



ROLE OF MAINTENANCE IN REDUCING BUILDING VULNERABILITY TO EXTREME WEATHER EVENTS

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CONTENT



- Impacts of weather events in Australia
- Australia practice
- Opportunities for reducing building vulnerability
 - Storms and cyclones
 - Floods
 - Wildfires



AUSTRALIA = 6 STATES + 2 TERRITORIES

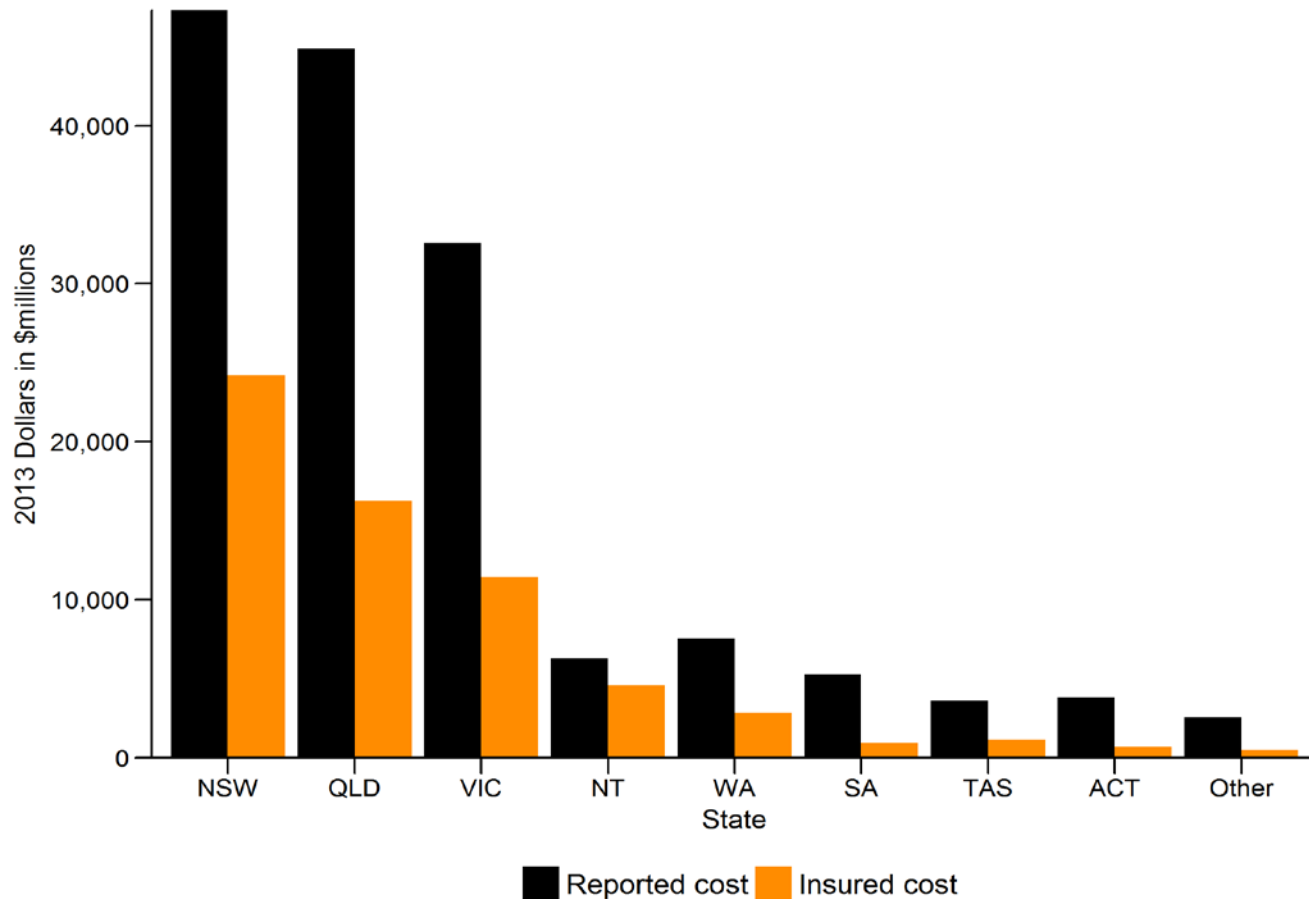


AUSTRALIAN DISASTER LOSSES

(FROM HANDMER, LADDS AND MAGEE 2018)



- Loss analysis by States & Territories



ANNUAL COST OF WEATHER EVENTS



	Wildfire	Flood	Cyclone	Storm	Total
VIC	8.9	3.6	0	9.0	21.5
NSW	1.8	7.2	0	16.8	25.8
SA	1.2	1.6	0	0.4	3.2
WA	0.4	0.1	2.7	1.2	4.5
QLD	0.6	14.4	13.1	3.8	31.9
TAS	1.9	0.4	0	0	2.3
NT	0	0.8	3.2	0	4.0
ACT	2.2	0.2	0	0.5	2.9
Total	17	28	19	32	96

As percentage of yearly average national loss for the last 46 years



EMERGING RISKS

- **Climate related risks**
 - Extreme weather events become more intense
 - Heavy rainfall after long term drought
- **Change in construction practice**
 - Leaky house syndrome
 - Condensation in living space
- **Non conforming building products**
 - Fire resistance of cladding materials
 - Changing of supply sources



AUSTRALIAN POLICIES & REGULATIONS



- **Issues with policies and regulation**
 - performance-based: difficult to control
 - exclude post construction activities (e.g. maintenance)
 - Not covering all extreme events
- **Ineffective compliance and enforcement system**
 - Senate inquiry (2018)- non conforming building products
 - Shergold and Weir report (2018)- lack of control



OPPORTUNITIES FOR REDUCING VULNERABILITIES



- Opportunities vary with type of hazards
- Need to get better understanding
 - Risk exposure
 - Building vulnerability
 - Hazard characteristics(Sendai Framework for Disaster Risk Reduction)
- **Building Vulnerability**
 - Nature of the hazard
 - Age of building
 - Type of construction



FLOOD – BUILDING VULNERABILITY



- Damage is associated with the effects of water on materials such as wall finishes and timber, mud collection inside the building and under the floor space
- Regulation allows buildings in flood prone areas since 2012
- Standard for construction of buildings on flood-prone land will prevent structural failure but not damage for the submerged parts
- Opportunity to ‘build better’ only exists after event – rarely taken



STORM



Thunder storm
(Southern Australia)



Cyclone
(Northern Australia)



Dust storm



Hail storm

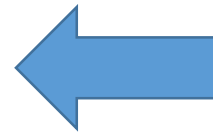


Tornado

STORM DAMAGE



Water
Penetration



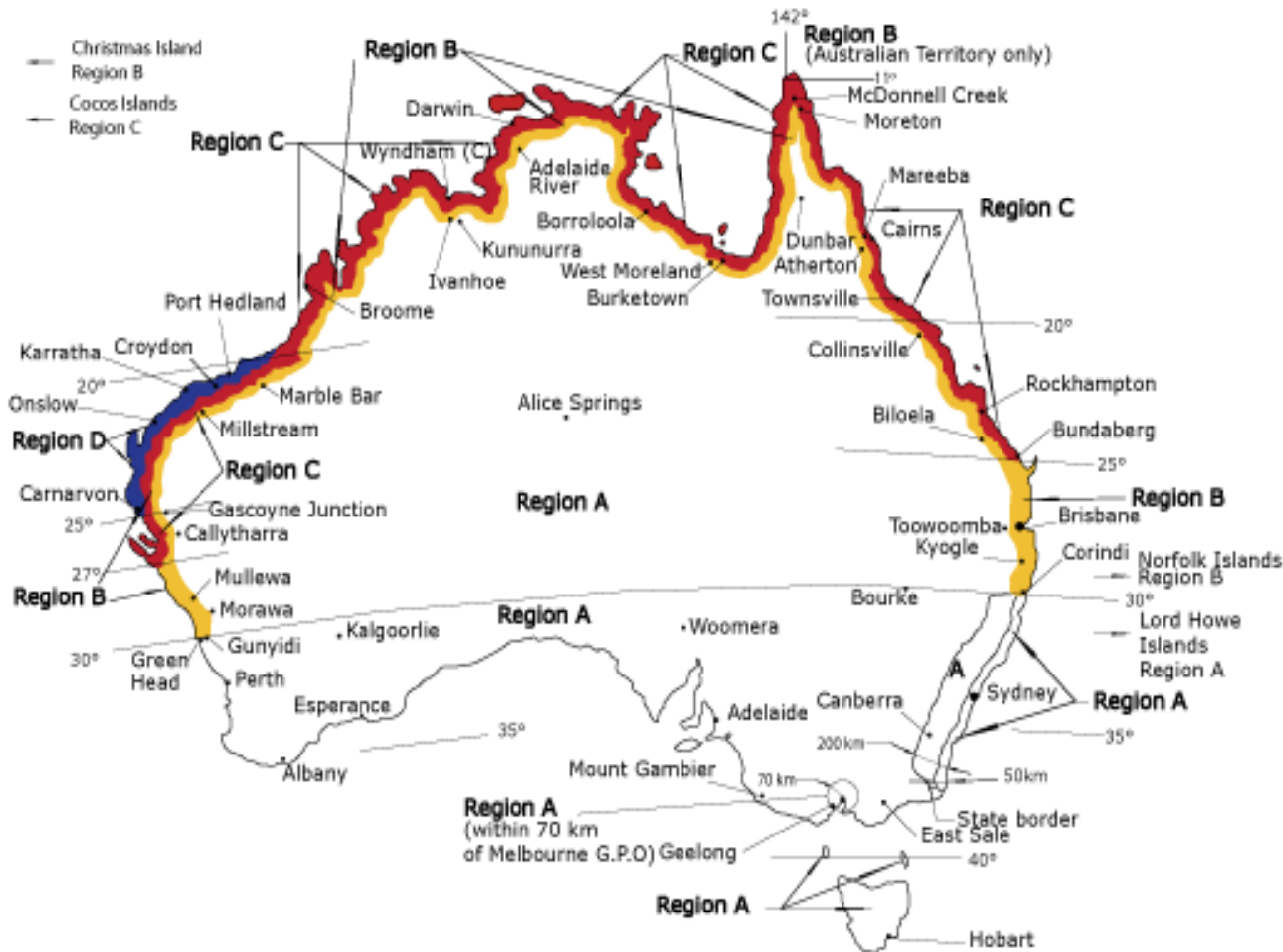
↑ Structural damages ↓



Erosion



WIND



Region	Basic Design Gust Speed
A	45 – 46 m/s
B	57 – 60 m/s
C	69 – 74 m/s
D	88 – 94 m/s

- Tightening of regulation around 1980
- Water penetration caused by wind driven rain – main cause of property damage
- Vulnerable building elements identified by damage surveys
- Software package for condition assessment developed



STORMS – BUILDING VULNERABILITY



- Damage is associated with high wind, hail and heavy rain (flash flood and water penetration)
- Regulation requires design for wind with annual probability of 1:500 to 1:1000 for most buildings
- Regulation also requires weatherproofing with a test method for verification
- No design requirements for hail at present – most heavy loss per single event



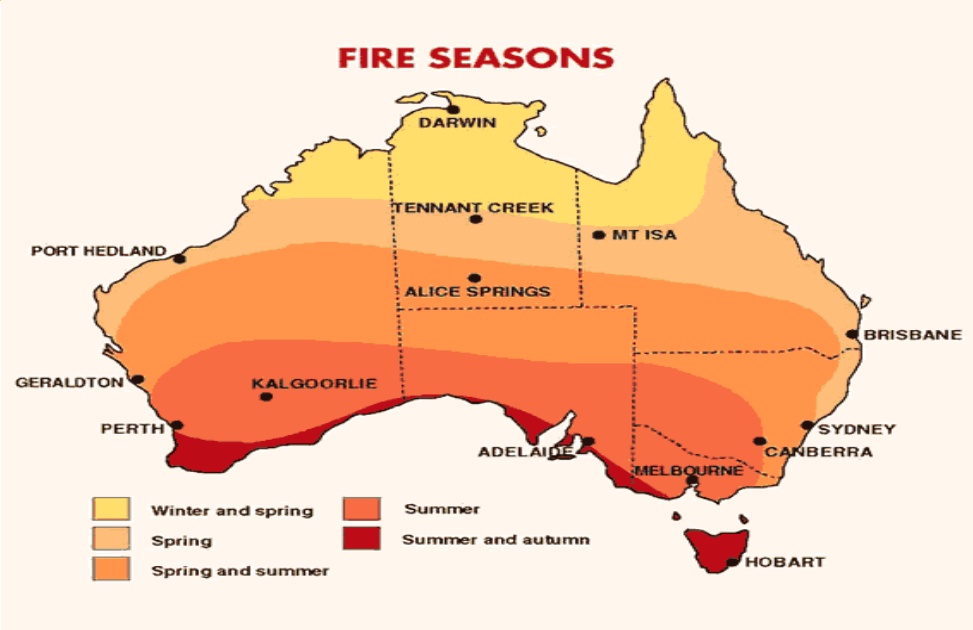
WILDFIRE



Central Queensland 2018



WILDFIRE

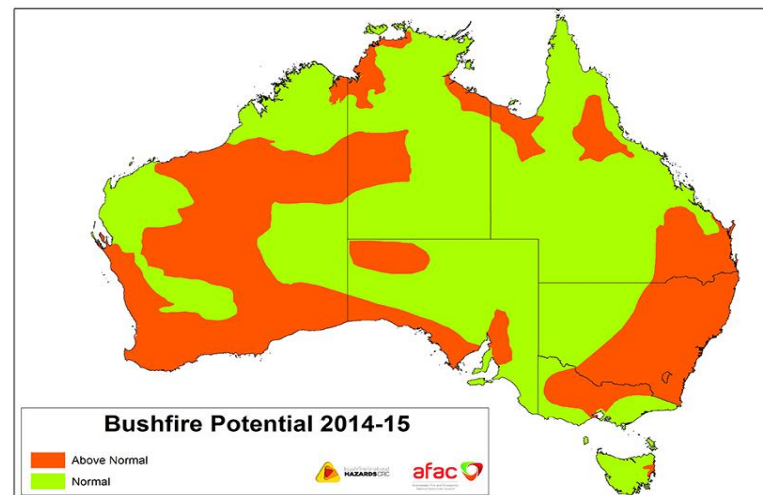
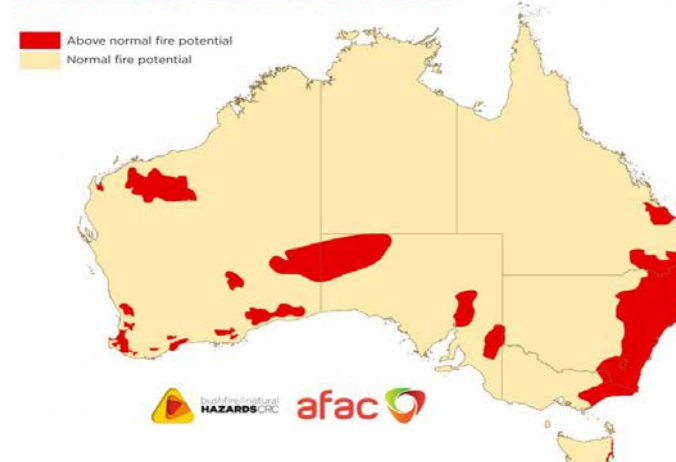


Fire seasons vary with location
(Map by Bureau of Meteorology)

Location specific hazard varies with:

- Weather
- Vegetation
- Ground slope

SOUTHERN AUSTRALIA SEASONAL BUSHFIRE OUTLOOK 2018



- Regional risk varies from year to year.
- Bushfire potential maps issued every year (AFAC+CRC)
- Grass fire and forest fire



WILDFIRE – BUILDING VULNERABILITY



- Damage is associated with ember attack usually within 100m of the bush but could be up to 1000m
- Standard for buildings constructed in bushfire prone areas since 1999
- Building vulnerability in bushfire prone areas is related to evacuation policy
 - Mandatory evacuation: better safety for people
 - Stay to put out spot fire: better for buildings
- Maintenance reduces the risk of ignition due to embers
 - Removing combustibles around the buildings
 - Preventing embers from entering/accumulating in building cavities (roof, wall, under floor ...)



CONCLUDING REMARKS



A brief overview of

- Australian major extreme weather events and their impacts
- Australian building vulnerabilities to these events
- Contributions that maintenance can make to mitigate the impacts of these events

Thank you for your attention.



ACKNOWLEDGEMENT

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 - Website for SBEnrc project P1.53:
<https://sbenrc.com.au/research-programs/1-53/>

