Volunteer Fire Fighters Association
"The Voice of Volunteer Firefighters in NSW"
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Current inadequacies and opportunities to improve community safety and planning in NSW.

Volunteer Fire Fighters Association of New South Wales

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Volunteers for community and the environment

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2 Current failures in bushfire safety, people, communities and preparedness

It is important to consider key issues in **relation to bushfire safety, people, communities and preparedness:**

2.1 Current poor land and fire management increasing community disasters

Prescribed burning programs are at very low levels in all states except WA, often of the order of 1-2 % of forested areas per year. The current inadequate prescribed burning policy and implementation environment reinforces a shift towards more widespread high intensity fire regimes in the same areas where prescribed fires are restricted.

As a consequence, large and intense bushfires have mega social, economic and environmental impacts and can travel across landscapes over long distances, devasting communities, large areas, ecosystems and flora and fauna, including over 17 million hectares during the 2019/ 20 Australian bushfires. These 2019/ 20 bushfires were also very costly, estimated by AccWeather to be $110 billion in terms of total damage and economic loss. These large and intense bushfires have social, economic and environmental impacts, including massive impacts on greenhouse gas storage and emissions.

The photograph below clearly highlights the massive impact of intense bushfires, including on long term greenhouse gas storage and release over very long periods.

Figure. South of Tumbarumba in August 2022, 2.5 years after the 2019/ 20 bushfires, highlighting the massive impact of these bushfires, including on tree death, understorey fuels, greenhouse gas storage and release over very long periods.

2.2 Inadequate fire and bushfire risk and mitigation and consequent impacts on communities

There have been a very large number of bushfires in Australia's history. In relation to the disastrous 2019/20 bushfire season, as noted in the paper Filkov et al. (2020):

… A total of 18,983,588 hectares were burned, 3,113 houses and 33 lives lost in 15,344 bushfires in Black Summer fires; and

Damage from the bushfires is estimated to have had a $20 billion impact to the economy, greatly exceeding the record A$4.4 billion set by 2009 Black Saturday fires.

There are many important risk and mitigation issues in relation to fire and bushfire management in south eastern Australia:

- There is a poor consideration of the fuel load issue across forests and actual forest fuel loads in forests, at very high levels, strata and heights and increasing. There is inadequate action addressing the fuel load issue and reducing community, infrastructure and fauna impacts from bushfires.
- There is totally inadequate funding, focus and commitment for reducing fuel loads, undertaking prescribed burning, forest thinning and community protection. There is inadequate state funding for prescribed burning and minor federal funding to increase prescribed burning, noting areas of prescribed burning are very small and decreasing and communities are at major bushfire risk.
- There have been losses of bushfire skills over the last 30 years. This applies with bushfire control, backburning, prescribed burning and in some cases the use of aircraft in prescribed burning.
- Many communities have limited fire mitigation with inadequate bushfire protection.
- There is little active community involvement in fire management across Australia, only in a small number of cases. The bushfire impacts on towns and cities across Australia has been large over long period.
- In a number of local government areas there has been limited funding and, in some cases, will to resolve fire issues and mitigation.
- Risks at each location vary and solutions will vary depending on extent of the bushfire problem, extent of impacts, funding, extent of mitigation opportunities and community input to solutions.
- Focus on low intensity burning for protection of towns and cities at the expense of landscapes is increasing the bushfire problem with long run fires across landscapes.
- Bushfire insurance costs are going up.
- Infrastructure protection from bushfires is a sleeping disaster area.
- There is limited funding and actioning for improving resilience in Australia's forests and protecting communities. There is generally very poor actioning in regards to forest health and the decline of forest health across Australia's forests, mild fire is an important component of improving forest health and setting up healthy and landscapes.

There are many barriers and restrictions to the use of low intensity prescribed and ecological maintenance burning in south eastern Australia, further increasing bushfire risks to communities and the same ecosystems where low intensity fire is restricted. Barriers occur within the following category areas, including funding: community and infrastructure; risk management; expertise; advice source; bureaucracy and leadership and on the ground barrier issues in need of resolution. It is important to consider barriers in optimising low intensity burning programs in south eastern Australia in order to optimise fire management.

One state leads the way in regards to undertaking low intensity burning of forested areas. As outlined in The Truth About Fuel Reduction Burning on the Bush Fire Front website, the graph below is the result, not of junk science modelling, but of real data gathered from almost 60 years of historical data from the forests of south west WA. These data unequivocally show that when the area of prescribed

burning trends down, the area of uncontrolled bushfires (wildfires) trends up. There is a simple explanation: bushfires are more difficult to put out in long unburnt, heavy fuels. The area annually burnt by bushfire escalates exponentially when the area of prescribed burning in a region falls below 8 percent per annum. Burning about 8% per annum results in about 40 % of bushland carrying fuels 0 to 5 years old.

2.3 Inadequate investment in disaster resilience and safer communities to reduce crises, costs and resources

The Australian Business Roundtable for Disaster Resilience and Safer Communities report "We cannot prevent weather events, but that does not make disasters inevitable" (November 2017) considered the total economic cost of natural disasters in each state and territory, finding that the forecast cost of natural disasters will reach $39 billion annually by 2050 noted the following:

"This report considers challenges for disaster resilience in the states and territories, and the role of each government in collaboration with other jurisdictions, community and business.

The report:

Confirms that further investment in disaster resilience – in both physical and community preparedness – is essential to lessen the forecast increase in costs.

Finds that investment in disaster resilience yields a double dividend. First, in the avoided impacts of disasters when they occur. And second, in the broader co-benefits that arise even in the absence of a disaster.

Shows that state and territory governments have several levels to directly build resilience."

Deloitte Access Economics report "Economic reality check Adapting Australia for climate-resilient growth" from January 2022 notes:

"Australia's disaster relief strategies are underpinned by a cycle of underinvestment in resilience and adaptation. It's been estimated by the Productivity Commission that 97 per cent of all-natural disaster funding in Australia is spent after an event, with just 3 per cent invested prior to an event to reduce the impact of future disasters."

The investment of just 3 per cent of all-natural disaster funding in Australia prior to disaster events to reduce the impact of future disasters is staggering. And considering that investment in disaster resilience yields a double dividend, avoided impacts of disasters when they occur and also the broader co-benefits that arise even in the absence of a disaster, major and increased investment in bushfire and flood mitigation is essential.

There is further disaster funding detail in the Menzies Research Centre Policy Paper (2020), Strengthening Resilience: Managing natural disasters after the 2019-20 bushfire season:

"Despite this relentless commitment to inquiries, in 2014, a report released by the Productivity Commission into Natural Disaster Funding Arrangements found that government natural disaster funding arrangements had been inefficient, inequitable and unsustainable. 'They are prone to cost shifting, ad hoc responses and short-term political opportunism.' The Productivity Commission lamented that the funding mix was disproportionately recovery-based and did not promote mitigation. It observed that the political incentives for mitigation were weak, 'since mitigation provides public benefits that accrue over a long-time horizon,' and that over time this would create entitlement dependency and undermines individual responsibility for natural disaster risk management.' At that time, it said, mitigation funding amounted to only three per cent of what is spent on post-disaster recovery and recommended that the Australian Government should gradually increase the amount of annual mitigation funding it provides to state and territory governments to $200 million."

The paper pointed out that, in Australia, "one dollar spent on mitigation can save at least two dollars in recovery costs. Committing additional mitigation funding makes economic sense".

The importance of adequate investment in fire and flood risk reduction and mitigation is critical, as well as reducing the extent and number of crises.

2.4 Failures in bushfire evacuation planning

The ABC article highlights an example of major bottleneck during the 2019/ 20 bushfires:

https://www.abc.net.au/news/2023-08-25/wollondilly-residents-road-upgrades-bushfire-traffic-bottleneck/102776522

Ms Davies was one of thousands of people tried to evacuate on one road at once on December 19, 2019, when an out-of-control bushfire raged towards the towns of Balmoral, Buxton and Bargo.

It resulted in the 15-kilometre traffic jam that stretched from Bargo to Picton.

This highlights the importance of sound planning of all evacuation routes during bushfires.

3 Key opportunities in relation to land and fire management increasing community safety

Key opportunities include:

3.1 Optimise prescribed burning

It is essential that greater funding is allocated to bushfire mitigation to reduce the extent of bushfire risks and crises, and consequent need for disaster resources. This includes prescribed burning and forest thinning, as widely used in the US. The Disaster Ready Fund (DRF) of $1 billion dollars over the next five years to improve Australia's resilience and reduce the risk of natural disasters is not adequate to address this massive fuel load issue.

In addition, expanding the prescribed burning program to 8 % of forests per year provide a great training and expertise program that can be used in major bushfire crises where they occur.

3.2 Increase use of mild fire for healthy and resilient ecosystems and reduced carbon emissions

As outlined by Jurskis, Burrows, Roger Underwood, in A comment on Wilson, Bradstock & Bedward – Forest ecology and management (2021) 118701: "addressing carbon stock risk mitigation" raise important points in relation to resilient landscapes in Australia:

6. Implications for management

The top priority for forest management in ***Australia must be to restore sustainable regimes of mild burning throughout the landscape, including*** *very tall forests of mountain ash, where large avoidable carbon emissions from high-intensity fires are but one facet of environmental degradation including erosion, siltation and reductions in streamflow and biodiversity. Socioeconomic problems including losses of homes, infrastructure (with stored carbon) and human lives are equally concerning.*

We can re-establish healthy, safe and productive landscapes by using our long collective experience in sustainable fire management as well as accurate information to assess our options and optimise the mix of ecosystem values and services (Bi et al., 2001, Jurskis, 2015, Jurskis et al., 2020, The Howitt Society, 2020). Given the unprecedented carbon emissions and environmental and socioeconomic destruction from our Black Summer of 2019/20, there is huge scope for improvement.

It is important to understand that establishing resilient landscapes reduces the shocks of intense bushfires on communities, biodiversity and greenhouse gas emissions.

3.3 Use mild fire effectively to protect communities

There is clear evidence from around the world that megafires, forest decline, pestilence and loss of biodiversity are consequences of lack of ecological maintenance by gentle fire. Healthy and safe

forests are extremely resilient to drought, and much less affected by megafires and pestilence. As a result of government policies, there are hardly any left.

One example is from WA. As outlined in "The Truth About Fuel Reduction Burning" on the Bushfire Front website, real data gathered from almost 60 years of historical data from the forests of south west WA, the data unequivocally shows that when the area of prescribed burning trends down, the area of uncontrolled bushfires trends up. There is a simple explanation: bushfires are more difficult to put out in long unburnt, heavy fuels. The area annually burnt by bushfire escalates exponentially when the area of prescribed burning in a region falls below 8 percent per annum. Burning about 8% per annum results in about 40 % of bushland carrying fuels 0 to 5 years old.

3.4 Better prepare communities for crises to manage bushfire mitigation and bushfire disasters

Opportunities to better prepare communities for crises to manage bushfire mitigation and bushfire disasters include:

- Increase prescribed burning programs around many at risk bushfire communities and very high fuel loads around communities.
- Improve bushfire design, layout, removal of grass fuels, controls, mitigation and consideration of firebrand distribution in many towns and cities, in some cases with systemic failure in addressing sound safe bushfire protection of communities. Address the inadequate ongoing focus in many towns and cities on bushfire protection and reducing bushfire risks. There are an increased number of people living in regional and city locations, including at the wildland urban interface, also increasing risks of bushfires starting, including non-permanent residents, hobby farms and weekend retreats. This has become a bigger problem as people from the city often had very little knowledge on how to reduce the fire risk on their property and often do not ask key questions from the local owners.
- Prepare and implement community bushfire protection plans, neighbourhood/ locality plans or other such plans for individual towns, including sound annual mitigation focussed to adequately protect these towns.
- Increase support and programs in NSW for community participation and preparedness for bushfires, noting Victoria, SA, Tasmania, SA and WA have community fire participation programs in place. This government support is critical, noting this issue has important link with the National Strategy for Disaster Resilience, critical infrastructure resilience strategies and emergency management arrangements. Establishment of fire adapted community groups in towns and cities would be another opportunity to improve community safety. There does not appear to be federal requirements for nationally consistent community protection plans.
- Increase implementation of household bushfire survival plans.
- Increase district/ community/ town/ city awareness of previous bushfire travel paths over the last 80 plus years and local town/ city bushfire plan members to progress this. This was essential information in order to plan mitigation and optimise escape routes.
- Undertake ongoing mitigation in relation to all likely evacuation and key road routes to reduce route blockage risks from bushfires, restricting safe access and emergency escape in some cases, many having no mitigation treatment measures such as low intensity burning, fuel treatment and dangerous tree management.
- Optimise communication systems to better handle bushfire events, reducing safety risks.
- Increase local/ regional transparency in relation to prescribed burning planning, performance monitoring and annual mitigation and opportunity for public review of prescribed burning that had been undertaken to protect communities and schedules for upcoming periods.
- Implement a program to address unsafe landscaping around and within towns and around houses in many cases, reducing bushfire risks.

Figure. Electricity distribution system impacted during a bushfire.

A useful case bushfire community protection study is extracted from Brian William's submission to 2020 Bushfire Royal Commission, a very good submission:

Kurrajong Heights has a highly successful BFMP that has kept the community safe for 68 years. The Kurrajong Heights BFMP relies heavily on local knowledge.
Knowledge of terrain, fire behaviour and fire paths.
The Kurrajong Heights Brigade has developed and implemented a plan that hazard reduces blocks using a mosaic pattern. This strategy keeps low fuel areas as a blocking influence for approaching wildfire. Refer below

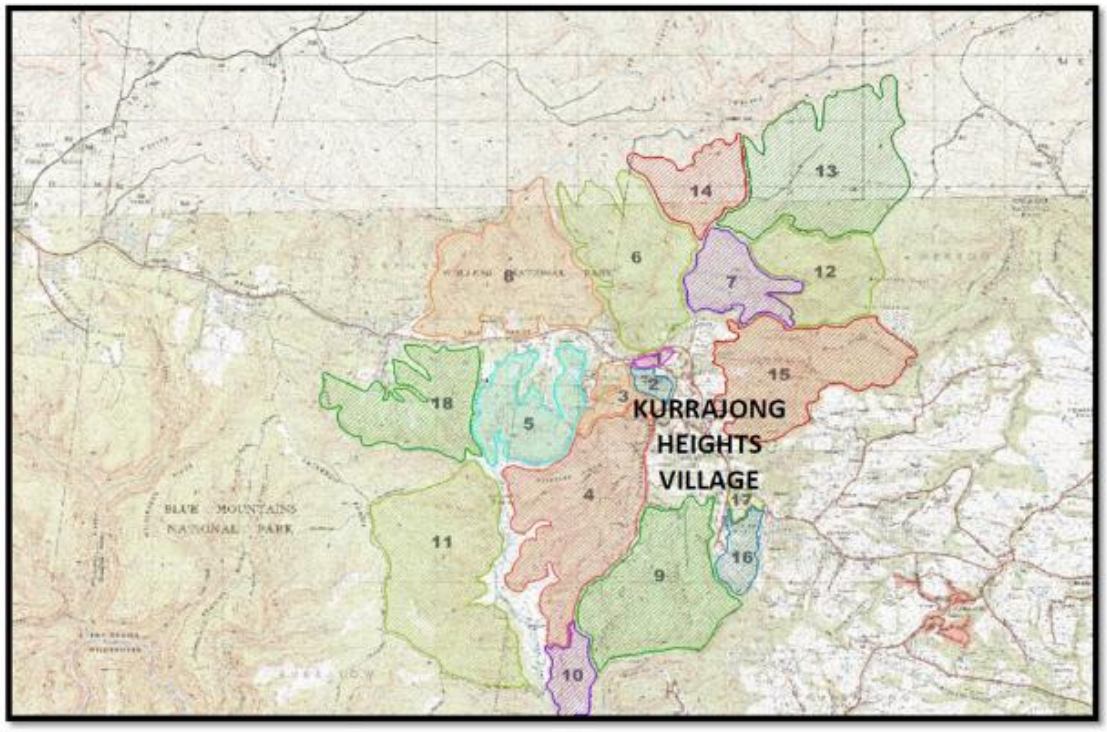

Figure. Kurrajong Heights Brigade hazard reduction blocks using a mosaic pattern

The approach used at Kurrajong Heights should be mandatory for all individual towns and cities in NSW.

There are other bushfire protection opportunities for communities:

- Major investment in avenues and opportunities such as the fire adapted communities, firewise, local fire safe councils are needed to increase community safety.
- Improved bushfire protection opportunities and approaches to protect communities need to be tabled for each town and city and discussed with each community and then at state and federal levels.

3.5 Adopt safer town and city bushfire design

Many recent subdivisions have very dense housing, mulch landscaping, poor tree selection, timber fences and inadequate defendable space in relation to bushfire risks (refer two Figures below). Where bushfires and firebrand masses drop into these areas, it is suggested that the outcome will be worse than the ACT 2003 fires, due to the very dense housing, mulch landscaping, poor tree selection, timber fences and inadequate defendable space. VFFA understands the ecological issues, but smarter choices need to be made in relation to bushfire risks, including avoiding mulch landscaping, improved tree selection, metal fences and revised defendable space.

Figures. Two photos above of a development with likely bushfire risks

Blanchi et al. (2012) Life and house loss database description and analysis; Final Report. Bushfire CRC report to the Attorney-General's Department. CSIRO EP-129645, 92pp.

A CSIRO analysis of Australian wildfire fatalities over the past 110 years has found that:

- *50% of deaths happened within 10 metres of a forest,*
- *78% happened within 30 metres of a forest, and*
- *85% happened within 100 metres of a forest.*

This information highlights the importance of adequate defendable space.

In an article titled "Forest Leaves Trees and Fire - a forester's perspective" by Roger Underwood dated October 2023 notes:

In a letter to the editor of The West Australian newspaper not long ago, I suggested that people building new homes in bushfire-prone areas in south-western Western Australia should consider planting northern hemisphere deciduous hardwood trees rather than native eucalypts like jarrah (Eucalyptus marginata) and marri (E. calophylla), or that perennial Australian favourite, the lemon-scented gum (E. citriodora).

I have also opposed the planting of eucalyptus trees (especially the tall forest trees) as street verge trees in suburbs close to bushland.

The eucalypts not only drop their leaves and shed bark in the height of summer, filling gardens and gutters with dry leaves, bark and twigs, but contain volatile and flammable oils in their foliage which explode when ignited. For anyone who doubts this, it is a very instructive experience to place a leafy branch, freshly fallen from a eucalyptus tree onto a bonfire. It smokes momentarily, and then suddenly bursts into intense flame. This explains the phenomenon of the "fire ball" observed by many firefighters – the entire crown of a tree, bombarded with embers from an approaching bushfire, suddenly explodes en masse, and a ball of fire rolls through the air into the next tree, setting it alight, and so on.

A live eucalyptus tree instantly transformed into a fireball by an intense bushfire

Most non-eucalyptus hardwood trees (usually referred to in the Northern Hemisphere as "broadleaf" trees), on the contrary, are relatively non-flammable. The green foliage is very hard to ignite and smoulders rather than bursts into flame. These trees have the additional advantages of the lovely colours of the foliage in autumn, and (being deciduous), allowing access to winter sunshine.

There is a lot of merit in this advice, bushfires, bushfire design and landscaping are often poorly considered in new developments.

3.6 Evacuation routes

The ABC article highlights concerns in relation to long evacuation times during bushfires and other disasters:

https://www.abc.net.au/news/2023-11-23/wollondilly-shire-hazard-study-appin-development-evacuation-time/103135094

The article notes that a Hazards Analysis and Emergency Management Study (HEAMS) was commissioned by Wollondilly Council to review shire wide disaster planning and provide recommendations for improvement and noted:

A recently publicised report warns that if bushfires threaten planned new major housing developments on Sydney's south-western fringe, it could take residents more than eight hours to evacuate.

Considering Australian bushfires, what happened during the 2019/ 20 bushfires and what happened in Maui in 2023, this is an important area that needs to be addressed for all communities.

3.7 Address disaster management opportunities

Note. If disaster management can be turned around and other opportunities seized on in relation to science, productivity, regional development and natural resources, huge savings and improvements in budgets and the economy can be made.

There are many opportunities:

- Address the fire mitigation low intensity focus, which is a national disgrace.
- Prepare an Australian disaster mitigation preparedness strategy, refocussing expenditure on bushfire mitigation.
- Prepare an Australia blueprint for better learning and more effective outcomes from disaster reviews, utilising experienced on ground disasters managers.
- Ensure greater involvement of the insurance sector in disaster planning and management, reducing risks.
- Reduce insurance premiums, ensure governments at all levels/ communities/ businesses work with the insurance industry on ways to achieve this.
- Ensure the financial and human impact of megafires being considered combined with consequent changed rainfall patterns and consequent floods in the years after major bushfires, refer research by John Fasullo. This is a double whammy of impacts and costs.

There are many economic reform and productivity opportunities across the spectrum of mitigation, prevention, suppression and recovery, particularly in regards to bushfire and flood issues. Some of these opportunities are outlined below:

- Implement cost effective opportunities as identified by Deloitte Access Economics (2013), "Building Our Nation's Resilience to Natural Disasters" for the Australian Business Roundtable for Disaster Resilience and Safer Communities.
- Implement key recommendations of the Menzies Centre report: including Government funding should prioritise risk reduction which will reduce the need to spend on disaster recovery.

3.8 Adopt optimised choice of tree species for changed climate, optimum carbon capture and bushfire risks

ABC News reported on “Plane trees to be phased out in Sydney's parks and streets and replaced with more drought-tolerant species” on ABC Radio Sydney, by Declan Bowring Posted Thu 26 Oct 2023 at 6:26am, updated Thu 26 Oct 2023 at 9:53am:

Ms Sweeney said the city went through 400 species to find the ideal street tree that could thrive in Sydney with a climate featuring greater periods of drought and warmer conditions, similar to Grafton in northern New South Wales. e City of Sydney will replace the trees with other species that can handle the warming climate. (ABC News: Zalika Rizmal) To their surprise, the plane tree was one of the least well suited. "We looked at all of the research and did an extensive amount of work to futureproof our urban forest and our canopy cover," Ms Sweeney said. "Of the 400 species, the plane tree was found to be ranked the third most vulnerable to drought."

The city's plan is that when a plane tree needs to be removed, it will be replaced with a species better suited to the changed climate in the long term.

The replacements will be a mix of native and introduced species and have been chosen based on many factors including the side of the street they are on.

Some examples include native eucalyptus, bloodwoods and leopard trees and imported species such as rain trees.

"We really do need to have that balance between summer shade and winter sunlight in some locations," Ms Sweeney said.

This is common sense approach, reefing tree species over time. The same logic applies to bushfire tree and shrub selection outlined above, choosing species that are not major bushfire risks.

Increasing age of trees and bushfire destruction is increasing carbon emission as highlighted in https://healthyforests.org/2023/08/usda-forests-converting-to-carbon-emitters/ USDA: Forests Converting to Carbon Emitters healthy forests August 8, 2023 | News

A new report from the U.S. Department of Agriculture (USDA) finds American forests may convert from being carbon absorbers to significant carbon emitters. Researchers say the shift is due to the increasing destruction from natural disasters and the aging of forests, which is reducing their carbon absorbing capabilities. Our forests currently absorb 11 percent of U.S carbon emissions, or 150 million metric tons of carbon a year, equivalent to the combined emissions from 40 coal power plants. However, starting in 2025, their ability to hold carbon may start plummeting and could emit up to 100 million metric tons of carbon a year as their emissions from decaying trees exceed their carbon absorption. Without action, forests could become a “substantial carbon source” by 2070, the USDA report says. Already, several states in the Western U.S. have incrementally emitted more carbon than they removed from the atmosphere each year, including those in Colorado, Idaho, Montana, New Mexico, Utah, Arizona, Nevada, South Dakota and Wyoming – states with large amounts of federally-owned forests. Untreated insect epidemics and disease are resulting in significant tree mortality, which directly contributes to massive carbon-emitting wildfires. In Colorado, for example, the mountain pine beetle killed trees across 3.4 million acres between 1996 and 2013 (photo, right). Between 2011 and 2020, Colorado faced an average 5,618 wildfires each year that burned more than 237,000 acres annually. The report also found that our forests are rapidly aging. Older, mature trees absorb less carbon than younger trees of the same species. Comparing forest management to prescribing the proper drugs to a patient, one researcher says one solution is cutting a small portion of aging forests to make ways for younger trees that absorb more carbon. The best solution for reducing carbon emissions is to maintain the cycle of forestry- the continuous planting, growing and harvesting- that results in net zero carbon emissions and discourages the conversion of forests to non-forests. Yet federal agencies continue to fall behind, despite billions of dollars in new government spending on hazardous fuels reduction and other management efforts.

Selection of bushfire safe trees and an ongoing replacement of older/ often unsafe trees is critical in relation to optimising carbon capture, heat reduction and reducing bushfire risks.

3.9 Incorporate smarter US bushfire approaches to protect communities

Other valuable information comes from the USA. They are focussed on establishing and managing policy and systems for creation and maintenance of resilient, low fuel, healthy and safer landscapes. They have implemented the USA Bipartisan legislation, optimising forest health using prescribed burning and where required forest thinning opportunities. The USA is way ahead of Australia in these areas.

Key points extracted from the Executive Summary of the US document by FEMA and the US Fire Administration (2022) and titled Wildland Urban Interface: A Look at Issues and Resolutions A Report of Recommendations for Elected Officials, Policymakers and All Levels of Government, Tribal and Response Agencies (June) include:

https://www.usfa.fema.gov/downloads/pdf/publications/wui-issues-resolutions-report.pdf

- *Wildfires are among the worst natural and man-made disasters currently facing our nation. The damage a wildfire causes is multifaceted as it affects multiple areas of civilization and the safety and health of responding firefighters. Today, factors such as climate change and reduced land management practices are significantly contributing to the cause, the increasing frequency and the greater intensity of wildfires, particularly in the WUI.*
- *….as the United States' population grows and development of wildland continues, the WUI expands, increasing vulnerability for thousands who choose to live in the space and the firefighters who respond to fight the fires that occur. This unique fire problem has become a high-risk public safety concern for life safety, public and responder health, private property and businesses, the economy, and the ecology in these regions.*
- *Without intervention, adverse consequences of wildfire in the WUI will worsen. Our nation is on the precipice of an all-hands moment in which landowners, citizens, communities, infrastructure organizations, academia, researchers, not-for-profit organizations, governmental agencies and others have critical roles in coordinating a collaborative approach to contain and control the threat of wildfire in the WUI.*
- *It is essential that elected officials and other government leaders allocate resources and support this imperative to address the WUI wildfire problem. FEMA/DHS/USFA developed the "Wildland Urban Interface: A Look at Issues and Resolutions" to stimulate action by raising awareness of the crisis that our nation faces related to wildfire in the WUI and lay out a unified, strategic approach to risk reduction at the national, state, regional and local levels.*
- *In developing this report, a cross-functional group of stakeholders and subject matter experts (SMEs) from across the nation convened to identify 33 challenges within 13 key WUI issues and develop recommendations to address each challenge. In total, 112 recommendations are presented. These recommendations address challenges in firefighter health and safety, public health and safety, evacuations, forest and rangeland health and resiliency, climate change, community planning and resiliency, infrastructure and utilities, communication strategy and engagement operations, socioeconomic impacts, recovery, emerging technology, data use and modeling, and risk management in wildland fire. The recommendations should be pursued together, forming a system of strategies that require urgent, sustained and actionable implementations. These recommendations are not quick fixes, but solutions for the long term. Leadership on and commitment to the implementation of these recommendations results in a safer America.*

The above document is valuable reading for those involved in land and fire management in Australia, outlining the large number of challenges and recommendations.

In relation to Australia, the positives and opportunities out of this detailed document and other recent US fire and land management policy developments and commitments for the US are many and include:

1. There is key federal legislation commitment in place for this work reducing fuel, increasing prescribed burning, improving forest health and expanding community mitigation work under the Bipartisan Infrastructure bill and other legislation.
2. There is firm commitment to this work through Confronting the Wildfire Crisis A Strategy for Protecting Communities and Improving Resilience in America's Forests and also the earlier National Cohesive Wildland Fire Management Strategy in place.
3. There is a good awareness of the forest fuel load issue across forests, at very high levels and changes in openness of forests since fire suppression became the focus.
4. There is increased funding to reduce fuel loads, prescribed burning, forest thinning and community protection.
5. Firefighter and public health and safety are critical issues.
6. Infrastructure and utilities protection are important issues.
7. There is active community involvement in fire management and this will increase. Forest Service partners include Firewise, local fire safe councils, the Fire Adapted Communities Learning Network, and the Ready, Set, Go! Program.
8. Optimising forest health and resilience is being actually considered and addressed.
9. Thinning is accepted as a sound option to improve forest health. Open forests from a century ago before fire restriction policies were put in place are important considerations.
10. Indian burning practices are being considered and addressed.

3.10 Address Pacific cooling research from Australian bushfires and consequent rainfall impacts

A recent paper by John T. Fasullo*, Nan Rosenbloom, Rebecca Buchholz (2023) A multiyear tropical Pacific cooling response to recent Australian wildfires in CESM2 SCIENCE ADVANCES 10 May 2023 Vol 9, Issue 19 DOI: 10.1126/sciadv.adg121 highlights:

The climate response to biomass burning emissions from the 2019–2020 Australian wildfire season is estimated from two 30-member ensembles using CESM2: one of which incorporates observed wildfire emissions and one that does not. In response to the fires, an increase in biomass aerosol burdens across the southern hemisphere is simulated through late 2019 and early 2020, accompanied by an enhancement of cloud albedo, particularly in the southeastern subtropical Pacific Ocean. In turn, the surface cools, the boundary layer dries, and the moist static energy of the low-level flow into the equatorial Pacific is reduced. In response, the intertropical convergence zone migrates northward and sea surface temperature in the Niño3.4 region cools, with coupled feedbacks amplifying the cooling. A subsequent multiyear ensemble mean cooling of the tropical Pacific is simulated through the end of 2021, suggesting an important contribution to the 2020–2022 strong La Niña events.

Put simply, it is likely that a mary go cycle round is being set up:

- Major bushfires occur with large emissions, such as the 2019/ 20 bushfires
- Then Pacific cooling and consequent increased rainfall impacts in E Australia making La Nina's worse and increasing vegetation growth such as in 2020 to 2022.
- Consequent increased bushfire risks when an El Nino strikes such as in late 2023, with large areas of increased vegetation over Australia from previous heavy rainfalls.

This research needs to be considered and actioned, there is one obvious solution in markedly increased prescribed burning across south eastern Australia, reducing both bushfire insurance costs and flood insurance costs and better protecting communities and the environment.

4 Conclusions

Current failures in bushfire safety, people, communities and preparedness as outlined in Section 2 addresses four failure areas.

Key opportunities in relation to land and fire management increasing community safety are outlined in Section 3 and includes ten opportunity areas.

It is important that governments at all levels soundly consider and address these failure and opportunity areas.

Kind Regards

Greg Godde
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