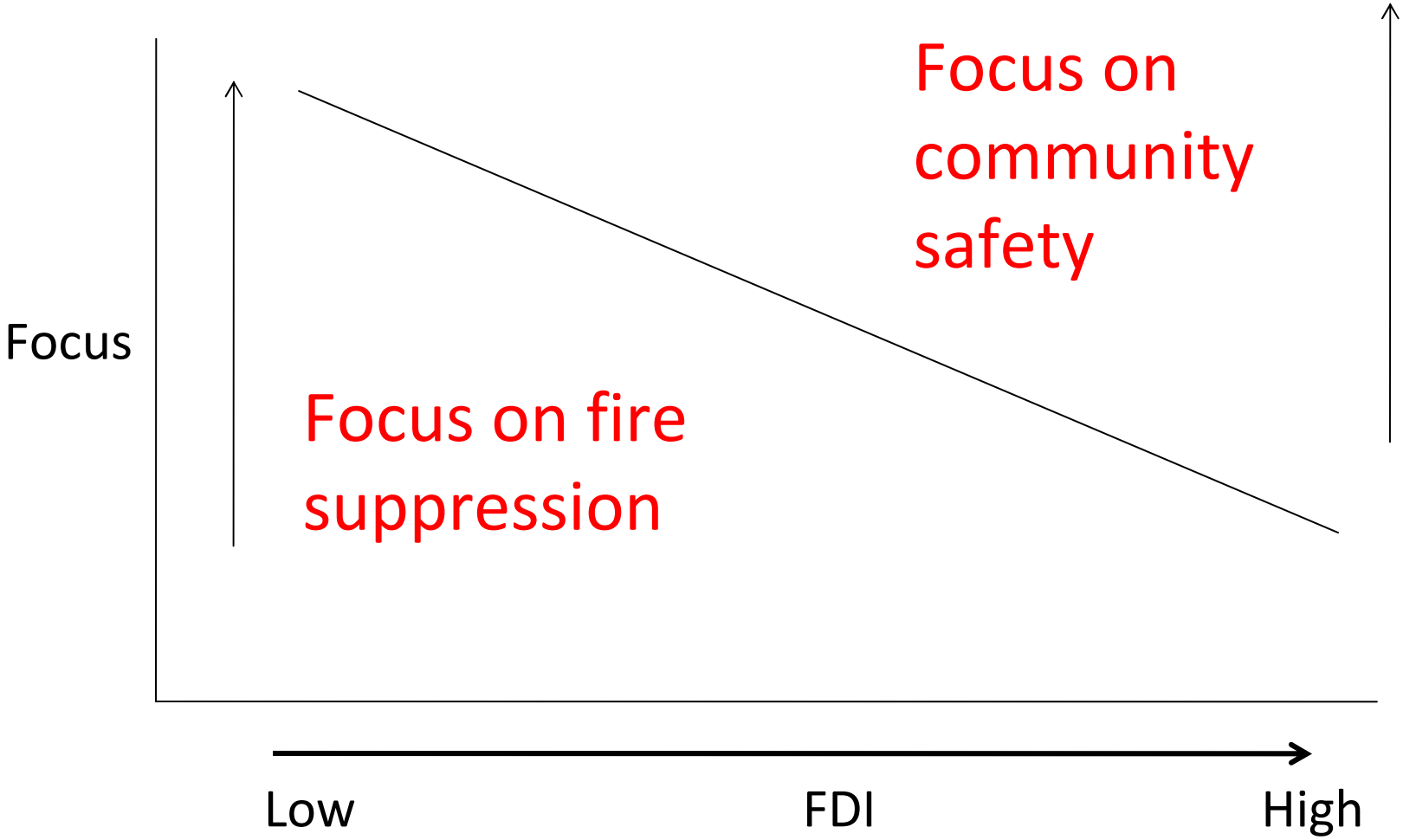
- Will require detailed planning from isolated towns
- Evacuation of vulnerable people requires specific focus
- Evacuation may not be feasible or suitable, but needs to be considered
- Recommended evacuation ‘drills’ be practiced in cooperation with local police and emergency managers
- Commission rejected mandatory mass evacuations

VRC Recommendations: Fireground Response

CFA and DSE

- amend SOPs so full IMT is in place by 10:00 on code red days and a core IMT is in place on extreme days, led by a level 3 IC
- amend the AIIMS framework to prioritise information function, allocate specific responsibilities to Deputy IC and ensure local knowledge
- Safety officer be appointed to every level 3 IMT

Responding to severe bushfires.
As FDI increases, suggest focus changes



Recommendations: Electricity caused fire

- Progressive replacement of all SWER (single-wire earth return) power lines
- Progressive replacement of all 22-kilovolt distribution feeders with aerial bundled cable or underground line
- Change asset inspection standards and procedures
- Measures to reduce the risks posed by hazard trees
- Councils advise on hazard trees
- Improve safety of lines
- Adjust all 22-kilovolt feeders on all total fire ban days

Recommendations: Organisational Structure

- Appoint a Fire Commissioner
- Make Chief Officer DSE Statutory Appt
- Property based fire levy
- National Centre for Bushfire research
- Independent Monitor on implementation of recommendations
- Review legislation for royal commissions

Further Information

- Bushfire Royal Commission Reports

http://www.royalcommission.vic.gov.au/

- Australasian Fire and Emergency Authorities (AFAC)

http://www.afac.com.au/home

- Bushfire CRC

http://www.bushfirecrc.com/