INDEPENDENT REVIEW INTO SOUTH AUSTRALIA'S 2019/20 BUSHFIRE SEASON

Submission by

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Cover page: Blue gum plantation on Kangaroo Island burnt in the 2019-20 fires. Photo by Kangaroo Island Plantation Timbers.

Executive Summary

Our submission

The Institute of Foresters of Australia and Australian Forest Growers (hereafter referred to as the 'Institute') is Australia's independent national body representing forest scientists, technicians, growers and managers with professional and practical expertise in private and public forest and plantation management.

Members are engaged in many aspects of forestry, nature conservation, resource and land management, research, administration and education. Fires are a day-to-day preoccupation of many of the Institute's members either through their practical work in forests or plantations; through involvement in research; or in the administration of forest/plantation management agencies or companies.

The Institute's 1,000 plus members have led the field of fire management and research in Australian forests over many decades. We advocate balanced land use that meets society's needs for sustainable forest management, timber supply, conservation outcomes, and addresses the fire and conservation issues arising through the changing climate.

Most foresters have had personal responsibility for bushfire (wildfire[1]) mitigation and suppression at some stage during their careers. They have generally also gained far more experience and understanding of fire in the natural environment than any other firefighters, largely through the operational use of fire for prescribed burning for silvicultural or conservation purposes, and for wildfire mitigation.

The Institute would welcome the opportunity to present in person to the Independent Review or to provide more detailed written information. We would be pleased to respond to any questions this submission may raise.

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Note: *Throughout this submission some terms are used interchangeably to describe the same thing. The attached* ***Appendix 2*** *defines and explains these terms and we recommend it as an important part of this submission.*

[1] Bushfire is an Australian term for any unplanned landscape fire in grassland, woodland, heathland or forest and is a term used in the Independent Review terminology. However, as it is sometimes only used to mean "forest" fire it has an element of ambiguity about it. Wildfire is the international term used for any unplanned fire in grassland, woodland, heathland or forest. As it is less ambiguous term and internationally understood, wildfire is the preferred term used by the Institute as an internationally recognised body.

Our concern for SE Australian forest fire management

The Institute is deeply concerned that the current primary focus of South East Australian forest fire management (**see section 3.3**) on fire suppression (also referred to as emergency wildfire response), in lieu of pre-season fire preparedness (chiefly prescribed burning to mitigate wildfire intensity), has unintentionally increased human and wildlife deaths, caused greater damage to assets, increased environmental degradation, and led to spiralling total fire costs.

The wildfire Royal Commissions of 1939[2] and 2009[3] both recommended a greater focus on fire preparedness, particularly prescribed burning to reduce forest fuel levels. After the 2009 Royal Commission, the States initially heeded this direction, but over time their expenditures on fire suppression, especially aircraft, increased relative to expenditure on preventative wildfire mitigation.

In the short term, a fire suppression focus drives down the area burnt by wildfire. Over time, however, it allows forest fuel levels to increase over the majority of the forest, thereby increasing the intensity of wildfires when they occur. These fires burn hotter and faster, are harder to control and invariably burn greater areas. The human, environmental and total economic costs spiral with increased area burnt at high intensities. Over time, primarily focussing on fire suppression is a flawed management strategy.

Furthermore, the prescribed burning still being done to reduce forest fuel levels has largely shifted from across the broad forested landscape to a focus on 'fence-line' burning adjacent to built assets in order to reduce community fire risk[4]. This shift has been driven by political and social factors, including more people living close to flammable forests, and the evolution of a more risk averse and litigious society. While protecting human life and property is paramount, such a focus becomes problematic if it allows fuel levels to build across the unburnt bulk of the forested landscape to an extent that resultant wildfires burn at intensities beyond our fire-fighters' capability to control them.

Accordingly, the Institute believes that forest fire management in SE Australia, including South Australia, is now too focussed on asset protection at the expense of extensive wildfire mitigation, i.e. through prescribed burning for fuel reduction, especially in public land tenures where fire-adapted vegetation requires more frequent low intensity fires for comprehensive conservation, and to prevent high intensity, tragic wildfires. Into the future, as expected warmer and drier conditions have greater impact on Australia's forests, governments need to give a higher priority to managing forest fuel levels across the entire forested landscape if the number and costs of wildfires are to be reduced[5].

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[2] Stretton LEB. 1939. Report of the Royal Commission to Inquire into the Causes of and Measures Taken to Prevent the Bush Fires of January, 1939, and to Protect Life and Property Melbourne, Victoria: Victorian Government.

[3] Teague B, McLeod R, Pascoe S. 2010. The 2009 Victorian Bushfires Royal Commission Final Report (Summary). Melbourne, Australia: Parliament of Victoria.

[4] Morgan G W, Tolhurst KG, Poynter M W, Cooper N, McGuffog T J, Ryan R, Wouters M A, Stephens N, Black P, Sheehan D, Leeson P, Whight S, and Davey S. (2020) *Prescribed burning in south-eastern Australia: history and future directions*. Australian Forestry 83 (in publication)

[5] Williams J.T. (2013), *Exploring the onset of high-impact mega-fires through a forest land management prism*, Forest Ecology and Management, Volume 294: 4 – 10, April 2013, http://dx.doi.org/10.1016/j.foreco.2012.06.030

Recommendations arising from a consideration of the Review's Terms of Reference

4.1 Reducing Bushfire Ignitions

Recommendation 4.1.1:
That South Australia establishes tenure-blind regional annual prescribed burn area for wildfire mitigation (i.e. hazard reduction burning) targets with adequate resources provided to meet them.

Recommendation 4.1.2:
That South Australia increases its ecological and cultural burning program

Recommendation 4.1.3:
That the causes and circumstances of arson during fire campaigns be investigated based on the 2019-20 fires in South Australia.

4.2 Community Preparation and Resilience

Recommendation 4.2.1:
That the Government of South Australia develops an education and engagement campaign focusing on raising community awareness for the benefits of prescribed burning for wildfire mitigation, combined with reforms to State planning regulations to facilitate an increase in cool season burning.

4.3 State Bushfire Plan and Bushfire Coordinating Committee

Recommendation 4.3.1:
That before this Independent Review makes any further recommendations regarding fire management it shall audit South Australia's implementation of:

- the 29 recommendations made by the Council of Australian Government's (COAG) 2004 *National Inquiry on Bushfire Mitigation and Management*.
- the 14 national goals within the *National Bushfire Management Policy Statement for Forests and Rangelands* (2014); and
- the recommendations of other relevant South Australian inquiries and reviews undertaken since 2004.

4.5 State Development and Control Planning

Recommendation 4.5.1:
That bushfire zoning and local government planning should be reformed to place the onus on State and Local government agencies to develop fuel management policies and outcomes in key regions.

4.7 Equipment and Resources

Recommendation 4.7.1:
That South Australia increases expenditure on off-fire season fire prevention for wildfire mitigation and reinstates a more equitable balance with in-season wildfire emergency response. This includes decreasing the growth in expenditure for large firefighting aircraft in favour of an increased number of smaller firefighting aircraft.

4.8 Incident Management and Emergency Coordination

Recommendation 4.8.1:
That in order to evaluate the effectiveness of incident management and emergency coordination arrangements in South Australia, the Independent Review into the 2019-20 Fire Season, investigates whether:
1. specific, measurable, achievable, relevant and time-bound objectives were documented for those in responsible positions during the 2019/20 forest fires, and if
2. people appointed to responsible roles have the skills and capability to fulfil their responsibilities.

Recommendation 4.8.2:
That in order to improve South Australia's wildfire suppression capabilities, for 2020/21, additional staff be recruited to DEW, Forestry SA and SA Water for year-round fire management activities.

4.9 Public Information and Warnings

Recommendation 4.9.1:
That South Australia invests in further research to improve the content of community messaging through the Bushfire and Natural Hazards Cooperative Research Centre.

1. Introduction

1.1 The Institute of Foresters of Australia and Australian Forest Growers

The Institute of Foresters of Australia and Australian Forest Growers (hereafter referred to as 'the Institute') is the independent national body representing Australia's forest scientists, technicians, growers and managers with professional and practical expertise in forest and plantation management.

The Institute is governed by an elected voluntary Board and has active members in all Australian States and Territories. A requirement of professional level membership is tertiary qualifications in forest science or a closely related scientific discipline, or alternatively, extensive practical experience in forest or plantation management or forest science. The age and experience profile of the Institute's 1,000-plus members ranges from new graduates to retired men and women with over 50 years of experience in land and park management in Australia.

The Institute's members are employed in a wide variety of positions including in native forest, plantation and national park management, research, bushfire management, land care, education, public service administration, private land forestry, and associated wood-based industries. Fires are a day-to-day preoccupation of many of the Institute's members either through their practical work in forests or plantations; through involvement in research; or in the administration of forest/plantation management agencies or companies.

Foresters and forestry practitioners have led the field of fire management and research in Australian forests over many decades and there are linkages and collaboration with professionals engaged in these activities elsewhere in the world. Most foresters have had personal responsibility for bushfire mitigation and suppression at some stage during their career. They have generally also gained far more experience and understanding of fire in the natural environment than other fire-fighters, largely through the operational use of fire during prescribed burning operations for silvicultural or conservation purposes, and for fuel reduction. Accordingly, our submission is restricted only to a consideration of just this one type of natural disaster – bushfire (i.e. wildfire).

The Institute is fortunate to have amongst its members some of Australia's more knowledgeable and experienced forest and park fire managers, and fire researchers.

1.2 Support for the Independent Review

The Institute welcomes this State Inquiry as an opportunity to have some influence on long overdue improvements to Australian forest fire management.

We believe that government policies for forest fire management over at least the past 25-years, particularly in southern and eastern Australia, have been overly influenced by urban-based political imperatives rather than the need for responsible land management that minimises the threat of fire.

We would also point out that we have made similar submissions to a number of previous inquiries and commissions and have subsequently watched with concern as recommended changes have not been fully implemented. We sincerely hope that the work of this

Independent Review leads to effective improvements to government and agency forest and fire policies.

1.3 This submission

This submission comprises:

- an overview of the SE Australian bushfire situation from the perspective of professional forest managers and scientists; and
- specific recommendations in response to the Independent Review's Terms of Reference.

The Institute would be pleased to respond to any questions that this submission may have raised to the independent review, either through an interview (in person or video conferencing) or with follow-up written material.

2. Background

2.1 The Institute and fire

The Institute is one of the few organisations to have developed formal national policies on bushfire/ wildfire management and the ecological role of fire in Australian forests and woodlands. These policies have been reviewed several times since they were first developed 40 years ago. The current Policy Statement 3.1, "The Role of Fire and Its Management in Australian Forests and Woodlands" represent our thinking and approach to forest fire and underpin this submission (see attached Appendix 1).

2.2 The basis for our contribution

Our contribution to this Independent Review is founded on the following factors:

2.2.1 Training, experience and responsibility

Since the early 1900s bushfire management in Australian forests and woodlands has predominantly been the responsibility of forestry agencies managed almost exclusively by professional foresters. Most Institute members have received university-level training in the science underlying bushfire behaviour, fire suppression and prevention, as well as in fire ecology, and land use planning which incorporates forest fire management.

Many Institute members spend their entire careers in field-based forest, park and plantation management roles where bushfire prevention and suppression are day-to-day preoccupations. This includes practical experience with prescribed burning for ecological, silvicultural, or fuel reduction purposes.

2.2.2 Pioneers in bushfire research and operational application

Professional foresters have pioneered and become leaders in nearly every aspect of bushfire research and applied management under Australian conditions. This includes research into fire behaviour and fire prevention, and its application via prescribed fuel reduction burning, fire suppression, bushfire safety, fire training, fire ecology and fire weather forecasting.

2.2.3 Historical lessons learned

Australian foresters know the history of bushfire disasters in this country – from Black Friday in 1939, Ash Wednesday in 1983, the 2003 Alpine fires; the Black Saturday fires of 2009, the Eyre

Peninsular and south-east forest fires in South Australia in 2006, the Dwellingup and Karridale Fires in Western Australia in 1961, and the Hobart (1967) and Sydney (1994) fires. Many Institute members fought these fires, and took part in subsequent inquiries that have aimed to improve forest fire management to minimise their re-occurrence.

2.2.4 Professional concern for environmental and community values

Foresters have a professional concern for Australia's forested lands and parks and the values that are threatened by high intensity bushfires. At the same time, we are also members of the community, and wish to see land management practices which effectively strive to protect human life and property from the ravages of fire.

3. Brief review of forest fire management in Australia

3.1 Australia is naturally fire-prone

Most of Australia's indigenous native vegetation and much of the exotic vegetation introduced by farmers, gardeners, and foresters is highly flammable. Accordingly, bushfires are inevitable in the landscape with fires of low and moderate intensity occurring almost every year, and major high-intensity conflagrations every few years when dry fuels and rainfall deficits combine with days of high temperature and wind. This has been the case throughout our recorded history.

Due to the flammability of its indigenous forests and its climatic characteristics, south-eastern Australia is regarded as one of the three most fire-prone areas in the world. It endures an annual fire season peaks in the warm summer months and its severity is largely dependent on the extent of rainfall deficit during preceding months or years. Inevitably, every 10 to 13 years, often under the influence of an El Nino event or a positive phase of the Ocean Indian Dipole, the rainfall deficit becomes such that in our native forests:

- normally moist vegetation (such as in wet montane and alpine forests) substantially dries out;
- accumulated surface fuels become highly flammable;
- natural barriers to fire become less effective (i.e. swamps, moist gullies and streams); and
- stressed trees shed foliage further adding to forest floor fuel loads.

Under these circumstances, despite the best intentions and efforts of on-ground fire suppression personnel, bushfires will invariably occur. Dry lightning is a major source of ignition in most seasons. So, too are human error, carelessness, and deliberate arson.

Traditionally, Australia's most damaging fires have occurred under weather patterns which draw hot dry air from central Australia to the south-east corner of the continent. A feature of these patterns is the propensity for the initial high temperatures, low humidity, and powerful northerly winds to be suddenly changed by a cold front bringing cooler, but gusty west to south westerly winds. Under these circumstances, any uncontrolled eastern flanks of already-going fires burning strongly under a northerly influence, can quickly become broad head fires burning under a westerly or south-westerly influence. This is a predictable set of circumstances which, so often in the past, has been the major factor implicated in human life and property loss.

Excluding fire from naturally fire-prone landscapes inevitably results in heavy fuel accumulations that consign forests to a regime of periodic large, high intensity fire. It is the small number of large-scale high intensity fires that result in the greatest loss of life, and damage to property and environmental values. It is widely recognised that less than 5 per cent of bushfires cause more than 95 per cent of damage.

3.2 Community attitudes to fire

Traditionally, rural and regional Australians have had a better appreciation of wildfire because they both use fire and are directly threatened by it; whereas those residing in our cities tend to assume that all fire is bad and display little appreciation of the past culture of Aboriginal burning. Today, after more than 150 years of increasingly urbanised settlement, this view is still prevalent in a community where most people have little appreciation of the natural relationship between fire and Australian ecosystems.

Unfortunately, a prevailing community belief that all fires are environmentally damaging has disproportionately influenced land management policies and practices. In particular, it is constraining the use of fuel reduction burning as a sensible means of mitigating wildfire intensity and threat.

3.3 What is forest fire management?

Forest fire management is comprised of seven basic components:

1. **Research and its application** – providing the scientific knowledge, developing aids for practical implementation, and providing the education to apply the knowledge and tools;
2. **Prevention** – reducing the incidence of fire through regulation, public warning, enforcement, and declaration of fire bans;
3. **Preparedness** – including prescribed burning for wildfire mitigation, fire-fighter training, operational and logistics planning, equipment procurement, and infrastructure development and maintenance (e.g. road/track network, helipads);
4. **Detection** - establishing and maintaining a fire detection network including fire-spotting towers, public reporting facilities, and remote sensing methods (e.g. satellites);
5. **Emergency Response** - to wildfires when they arise during the summer fire season;
6. **Recovery** – implementing systems and processes to reduce the impact of wildfires including provision of victim support services, and rapid environmental impact assessments and on-ground rehabilitation works;
7. **Landscape Fire Regime Maintenance** – including the use of prescribed burning to maintain biophysical and ecological processes so as to increase ecosystem resilience to events such as large, high intensity wildfires.

It is acknowledged that most of the public discourse surrounding the recent 2019/20 wildfires has been focussed on only two of these seven forest fire management components – wildfire mitigation (i.e. part-of 3 and 7) and emergency response to wildfires (i.e. 5).

The basis of successful emergency wildfire response is to contain wildfires as quickly as possible to a small size. If this is not achieved, fires can potentially grow to an unmanageable size whereby they can only be stopped by substantial rain events.

Successful emergency wildfire response depends on off-season fire mitigation activities, such as:

- regular forest road, track, and fuel break maintenance, which reduces the time taken for ground-based fire-fighters to reach a wildfire;
- broadscale fuel reduction burning, which reduces the intensity of wildfires and maximises the opportunity for fire-fighters to quickly contain them; and
- strategic fuel reduction along the public-private land interface, which reduces the threat of wildfires and allows a greater focus on containing them rather than protecting private and community assets.

The effectiveness of fire mitigation activities in aiding emergency wildfire response is dependent on: (1) their extent, i.e. the area that has been fuel reduced each year; and (2) the prevailing weather conditions under which the wildfire is burning.

3.4 The imbalance between in-season emergency response over off-season fire mitigation and over-reliance on aircraft

Traditionally, forest fire management was approximately equally focussed on off-season wildfire mitigation activities and in-season emergency response to suppress wildfires. In the mid-1990s, when this was arguably still the case, a University of Melbourne study concluded that every $1 spent on forest fire management (i.e. wildfire mitigation and suppression) by the then Victorian Department of Sustainability and Environment, was generating a $24 saving in averted wildfire loss.[6]

Since then, the resourcing balance has shifted towards emergency response in lieu of forest management (i.e. wildfire mitigation) on public and private lands, largely by spending more on the use of very expensive aerial fire-fighting technology. This has followed the lead of the USA and other fire-prone countries in the Mediterranean region. Internationally acclaimed, US fire historian, Stephen Pyne, has argued since the mid-1990s that the shift to greater use of expensive aircraft in lieu of forest management (mostly fuel reduction burning) largely explains why the US now annually endures very large forest fires that were far less common in the past.[7] Others, including former US Forest Service National Director of Fire and Aviation Management, Jerry Williams, have also endorsed this view.[8]

Pyne argues, the domination of emergency response over forest management in the US has fostered a self-sustaining cycle of massive wildfires, which reinforces the dominance of emergency response by fuelling demands for greater expenditure on more fire-fighting aircraft after each fire. Recent research from Mediterranean Europe refers to this phenomenon as a 'fire-fighting trap' that enshrines a future of larger and more severe fires.[9]

That Australia has fallen into this trap is exemplified by the Commonwealth Government's commitment to spend $11 million on four additional large aerial water tankers in latter stages of the 2019/20 fire season – a political decision forced by community and media pressure

[6] *An Economic Evaluation of Bushfire Prevention and Suppression*, by J. Bennetton and P. Cashin, Research Paper No. 598, Department of Economics, University of Melbourne (1997)

[7] Pyne, S., *The Still Burning Bush*, Scribe Publications (2006)

[8] Williams, J.T. (2013), *Exploring the onset of high-impact mega-fires through a forest land management prism*, Forest Ecology and Management, Volume 294: 4 – 10, April 2013

[9] Moreira et al (2020), *Wildfire management in Mediterranean-type regions: paradigm shift needed*, Environmental Research Letters 15 011001

generated by dire coverage of environmental and human damage caused by the 2019/20 fires.

To combat the 'fire-fighting trap', the recent Mediterranean research advocates:

> *… that policy and expenditures be rebalanced between suppression and mitigation of the negative impacts of fire.*

Stephen Pyne also addressed the question of appropriately balancing emergency fire suppression against land management in his 2006 book, *The Still Burning Bush*:

> *Down-sizing suppression forces will mean upgrading the staff for prescribed fire and fire research. Dampening the exorbitant costs of once-a-decade mammoth fires will see funds funnelled into higher annual expenses for environmental monitoring. There is, in brief, little reason to believe that fire's management will ultimately be less expensive than fire's suppression. ……. Whatever configuration Australia adopts, fire won't go away, and neither will the outlay for administering both its application and its removal.*[10]

The socio-economic value of returning to a more appropriate balance between forest management and emergency response in SE Australia is exemplified by a recent cost-benefit analysis of the higher annual fuel reduction burning program that has been maintained in the south-western forests of WA. This analysis found that the region's fuel reduction burning program delivers a $31 million per annum saving in expenditure on emergency wildfire suppression, and a $169 million annual saving in averted property loss/damage. Long term modelling of various annual fuel reduction burning options, suggests that every dollar invested in planned fuel reduction burning generates between $10 and $47 of benefit compared to a 'no-planned burning' scenario.[11]

The solution to stopping regular massive forest fires does not lie in continuously increasing expenditure on more and bigger water bombing aircraft. This has done little to reduce the frequency and extent of massive wildfires and effectively rewards poor forest management policies that are failing to adequately address the underlying causes of the problem.

The severity of wildfire and its community impacts will only reduce when landscape-scale fuel reduction is significantly increased across private and public forested lands, utilising modern methods while adopting the principles of indigenous Australians which worked for tens of thousands of years. It is time that governments reviewed their annual expenditure on fires and rebalanced the amounts spent between its in-season suppression and off-season mitigation.

COAG has already adopted this policy direction through its *National Bushfire Management Policy Statement for Forests and Rangelands* and yet South Australia, like the other States and Territories, have not committed to fully implementing the policy.

Observation and analysis suggest that emergency wildfire response has become overly reliant on aerial water-bombing and that this may be displacing the aggressive ground-based attack on forest fires which is integral to quickly containing them.

Water-bombing aircraft, operating in suitable conditions, are highly valued for initial 'first attack' on just-ignited small fires because they can restrict fire spread. However, forest fires can

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[10] *The Still-Burning Bush*, by Stephen Pyne, Scribe Publications (2006), pp.114-115

[11] Florec, V., Pannell, D., Burton, M., Kelso, J., and Milne, G. 2016, *Think long term: The costs and benefits of prescribed burning in the south west of Western Australia*, Non-peer reviewed research proceedings from the Bushfire and Natural Hazards CRC & AFAC conference, Brisbane, 30 August – 1 September 2016.

generally only be stopped and extinguished by ground-based firefighters building, and then working from, containment lines. Accordingly, aerial attack on such fires is largely about buying time before ground-based attack can contain them, and thereafter assisting mop-up by dousing significant hotspots.

Unfortunately, it seems that the massive expenditure on aircraft-based wildfire response is not only reducing the resources available for off-season land management for wildfire mitigation, but has also skewed emergency response away from ground-based attack which is the only way to ensure fires are contained. Greater efforts at mitigating the fire threat through forest management will be wasted if there is not sufficient commitment to direct ground-based attack on wildfires.

4. Addressing the Review's Terms of Reference

Note: The following comments and recommendations refer only to non-operational forestry matters, as the Institute's main focus is on national positions to improve integrated forested land use, as well as sustainable management that meets community and environmental needs while managing the fire threat.

4.1 Reducing Bushfire Ignitions

- Hazard Reduction
- Arson and Operation Nomad;

Over the past 20 years the incidence of damaging bushfires has increased despite a significant increase in wildfire response capability through improved weather forecasting technology, greater use of aircraft-based technology in mapping and water-bombing delivery, and increased access to interstate and international support with fire management equipment and personnel.

Indeed, the incidence of damaging wildfires with their associated costs, disproportionately exceeds the predicted increase in severe fire weather under climate change. This suggests that deficiencies in fire management (and fire-fighting tactics/practices) are counter-acting the theoretically improved emergency response capability.

South Australia is a large State that has been significantly settled and cleared over the last 150 years. This means that unlike other States, an important part of the wildfire risk (fuel hazard) is on private land.

Prescribed burning for wildfire mitigation (hazard reduction burning) on private land by the Department for Environment and Water (DEW) & Country Fire Service (CFS) occurs on only a very small proportion of the large area at risk. They simply do not have the capability and resources to manage the amount of work needed on private land to significantly mitigate this risk.

To significantly reduce South Australia's wildfire risk, substantial extra effort, resources and capability are needed with a strong community-based ownership of the risk and operational collaboration to support smaller land owners to manage the wildfire risk on their land.

Arguably, the nation's most successful land management regime has been that applied in the forests of south-western WA since the 1960s, whereby 6 – 8% of the forest has been annually prescribed burnt for wildfire mitigation (Hazard reduction). This means that at any point in time, between 30 – 40% of the forest contains fuels of less than 5 years of accumulation.[12] Under these circumstances, any wildfire generally runs into fuel reduced areas where it can be more easily controlled. This fuel management regime has kept WA's forests relatively free of the mega-fires that have afflicted SE Australia's forests.

Following the 2009 Victorian 'Black Saturday' fires, the subsequent Royal Commission recommended a tripling of the then rate of annual prescribed burning for wildfire mitigation to 5% of the suitable public forests. The Royal Commission did not provide a figure for forested

[12] Burrows N. and McCaw L. (2013), *Prescribed burning in southwestern Australian forests*, The Ecological Society of America: Frontiers in Ecology and the Environment, Volume 11 Issue s-1, e25-e34 (August 2013)

private lands. Ideally, such a target would be 'tenure blind' and include all public and privately managed lands.

Accordingly, the Institute believes that regional annual prescribed burn area targets should be a key performance indicator of adequate fire management performance. The Institute acknowledges that the target may vary according to the appropriate fire regimes of regional vegetation types as well as their mitigation objectives, but targets should be tenure-blind.

Recommendation 4.1.1:
That South Australia establishes tenure blind-regional annual prescribed burn area for wildfire mitigation (i.e.hazard reduction burning) targets with adequate resources provided to meet them.

Burning for ecological and cultural outcomes is an important part of managing fire in the South Australian landscape. Healthy ecosystems are those with appropriate fire regimes with a range of fuel levels and vegetation structures. They provide for sustainable biodiversity and help vegetation communities adapt to climate change. At the same time healthy ecosystems have a lower wildfire risk than unhealthy ecosystems.

All burning reduces fuel levels, and maintaining healthy ecosystems and landscapes at the same time is a win for all South Australians. Significantly more support and resources is needed in these two vital parts of fire management in South Australia.

Recommendation 4.1.2:
That South Australia increases its ecological and cultural burning program.

Alongside lighting strikes, fire ignition from arson is a major risk to the community and environment of South Australia. The psychological issues that lead individuals to wilful set fires were well researched by the Bushfire CRC[13][14] and are generally well understood by fire authorities, and usually well managed.

As arsonists are often difficult to identify, catch and convict, it is suggested that crime prevention strategic actions are best for preventing arson,[15] this includes prescribed burning for wildfire mitigation which makes it harder for an arsonist to ignite a large fire.

What is less well understood are the causes for arson occurring under the cover of wildfire suppression. This may take the form of unauthorised backburning, and has the effect of increasing fire area and impacts on private assets.

Backburning should be a well planned operation used to control the spread of an uncontrolled wildfire. It is an indirect form of fire control that should be used only after careful consideration by skilled fire crews. Backburning is a major strategic decision that should only to be made by an Incident Controller at a wildfire. However, during the 2019/20 fires there were reports of backburning failing and resulting in only increasing the burnt area. The Institute is not resourced to investigate such allegations. However, if this is so, proper independent incident reviews will

[13]Bushfire CRC (2010) Bushfire arson: What do we know now? https://www.bushfirecrc.com/sites/default/files/managed/resource/bushfire_arson.pdf
[14] Beale, J, Jones, W Preventing and Reducing Bushfire Arson in Australia: A Review of What is Known https://www.bushfirecrc.com/publications/citation/bf-2499
[15] Muller D A (2008). Offending and reoffending patterns of arsonists in NSW. (Bushfire CRC report) trends & issues in crime and criminal justice no. 348. Canberra: AIC

reveal how inappropriate such actions were when weather conditions and firefighting resources were unlikely to be conducive to success.

Recommendation 4.1.3:
That the causes and circumstances of arson during fire campaigns be investigated based on the 2019-20 fires in South Australia.

4.2 Community Preparation and Resilience

- Community Education and Engagement

Australia is a fire-prone continent, but a common response by the community to wildfire is one of poor or no preparedness. This is partly due to the large proportion of the population resident in cities and remote from natural settings, and partly due to the increased regulatory burden placed on landholders which disincentivises the practices for reducing forest fuels.

Recommendation 4.2.1:
That the Government of South Australia develop an education and engagement campaign focusing on raising community awareness for the benefits of prescribed burning for wildfire mitigation, combined with reforms to State planning regulations to facilitate an increase in cool season burning.

4.3 State Bushfire Plan and State Bushfire Coordinating Committee

- Developing policies and standards to reduce bushfire risk.

While our changing climate is exposing the weaknesses in our forest fire management, on public and private lands, adapting this management to meet the challenges ahead must have bipartisan political support and broadly-based community support. However, the polarised public debate over what caused the 2019/20 bushfires (i.e. climate change or inadequate forest fire management practices) demonstrates the difficulty in getting strong consensus on how best to move forward.

Nevertheless, past bushfire inquiries (i.e. 58 since 1939) represent positions taken under past State and federal governments of all persuasions and, for current-day observers, their recommendations collectively represent a bi-partisan position on bushfire mitigation that's hard to argue against.

Accordingly, the Institute believes this Independent Review should, as a starting point, be reviewing the degree of effective implementation of the recommendations and their intended outcomes from the past inquiries involving South Australia, to inform and potentially reinforce thinking about how to address the concerns arising from the 2019/20 bushfires.

In response to the 2009 Victorian Bushfires Royal Commission and various other inquiries, land and fire managers from government agencies in all States and Territories prepared a *National Bushfire Management Policy Statement for Forests and Rangelands*. Though approved and signed by all Council of Australian Governments (COAG) members by early 2012 and published in 2014, there has as yet been little action to implement it.

The *National Bushfire Management Policy Statement* is underpinned by the following broad vision:

Fire regimes are effectively managed to maintain and enhance the protection of human life and property, and the health, biodiversity, tourism, recreation and production benefits derived from Australia's forests and rangelands.

Central to this vision is:

The role fire plays in maintaining and enhancing biodiversity. Sustainable long-term solutions are needed to address the causes of increased bushfire risk.

To achieve the intent of the policy, 14 national goals were identified. The first goal was to maintain appropriate fire regimes with the right combination of size, intensity, frequency and seasonality of burning required to sustain Australia's forest and rangeland ecosystems.

Another important goal was to promote Indigenous Australians' use of fire and to further integrate Traditional burning practices and fire regimes with current practices and technologies to enhance wildfire mitigation and management in Australian landscapes. This effectively recognises the benefits of widespread, low-intensity, and patchy fires in creating sustainable landscapes resilient to climate extremes.

Further to this, the policy's goal to create employment, and foster workforce education and training in wildfire management, recognises the importance of fire as an integral part of our lives.

While these national goals still need to be developed into measurable outputs and/or outcomes, they do set the framework for a comprehensive and sustainable national forest fire management strategy to which the South Australian Bushfire Plan.

Recommendation 4.3.1:
That before this Independent Review makes any further recommendations regarding fire management it shall audit South Australia's implementation of:

- the 29 recommendations made by the Council of Australian Government's (COAG) 2004 *National Inquiry on Bushfire Mitigation and Management*;
- the 14 national goals within the *National Bushfire Management Policy Statement for Forests and Rangelands* (2014); and
- the recommendations of other relevant South Australian inquiries and reviews undertaken since 2004.

4.4 State Emergency Management Plan including Extreme Heat Planning

No comments are provided on this Term of Reference.

4.5 State Development and Control Planning

- Bushfire zoning; and
- Local government planning, roles in emergency management.

(Note: This section should be read in conjunction with section 4.1)
A common concern conveyed to the Institute is that current emergency management planning is lacking appropriate risk assessment and actions with respect to wildfires. State development and control planning is seen to work restrictively against the most cost-effective form of risk management (i.e. cool season prescribed burning for wildfire mitigation) in favour of high cost wildfire suppression techniques.

Recommendation 4.5.1:
That bushfire zoning and local government planning should be reformed to place the onus on State and Local government agencies to develop fuel management policies and outcomes in key regions.

4.6 Call taking and dispatch

No comments are provided on this Term of Reference.

4.7 Equipment and resources

- CFS/MFS appliances, communications and safety systems;
- Technology such as Automatic Vehicle Location (AVL), mapping, line scanning;
- Aviation resources including Large Aerial Tankers; and
- Logistics arrangements.

Over the past 20 years, Australia has followed the USA and other fire-prone countries in shifting to a forest fire management model strongly weighted towards emergency wildfire response in lieu of the traditional approach that was based on a reasonable balance between off-season fire mitigation (such as fuel reduction) and in-season wildfire suppression. The weighting towards emergency response is strongly correlated with the increasing expense of using aerial fire-fighting technology.

In the USA, the domination of aircraft-based emergency wildfire response arose because of a need to protect burgeoning suburbs, towns and other assets that were increasingly being built adjacent to or amongst flammable forests. But while this justified the approach, it is generally accepted to be failing to reduce the incidence and severity of large wildfires because:

- it is focussed on treating the symptoms rather than addressing factors that underpin fire risk;
- massive expenditure on aircraft reduces the budgetary resources for off-season fire mitigation activities such as fuel reduction and maintaining forest access that is integral to quickly containing fires while they are small;
- aerial water-bombing under suitable operating decisions, can be useful at saving houses and other community assets, but is relatively ineffective in controlling most forest fires; and
- an over-reliance on aerial water-bombing is partly displacing ground-based fire-fighting which, although carrying higher fire-fighter risks, is integral to containing wildfires.

These consequences are now evident in Australia, and according to some researchers and commentators they foster a self-sustaining cycle of massive wildfires which is regularly reinforced as each big fire increases community and political demands to further expand the fleet of fire-fighting aircraft. Recent research in Mediterranean countries, refers to this phenomenon as the 'fire-fighting trap' because nowhere in the world has increasing the numbers of fire-fighting aircraft ever reduced the incidence, extent, and severity of large forest fires.

Large Air Tankers as used during the 2019/20 fire season are enormously expensive and have limitations in their use. While fires were threatening townships in January, the media successfully

encouraged the Commonwealth Government to provide more funds ($11m) to the fire agencies, so they could contract four more at short notice. However, to date no independent evaluation of their effectiveness on the season's fire suppression operations has been made publicly available.

It is recognised that firefighting aircraft are an important part of the wildfire suppression (and mitigation) in South Australia. However, the large size of the State, and the few larger aerodromes, means that large air tankers are not suitable or effective in South Australia.

Given the extreme fire weather that South Australia often experiences with strong winds and violent wind changes, a better use for Commonwealth money would be:

- more, smaller aircraft, based in multiple locations for rapid first attack, rather than large aircraft with their longer turnaround times, and
- remote sensing through line-scanning aircraft and satellites.

Recommendation 4.7.1:
That South Australia increases expenditure on off-fire season fire prevention for wildfire mitigation and reinstates a more equitable balance with in-season wildfire emergency response. This includes decreasing the growth in expenditure for large firefighting aircraft in favour of an increased number of smaller firefighting aircraft.

4.8 Incident management and emergency coordination

- Incident management teams and facilities;
- Operational alignment of control agency and the State Coordinator;
- Functions and coordination between the State Control Centre, State Emergency Centre, State Emergency Information Call Centre Capability (SEICCC) and the State Crisis Centre; and
- Reporting to government.

Emergency management arrangements in South Australia, documented in the State Emergency Management Plan (SEMP)[16], provide for reasonable coordination amongst the responsible organisations and those people in responsible roles. The implementation of these arrangements, however, relies upon people with the skills and ability to follow the documented arrangements.

Whether the emergency management arrangements, in terms of command, control and accountability, are effective depends upon:

1. the objectives laid out to those with responsibility for the emergency, and
2. whether, or not, those appointed to such roles have the skills and ability to fulfil their responsibilities.

The Institute is not in a position to comment, at this stage, on whether specific, measurable, achievable, relevant and time-bound objectives were documented for those responsible during the 2019/20 forest fires. It expects that this Independent Review shall, through its investigative powers, be able to make a reasonable determination on that.

[16] https://www.dpc.sa.gov.au/responsibilities/security-and-emergency-management/state-emergency-management-plan/State-Emergency-Management-Plan_Part2_Arrangements-V1.2Fa.pdf

Likewise, the Institute is relying upon this Independent Review to identify whether those appointed had the relevant forest fire management skills and experience to fulfil their role of responsibility.

Recommendation 4.8.1:
That in order to evaluate the effectiveness of incident management and emergency coordination arrangements in South Australia, the Independent Review into the 2019-20 Fire Season, investigates whether:
1. specific, measurable, achievable, relevant and time-bound objectives were documented for those in responsible positions during the 2019/20 forest fires, and if
2. people appointed to responsible roles have the skills and capability to fulfil their responsibilities.

Land Management Agencies (DEW, Forestry SA & SA Water) have small but very effective capabilities to manage wildfire risk on their lands. In addition, they have good arrangements to strongly support the CFS in wildfire response. Their capabilities/resources largely complement and don't replicate the CFS resources.

These agencies have a focus on and consequently much knowledge and experience in burning (prescribed burning and backburning), remote area and forest firefighting with equipment to match which are important for the State's incident management. These Agencies have undergone a slow decline of resources available for fire management over the last decade to such low levels that are now hindering South Australia's overall fire suppression capabilities.

Recommendation 4.8.2:
That in order to improve South Australia's wildfire suppression capabilities, for 2020/21, additional staff be recruited to DEW, Forestry SA and SA Water for year-round fire management activities.

4.9 Public Information and Warnings

- Alert SA;
- Information Management systems to support improved messaging; and
- Coordination across Government messaging.

The 2009 Victorian Bushfires Royal Commission's recommendation No. 5 stated:

> *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. The approach should:*
>
> • *encourage individuals—especially vulnerable people—to relocate early,*
> • *include consideration of plans for assisted evacuation of vulnerable people*
> • *recommend 'emergency evacuation'.*

As a consequence there has been a changed approach within Victoria regarding community warnings. During the 2019/20 fire season authorities in the media strongly emphasised the message that leaving is the safest option for home owners threatened by fire. Unfortunately, providing such a simple message in response to a complex issue does not appear to be improving the personal safety of all categories of people in all circumstances.

Bushfire CRC research following the 2009 'Black Saturday' fires which investigated the decisions and actions of more than 600 survivors, was combined with a Victoria Police investigation into the deceased by police investigator Sergeant Doug Hart.[17] Using this valuable resource, the Australasian Fire and Emergency Services Authorities (AFAC) developed a guideline[18] to assist emergency service agencies to communicate the report's findings to communities for improved fire safety. The success of this cooperative approach to improve community safety was documented in a case study.[19]

More recently, Bushfire and Natural Hazards Cooperative Research Centre's (BNHCRC) research conducted by Dr Josh Whittaker[20] revealed that many people only leave home once they feel that they are threatened on seeing the fire. This indicates the complexity of providing messages that bring about the right response by different people facing a variety of fire circumstances.

Clearly more research is needed on the content of community messaging to ensure that an appropriate community response is heeded for different levels of fire behaviour.

South Australia struggles to resource an effective wildfire research program. Programs like the Bushfire CRC and Bushfire and Natural Hazards CRC have given South Australia enormous leverage through contributing to, and benefit from, collaborative independent applied research into wildfires and their management. State and Commonwealth contributions (both in cash and in-kind) are essential to progressing solutions to fire management issues. A continued investment is needed in wildfire research, with strong South Australian involvement.

Recommendation 4.9.1:
That South Australia invests in further research to improve the content of community messaging through the Bushfire and Natural Hazards Cooperative Research Centre.

4.10 Interstate Deployments

- Support to other states; and
- Coordination of resource sharing arrangements.

South Australia does well at suppressing the majority of its wildfires. It is the infrequent, large scale wildfires that test its capabilities and resources. In the Green Triangle, along the Victorian

[17] Victoria Police (2014) Lessons Learnt from the Black Saturday Bushfires: Information for fire agency managers of community safety.
[18] Community Safety Messaging for Catastrophic Bushfires: Lessons Learnt from Black Saturday Bushfires, Victoria 2009
http://www.afac.com.au/insight/doctrine/article/detail/community-safety-messaging-forcatastrophic-bushfires-lessons-learnt-from-black-saturday-bushfires-victoria-2009
[19] AFAC. (2017). Learning lessons from research insights. AFAC Case Study. AFAC, Melbourne, Victoria.
[20] Whittaker J. (2019) Ten years after the Black Saturday fires, what have we learnt from post-fire research? Australian Journal of Emergency Management • Volume 34, No. 2, April 2019 33

border, cross-border arrangements have been in place for four decades. The mutual support enables both State's to jointly tackle the infrequent ferocious wildfires.

The defence forces can also be very helpful, particularly in assisting South Australia when firefighting resources are pushed to the limit. They can provide logistical arrangement and firefighter base camps with great expedience and thereby relieve South Australian firefighters for fire-ground roles.

The collaborations achieved through the Forest Fire Managers Group (FFMG) and the Australasian Fire and Emergency Service Authorities Council (AFAC) have significantly benefitted South Australia in participating, influencing and achieving national outcomes for improving wildfire management.

Other areas where South Australia gains much value from interstate arrangements are:

- shared resources through the National Aerial Firefighting Centre (NAFC), National Resource Sharing Centre (NRSC) and the Australian Institute for Disaster Resilience (AIDR);
- collaborations on collective equipment purchasing;
- the development of wildfire prediction capability;
- the National Burning Project; and
- incident management training systems that FFMG & AFAC.

All of the above have significantly supported and improved fire management beyond what the State could have achieved alone.

South Australia gains much through its involvement in these national organisations to improve its wildfire management and so it should continue to support them.

4.11. Rapid Damage Assessment,

- Aerial surveillance and remote pilot aircraft; and
- Messaging of damage impact.

No comments are provided on this Term of Reference.

4.12. Transitional arrangements to recovery

- Australian Defence Force Support;
- Commonwealth Assistance; and
- Leadership and Coordination.

No comments are provided on this Term of Reference.

APPENDICES

Appendix 1: IFA Position Paper 3.1: The role of fire in Australian forests and woodlands[21]

The Institute of Foresters of Australia (IFA) advocates a better appreciation of the important and complex role that fire plays in the evolution and maintenance of Australian ecosystems and its potential to significantly impact on social, economic and cultural values. The IFA also advocates for better management of bushfires and prescribed fires, including the need for further scientific research and the systematic monitoring and review of fire management with the results being made available to policy makers, land managers, fire services and the community.

Fire is one of the most important factors in the ecology of Australian forests and woodlands. Hence, the managers of both public and private forests must understand the role of fire both in meeting land management objectives and in minimising the potential for adverse impacts on human life and property.

The Issues

Fire is an essential element of the Australian natural environment that cannot be removed. It is integral to maintaining environmental processes such as nutrient cycling, adaptation and evolution via gene expression and redistribution, faunal and floral composition and structure, hydrological processes and habitat formation and maintenance.

However, uncontrolled fire can also be destructive, potentially leading to human death, loss of houses, infrastructure and services, loss of amenity, impact on water flows and water quality, loss of habitat, loss of soil and soil nutrients and loss or degradation of other forest values such as timber. The impact of fire can also extend beyond the burnt area with smoke from bushfires or planned burns having potential to cause visibility problems, adversely affect human health, and damage crops such as wine grapes.

To manage for the protection of human life and biodiversity, fire must be viewed and managed at a landscape scale and over long timeframes even though its impact, at any one time, may be local and immediate. To this end, fire in the natural environment must be managed by professionally trained, experienced and accredited forest managers, not just emergency service agencies.

There has been an increasing reliance on the use of tools and technology, such as aircraft, firefighting vehicles, fire suppression chemicals, computer models and voluntary evacuation ("leave early") to control fires and reduce the loss of human life. This has been at the expense of rapid and aggressive early fire control using experienced and well trained ground crews in

[21] Available at: https://www.forestry.org.au/Forestry/About/Position_statements_policies/IFA_policies/Forestry/About_the_Forestry/Position_statement_policies.aspx?hkey=d18cfb2c-ce37-4178-8de2-7e24d25399d9

direct attack strategies early in the fire's development which, in most cases, is more likely to be effective than indirect attack strategies.

Position Statement

The IFA recognises that:
Fire is an essential ecological factor, which has an important and ongoing role in maintaining biodiversity and ecological processes in Australian forests and woodlands.

- The ecological effects of fire vary according to the season, frequency, intensity, patchiness and scale of burning within a landscape.
- Bushfires can have effects that are significant at local, regional and global spatial scales and operate on timescales from the immediate to impacting over decades or centuries.
- Bushfires can be a very real threat to human life, property, economic and cultural values, social function and environmental values.

The IFA considers that:

- Every fire management program should be objectives-based and outcome-focused. The objectives should be set out in management plans based on legislative requirements, government policy and public consultation. Objectives must cover the protection of human life, property, economic and cultural values, social function and environmental values.
- Short-term fire management objectives should be consistent with long-term, landscape-scale fire and land management objectives.
- A decision to deliberately exclude fire from naturally fire-prone forests and woodlands will have adverse consequences for ecosystem productivity and function in the long-term.
- Because of the complex interaction of factors affecting fire and land management, there can be some uncertainty about the outcomes of different strategies and operations, therefore a risk-based assessment is a good way to approach fire management. Given the uncertainty in all the contributing factors and their interactions, the application of sound risk management principles gives the best likelihood of achieving specific management objectives. Having an outcomes focus, with well-defined performance measures, will lead to a system whereby the results of fire management strategies can be identified and measured over a long timeframe.
- The Australian, State and Territory governments have a responsibility to provide adequate resources for coordinated research and systematic monitoring of the behaviour, environmental effects and social impacts of bushfires and to provide inter-generational continuity of skills, capability and resources.
- The focus in all fire management programs should be around Prevention, Preparedness, and Fire Regime management and there needs to be a move away from relying primarily on Response and Recovery.
- The use of fire in the landscape by many Traditional Owners is acknowledged. Traditional knowledge and burning practices have great potential to contribute to positive social and environmental outcomes. Fire management can be used to reintroduce traditional knowledge to communities where it has been lost.
- All fire management operations should put a high priority on fire-fighter safety. However, the level of risks taken should be commensurate with the potential benefits to be gained, cognisant of the fact that fire-fighting is inherently risky and that trying

to avoid all risk may inhibit the capacity to control fire in a timely manner and result in greater impacts and losses.

- Fire-fighting aircraft, tools and technology are not a substitute for effective on-ground fire-fighting. The primary focus of fire control should always be around on-ground efforts with aircraft, tools and technology being used to make on-ground efforts safer and more effective.
- Planned burning must be undertaken to enable forests and woodlands to be managed sustainably in the long-term, including the ability to evolve and adapt to climate change, physical disturbances, pests and diseases.
- Communication and consultation between forest managers, emergency response agencies and other stakeholders is vital to establish management objectives, including levels of "acceptable bushfire risk" for successful planning and fire management activities.
- Adaptive fire management ("learning by doing", monitoring and recording with scientific analysis) should always be used.
- Many aspects of forest fire management are common globally. It is important to exchange knowledge and expertise nationally and internationally to extend the range and depth of knowledge and experience in bushfire policy, research and management.

Supporting Documents

AFAC (2012). *Bushfire Glossary*. Prepared by the Rural and Land Management Group for AFAC Agencies. Australasian Fire and Emergency Service Authorities Council. 36pp. http://www.afac.com.au/docs/default-source/doctrine/bushfire-terminology.pdf

AFAC (2016). *National Position on Prescribed Burning. A report sponsored by the National Burning Project*. Australasian Fire and Emergency Service Authorities Council, East Melbourne, Vic. Australia. AFAC Publication No. 2036, 6pp. https://www.afac.com.au/initiative/burning

Department of Environment and Conservation (2008). *Code of Practice for Fire Management. Western Australia*, Dept. Environment and Conservation. 26pp. https://www.dpaw.wa.gov.au/images/documents/fire/fms-code-of-practice.pdf

Department of Sustainability and Environment (2012). *Code of Practice for Bushfire Management on Public Land.* Victoria, Department of Sustainability and Environment. 44pp. https://www.ffm.vic.gov.au/data/assets/pdf_file/0006/21300/Code-of-Practice-for-Bushfire-Management-on-Public-Land.pdf

Forest Fire Management Group (2014). *National Bushfire Management Policy Statement for Forest and Rangelands*. Prepared by The Forest Fire Management Group for The Council of Australian Governments. 28pp. http://www.afac.com.au/docs/default-source/assets/national-bushfire-management-policy.pdf

Pyne, S.J. (2006). *The Still-Burning Bush*. Scribe, North Carlton, Victoria, Australia. 137pp.

South Australia (2012). *Code of Practice for Fire Management on Public Land in South Australia*. South Australia, Government. 12pp. http://www.environment.sa.gov.au/managing-natural-resources/fire-management/bushfire-risk-and-recovery

Appendix 2: Clarifying some Forest Fire Management Terminology

Institute members are encouraged to use the comprehensive, standard reference list of fire terms used in Australia published by the Australasian Fire and Emergency Services Authorities Council (AFAC 2012). This paper is to provide to clarify some commonly misused fire management terms.

Wildfire or Bushfire?

Bushfire is an Australian term for any unplanned landscape fire in grassland, woodland, heathland or forest. However, it is sometimes only used to mean "forest" fire and so has an element of ambiguity about it. **Wildfire** is the international term used for any unplanned fire in grassland, woodland, heathland or forest. However, it is sometimes taken to imply fires are of high intensity, when wildfire can be low and/or high intensity, but are all "unplanned". Wildfire is a less ambiguous term and internationally understood and therefore our preferred term.

Planned Burn / Controlled Burn / Prescribed Burn / Cool Burn / Hazard Reduction Burn / Ecological Burn / Habitat Burn / Burning Off?

The preferred term is "**Prescribed Burn**" for fires which have been carefully planned and documented before implementation with a clearly stated set of management objectives and carried out under clearly prescribed conditions based on fire science. "**Burning Off**" is also a deliberately lit fire to achieve certain outcomes, but is done without careful documentation or prescription settings and usually implemented based on the past experience of the owner of the fire. "Controlled Burns", "Cool Burns", "Hazard Reduction Burns", "Regeneration Burns", "Slash Burns" , "Fuel Reduction Burns", "Ecological Burns", "Habitat Burns" and "Backburns" are all forms of Prescribed Burns.

Backburning or Prescribed Burning?

Backburning is a planned burning operation used to control the spread of an uncontrolled fire. It is used as an indirect form of fire control and should be carried out after extensive consideration and with skilled fire crews. Backburning is a major strategic decision only to be made by an Incident Controller at a wildfire. Sometimes people will refer to Prescribed Burning as Backburning, but this is not correct. It is true that Backburning is one special form of **Prescribed Burning**, but Prescribed Burning is far broader than just Backburning.

Backburning or Burning-Out?

Backburning involves lighting a new, independent fire ahead of a wildfire front so as to remove all the fuels from a designated control line back to the wildfire front. Typically the backburn will be burning back into the wind and hence its name. When a backburn and a fire front meet, the local fire intensity is likely to be increased. Under conditions when a wildfire cannot be controlled by direct attack, maintaining control of a backburn is a very risky and difficult strategy to implement and therefore must be sanctioned by the Incident Controller of a Wildfire. **Burning-Out** may involve small or very large areas of deliberate lighting, but it is done within the limits of an existing fire area, hence it is a tactical decision that can be made of Operational leaders on the fireline or by the Incident Controller. The aim of a burning-out operation is to consume all the fuels within fire control lines under mild and controlled conditions to prevent spotting or intense fire runs breaching the control lines under any expected more severe weather conditions.

"Fuel Load" or "Fuel Level"?

"Fuel Level" is a relative measure of the fuel based on the arrangement, structure, composition, proportion of dead material, and thickness of the fuel elements in the fuel complex. Generally, the "Fuel Level" refers to the **"Fine Fuel"** component of the fuel complex, i.e. that fuel that burns in the flaming zone of a fire and is generally taken to be dead vegetative material less than 6 mm in thickness and live vegetation less than 2 mm thick. The Fuel Level is often assessed using a visual guide such as the Overall Fine Fuel Hazard Guide written by Hines *et al.* (2010). **"Fuel Load"** is one aspect of the fuel level related to the weight of fuel per unit area, often expressed in terms of tonnes per hectare (t/ha). "Fuel Load" is important in calculating the heat release and intensity of fires, but it does not capture other important attributes of fuels that influence fire behaviour. Under dry conditions, the fuel consumed by a fire will also include larger sized pieces of dead woody fuel, >6 mm thickness, that contribute to the depth of the flaming zone, residual heating of vegetation and soil, and the strength of the convective plume above the fire. "Fuel Level" is much better related to attributes of fire behaviour such as flame height, and rate of spread.

"Hazard Reduction"?

According to standard risk assessment procedures, a "**Hazard**" is a source of potential harm or a situation with potential to cause loss if a value or asset is exposed to it. Fine fuels are often referred to as a "Hazard", but it is not the fuel that is the hazard, but the nature of the fire that it might support. The real hazards are aspects of fire such as radiation, convective heat, embers and smoke. Therefore, "**Hazard Reduction Burning**" and "**Fuel Reduction Burning**" refers to **"Prescribed Burning"** that changes the "**Fuel Level**" in a way that reduces the level of radiation, convective heat, number of embers and amount of smoke produced during a fire.

References:

AFAC. 2012. Bushfire Glossary. Australasian Fire and Emergency Service Authorities Limited (AFAC). 36pp., East Melbourne. Available at: https://www.afac.com.au/docs/default-source/doctrine/bushfire-terminology.pdf

Hines, F, Tolhurst, KG, Wilson, AAG, McCarthy, GJ. 2010. Overall fuel hazard assessment guide, 4th Edition. Department of Sustainability and Environment Victoria, Melbourne. Research Report series No.82, Melbourne. Available at: https://www.ffm.vic.gov.au/__data/assets/pdf_file/0005/21110/Report-82-overall-fuel-assess-guide-4th-ed.pdf