SUBMISSION

NSW INDEPENDENT INQUIRY INTO THE 2019-20 BUSHFIRE SEASON

NATURE CONSERVATION COUNCIL OF NSW
9 April 2020

CONTENTS

1.0 Introduction

The Nature Conservation Council of NSW (NCC) welcomes the opportunity to make a submission to the NSW Independent Inquiry into the 2019-20 bushfire season.

NCC believes that the catastrophic bushfires which burnt swathes of eastern NSW, as well as parts of eastern Queensland and Victoria, provide a timely opportunity to reassess our approach to fire management, particularly in light of the devastating impacts to natural ecosystems and the unique fauna and flora which are dependent on these impacted landscapes.

NCC maintains that a prime bushfire management aim should be to ensure that both public and privately-owned natural areas are managed to maintain ecological processes and the conservation of biodiversity.

2.0 NSW Conservation Council

NCC is the peak NSW conservation organization, representing over 150 community environmental organisations from across New South Wales. NCC policies are approved by the member organisations at the NCC Annual Conference. They are therefore highly representative of the broader views of the environment community.

2.1 NCC Community Bushfire Programs

The NCC organises and participates in a large number of fire management activities aimed at advocating sustainable fire management practices and encouraging community participation and resilience.

NCC has been involved in bushfire management since 1979 when the NCC's Bushfire Program was established. It has been involved in the Hotspots Fire Project since 2005. NCC aims to ensure that all bushfire management activity in NSW is ecologically sustainable while protecting life and property.

2.1.1 NCC Bushfire Program

Since the gazettal of the *Rural Fires Act 1997* (RF Act), NCC has had a statutory opportunity to appoint conservation representatives to the state's peak Bush Fire Coordinating Committee (BFCC), the Rural Fire Service Advisory Committee (RFSAC) and Bushfire Management Committees (BFMCs) around the state. NCC is also a member of the BFCC Standing Advisory Committee and numerous BFCC working groups and reference committees.

NCC has 43 representatives who participate on BFMCs across NSW and actively contribute to the preparation and review of BFCC policy and planning documents including bush fire risk management plans, BFCC policy documents, community protection plans (CPPs), fire access and fire trail plans (FAFT's), the Biodiversity and Fire Guidelines, Planning for Bush Fire Protection, the Bush Fire Environmental Assessment Code and Guidelines and the review of the BFMC Handbook and policy reporting and monitoring processes.

Every two years the Bushfire Program convenes a bushfire conference, which brings together NCC member organisations, academics and students, Traditional Owners, fire and emergency service agencies, land managers, local government and interested community members to share and discuss aspects of fire ecology, fire behaviour, cultural burning practices, fire management policy and programs, climate change, rehabilitation and recovery and minimal impact guidelines. This year the conference has been postponed to May 2021, but the program will continue to highlight issues and concerns arising from the 2019-20 bushfires and plans to incorporate those issues in

the 2021 Conference.

The program also delivers community engagement and stakeholder focused workshops and video training resources to enhance community preparedness, to coach and train volunteers and BFMC members and particularly to support sustainable fire management practices on private lands.

2.1.2 The Hotspots Fire Project

Hotspots is co-delivered by the NSW Rural Fire Service (RFS) and the Nature Conservation Council of NSW (NCC) under the guidance of an Advisory Committee. Chaired by NCC, the Advisory Committee involves representatives from the NSW RFS, Local Land Services, Department of Planning, Industry and Environment, National Parks and Wildlife Service, Local Government, NSW Farmers, Forestry Corporation, University of Wollongong Centre for Environmental Risk Management of Bushfires and the Southeast Queensland Fire and Biodiversity Consortium.

Hotspots provides landholders and land managers with the skills and knowledge they need to participate in fire management planning. Hotspots operates on a core belief that well-informed and well-prepared communities complement the role of land managers and fire agencies and that a shared approach to fire management is critical to successful planning and implementation.

The Hotspots Program delivers community engagement workshops supporting neighbouring landholders to create property-based fire management plans which assist owners to plan and implement actions on their property to mitigate bushfire risk and to maintain biodiversity. Implementation of these plans is facilitated by training in fire behaviour, the permit and legislation requirements and practical hands-on experience participating in a small prescribed burn.

To assist the Inquiry, the NCC has responded to the terms of reference, with particular attention devoted to ToR 1, ToR 2; and ToR 3 as follows.

3.0 ToR 1: The causes of, and factors contributing to, the frequency, intensity, timing and location of, bushfires in NSW in the 2019-20 bushfire season, including consideration of any role of weather, drought, climate change, fuel loads and human activity.

3.1 Cause - Lightning

According to recent NPWS fire records which cover most of the 2019-20 fire season to January 2020, lightning is recorded as the primary cause of this season's wildfire activity both in terms of number of ignitions (i.e. 75% of total); and of area burnt (i.e. 75% of total). This compares to an average annual occurrence of lightning ignitions of 34% of total annual ignitions and 67% of average annual area burnt by wildfire.

Lightning ignitions were responsible for some of the largest and most difficult fires to suppress, including the Gospers Mtn (512,626ha), Dunns Road (333,940ha) Badja Forest Road (315,512ha), Currowan (314,599ha) and Green Wattle Creek (278,199ha) fires.

These ignitions occurred on a variety of tenures including in wilderness areas (Gospers Mtn and Green Wattle Creek), on private property (Dunns Road) and in state forest (Currowan and Badja Forest Road).

It is not uncommon for waves of lightning ignitions to occur during dry thunderstorm events, often stretching the resources of RFS and NPWS Rapid Aerial Response Teams (RARTs). These teams are comprised of specially trained and equipped remote area firefighters who are deployed and supported by aircraft to effectively and safely respond these types of ignitions. Research indicates that climate change projections may well increase the frequency of lightning ignitions in the future[1,2], therefore the cost-effectiveness and resourcing associated with these teams would be worthy of review.

3.2 Cause – Arson

Deliberate lighting of fires during adverse fire weather conditions, in particular on Total Fire Ban days, has been an issue for decades. NCC believes that more concerted and consistent efforts to prevent illegal ignitions and to investigate and prosecute offenders is required, e.g. the permanent establishment of well-resourced bush fire arson investigation teams.

However, despite media comments to the contrary, according to NPWS records arson and suspected arson were only recorded for 6% of all ignitions this season, whereas the long-term annual average is 36% of all ignitions; a very significant drop. As a percentage of area burnt, arson this season accounted for 11% of total area burnt compared with a long-term annual average of 13%, a slight reduction. The role of the NSW Police and of fire authority ignition prevention strategies may well have contributed to this significant drop in numbers of ignitions.

Although there is little conclusive evidence that arsonists specifically target high fire danger days (see Bushfire Arson bulletin no. 39), deliberate bushfires which are lit on these days are potentially more dangerous and, as they require more effort and resources to suppress, they

[1] Krause, A., S. Kloster, S. Wilkenskjeld, and H. Paeth (2014), The sensitivity of global wildfires to simulated past, present, and future lightning frequency, J. Geophys. Res. Biogeosci., 119, 312–322, doi:10.1002/2013JG002502.

[2] Price, C.; Rind, D. Possible implications of global climate change on global lightning distributions and frequencies. J. Geophys. Res. **1994**, 99, 823–831.

impact on the ability of fire services to fight other fires[3].

3.3 Cause – Other Human Activity

The cost of dealing with escaped fires is considerable and ongoing. The large fires this year, many of which started in August/September on the North Coast, required extensive aerial water bombing and resources brought from across the state, interstate and overseas, costing hundreds of millions of dollars. Apart from the appalling loss of human lives, this sum does not include the cost of lost built assets and income losses, as well as the huge ongoing environmental costs, including the loss of irreplaceable hollow bearing trees and other critical Threatened Species habitat as well as the species themselves.

The 2019-20 fires have been unprecedented in their extent and impact; however it is notable that in the winter of 2018 more than double the number of fires burned across NSW than in the previous year. Yet even now, in the certainty of climate change and this weather becoming a normal average pattern for NSW, there is still no requirement for landholders to apply for permits to burn outside the Bush Fire Danger Period. The non-issue of fire permits outside the Bush Fire Danger Period contradicts the requirement under Section 88 (1) of the RF Act to attain a permit throughout the year for all fires to be lit in fire districts operated by Fire & Rescue NSW and rural fire districts where the proposed fire would be likely to be dangerous to a building. All fires have the potential to be dangerous to a building or buildings.

Each 'permit season' sees a rush in landholders burning off immediately before the need to obtain a fire permit is required. Often the Bush Fire Danger Period is brought forward after fires begin to escape and cause problems, an action akin to closing the door after the horse has bolted. It is already a requirement to notify the Rural Fire Service 24 hours prior to lighting a fire at any time during the year, so applying for a permit should not result in additional inconvenience, particularly with technology such as email etc available.

Currently fire permits are often issued by volunteers. The requirement for year-round permits should be facilitated by dedicated paid staff to undertake this activity. These staff need to be trained and experienced in assessing burns proposed by landholders to ensure that burns can be safely undertaken and contained with sufficient firefighting resources on hand to manage the burn. Fire permits should not be issued for burns which do not meet these safety criteria.

As well as ensuring that appropriate resources such as trained paid staff are on hand to properly assess proposed burns prior to the issue of permits so that proposed burns can be carried out safely, enforcement of some provisions in the RF Act is needed to further reduce the likelihood of hazard reductions and other planned burns from escaping.

Under section 100(1) of the RF Act it is an offence to allow a fire to leave a landholder's property and cause or be likely to cause damage to another property. This is known to occur in rural areas in NSW on numerous occasions every year. The maximum penalty is 1000 penalty units or imprisonment for 5 years, or both. These are significant penalties, so the offence is considered to be substantially egregious.

However, there are very few prosecutions for this offence, with only warnings given to first, second and often serial offenders. This is unacceptable given the damage caused by escaped fires to neighbouring landholders and the environment and the expense incurred by the community both in fighting such fires and recovery efforts.

[3] AIC (2007) BushFIRE Arson Bulletin No. 49. Climate Change and Fire Danger. Australian Institute of Criminology.

Additionally, it is also an offence to leave a fire unattended from the time it is lit until such time as it is thoroughly extinguished (Section 100 (2) RF Act). The definition of 'attended' is vague and could include fires left burning on one part of a large rural property while the owner may be at home on the property kilometres from the fire.

The requirement for year-round permits would require that fires are attended at all times. However, it needs to be made clear that 'attendance' must be active and in close proximity to the fire with appropriate resources to ensure it is kept contained. Adequate staff, resources and 'political will' need to be provided by Government to properly ensure compliance with the RF Act and to actively enforce legislation by authorities.

3.4 Ignition Prevention

In 2019-20, NSW Police established an expanded Strike Force Tronto[4] and a Strike Force Yeelanna (North Coast)[5] to help educate the community on issues surrounding deliberately lit fires, particularly by landowners, farmers and graziers on the approach to the fire season.

The State Bush Fire Plan (Dec. 2017) states that "*Arson and ignition prevention strategies are developed by the Bush Fire Arson Task Force (State) and Inter Agency Arson Working Groups (District)"*. However, NCC is not aware of any state-wide strategy for arson prevention or ignition prevention strategies more broadly. Ignition/arson treatment actions are required to be detailed within District Bush Fire Risk Management Plans, however these are cursory at best. A bushfire arson prevention handbook (Anderson, 2010) was developed by the Australian Institute of Criminology (AIC) and is a resource for fire agencies and police, especially when developing community-based bushfire and bushfire arson (BFA) prevention strategies. The handbook draws on current crime prevention knowledge about the factors that lead to the occurrence of arson and highlights information that is important when evaluating activities or projects.

The AIC Handbook is not currently referenced within the District Bush Fire Management Committee Policy or handbook (e.g. The District Bush Fire Management Committee Member Handbook) relating to the development and review of Annual Ignition Prevention Plans and associated strategies.

RECOMMENDATIONS

- **A review be undertaken of the cost-effectiveness, operational protocols and resourcing requirements of the RFS and NPWS RART programmes, particularly in the light of climate change impacts on lightning ignitions.**
- **The BFCC in conjunction with the NSW Bushfire Arson Task Force review the policies and procedures associated with ignition prevention strategies within BFCC policies and guidelines and within District Bush Fire Risk Management Plans.**
- **Consider legislation that requires the mandatory issue of year-round permits for all planned burns adjacent to public lands in bushfire prone areas.**
- **Appropriate resources, including trained paid staff, to be provided to properly manage the permit system to ensure that only those burns that can be carried out safely are issued fire permits.**
- **The necessary resources to ensure compliance with the *Rural Fires Act 1997* be provided to fire authorities, with increased emphasis on follow up by the NSW Police on fires that escape**

[4] https://www.smh.com.au/national/nsw/like-nothing-we-ve-ever-seen-before-police-step-up-bushfire-investigations-20200124-p53udv.html

[5] https://www.bellingencourier.com.au/story/6370273/its-hotting-up-and-we-need-to-be-wary/

from landholders' properties onto public and other adjoining lands.

- **The Rural Fire Service increase resources to ensure landholders who light fires maintain an active presence at fires at all times until they are fully extinguished.**

3.5 Contributory Factor - Weather, Drought and Climate Change

Climate change impacts on fire weather have been predicted for some time now. More than 10 years ago, Lucas et al (2007) predicted that as a result of climate change impacts, dangerous fire seasons will become more common, the more extreme years will become even worse, 'marginal' years will become more dangerous and the infrequent less extreme years will remain so[6].

The Bureau of Meteorology has identified the 3 years from February 2017 to January 2020 as the driest on record when averaged over the Murray–Darling Basin and New South Wales. The dry conditions of the last three years have been particularly acute during the cool season, with April−October rainfall totalled across the three years, the lowest on record across large parts of western and eastern New South Wales. Accompanying this significant rainfall deficit, 2019 saw NSW experience average maximum (+2.44^{o}C departure from 30-year average (1961-1990), minimum (+1.45^{o}C) and average temperatures (+1.95^{o}C) that were the highest ever recorded.

Such extended periods of hot, dry conditions combined with the onset of strong winds are generally the catalyst for major bushfire events. Extended periods of dry soils, high temperatures and low humidity result in reduced moisture content of live fuels and drying of heavier ground fuels and increasing levels of total available fuel for a fire to burn.
Past major droughts and bushfires in south-east Australia have very often been associated with synoptic climate drivers of significant fire patterns such as combinations of strong negative El Niño–Southern Oscillation (ENSO), strong positive Indian Ocean Dipole (IOD) and late season monsoonal events and strong negative Southern Annular Mode (SAM) events[7].

These synoptic weather cycles generally result in decreased rainfall, increased maximum temperatures, higher wind velocities and lower humidity in Eastern Australia. The frequency of high fire danger ratings and risk of a significant fire danger season in southeast Australia are significantly higher following these events. The last strong El Niño event was during 2015-16, however a very strong positive IOD event prevailed during 2019. It was the strongest positive event recorded since 1997 and strongly contributed to the widespread warm and dry conditions experienced across Australia in the latter half of 2019 and it combined with a strong and relatively long-lasting positive SAM event.

There is a strong positive association between temperatures and fire occurrence in the southern hemisphere, with a tight coupling between lightning-ignited fire occurrences and the trend in the Southern Annular Mode[8].

Recent history therefore indicates that large scale fires occurring across a broad part of south-eastern Australia are generally associated with a drying weather pattern prevailing over a lengthy period, resulting in stress to vegetation and landscape processes.

Anthropogenic climate change is exacerbating the impacts of these climate drivers, with climate

[6] Lucas C et al. 2007. Bushfire weather in southeastern Australia: recent trends and projected climate change impacts. http://www.climateinstitute.org.au/images/stories/bushfire/fullreport.pdf.

[7] Skidmore, A.K. (2013) Predicting bushfire activity in Australia from El Nino/Southern Oscillation events. Australian Forestry Vol.50, No. 4. pp:231-235.

[8] Mariani, M., Holz, A., Veblen, T., Williamson, G., Fletcher, M-S., Bowman, D. (2018) Climate Change Amplifications of Climate-Fire Teleconnections in the Southern Hemisphere, Geophysical Research Letters. DOI: 10.1029/2018GL078294.

data records showing that global temperature rise has accelerated over the last few decades[9]. The Commonwealth Government's National Environmental Science Program has stated that its research suggests human-caused climate change has already resulted in more dangerous weather conditions for bushfires in recent times for many regions of Australia.
These trends are very likely to increase due to rising greenhouse gas emissions.

This bushfire season clearly shows that climate change is causing fire seasons to commence earlier and last longer, the opportunity to undertake safe and effective hazard reduction burning is reduced[10], fires to be increasingly unpredictable and difficult to contain, weather to increasingly become a major driver in fire behaviour and our fire mitigation and suppression capabilities less effective.

As greenhouse gas emissions increase, temperatures rise globally and heatwaves and drought become more frequent, fire risk will continue to escalate in the future without sustained efforts to tackle climate change. The 2019-20 fire season has been an unwelcome insight into the future for NSW. An official recognition of the changing climate and its effect on fire danger is required, placing climate change at the centre of policy and planning decisions in the State, with no new fossil fuel projects and the phasing out of existing fossil fuel projects.

RECOMMENDATIONS

- **That future planning for bushfire risk management in NSW recognise that climate change is now a major driver of increased bushfire danger and that further increases in global temperature are likely to increase the length and severity of fire season, restrict the window of opportunity for safe and effective hazard reduction burning and change the relative risk associated with bushfire events across NSW.**
- **To minimise the impacts of future projections of climate change on bushfire weather, that Governments commit to more effective climate change mitigation strategies and targets in line with the objectives of the Paris Agreement (to keep warming well below two degrees and pursue efforts to keep warming to 1.5 degrees).**

3.6 Contributory Factor - Fuel Condition

NCC acknowledges that the condition of fuel is a major factor influencing both fire intensity, rates of spread and therefore the difficulty of containment and the impact of bushfires[11]. NCC supports hazard reduction treatments including manual and mechanical removal of fuel and hazard reduction burning, particularly within Asset Protection Zones (APZs) and Strategic Fire Advantage Zones (SFAZs). NCC also supports burning as a primary ecological tool in maintaining the health of fire prone landscapes across Land Management Zones (LMZs), while acknowledging that ecological burning may also have a secondary benefit of reducing fuel hazards, providing all such works are undertaken in accordance with the NSW Bush Fire Environmental Assessment Code, a streamlined approval process, or alternatively in accordance with the *Environmental Planning and Assessment Act 1979*.

The accumulation of fuel levels in bushfire prone landscapes is influenced by a variety of factors including the vegetation or fuel type[12], the time since the last fire, grazing pressure, recent storms

[9] Gergis, J.L., Fowler, A.M. A history of ENSO events since A.D. 1525: implications for future climate change. *Climatic Change* **92,** 343–387 (2009). https://doi.org/10.1007/s10584-008-9476-z
[10] Swann and Ogge (2020) Out of Season. Expanding summers and shrinking winters in subtropical and temperate Australia. Discussion Paper. Australia Institute
[11] McCaw, W.L., Gould, J.S. and Cheney, N.P. (2008) Quantifying the effectiveness of fuel management in modifying wildfire behaviour. Paper presented to the 2009 AFC Conference, Adelaide.
[12] AFAC (2015) Bushfire Fuel Classification Overview. Australasian Fire and Emergency Service Authorities Council, Melbourne.

and both short and long-term soil moisture condition.

Fuel loads across NSW are managed in accordance with Bush Fire Risk Management Plans. From those plans, annual hazard reduction works programs are prioritised according to the bushfire zoning and associated risk to life and property. Implementation is subject to environmental assessment, approval, operational planning and resourcing and weather conditions on the day. NCC is aware that the window of opportunity to undertake burning as a hazard reduction strategy is narrowing as a result of climate change impacts, no more so than over the last 12 months. Hazard reduction burning also carries great risks as was seen at Mt Ku-ring-gai NSW in 2000, Margaret River WA in 2011 and Lancefield Vic in 2015.

Smoke impacts from hazard reduction burning are also subject to greater community concern, particularly in wine producing areas and adjacent to schools, nursing homes and hospitals, while more frequent burning and subsequent vegetation shifts can also contribute to increased greenhouse gas emissions.

Regional and state-wide performance is monitored quarterly by the NSW Bush Fire Coordinating Committee against the state-wide targets, originally established in 2011-12 within the NSW 2021 State Plan.

NSW 2021 - Goal 28

- Increase the number of properties protected by hazard reduction works across all bush fire prone land tenures by 20,000per year by 2016; and
- Increase the annual average level of area treated by hazard reduction activities by 45 per cent by 2016.

It is important to note that to meet this target, fire and land management agencies work together through District Bush Fire Management Committees to target fuel reduction and other bushfire risk reduction activities in prioritised high risk areas.

The targets were changed in April 2015 (NSW Election Commitments 2015-2019 p.14) to:

- 600,000 properties to be protected; and 750,000 hectares to be treated April 2015 to March 31st 2019.

As at the end of March 2019, NSW was slightly behind in works completion with 549,169 properties protected – should be at 600,000 (92.12%); and 684,609 hectares treated – should be at 750,000 (92.43%). Revised targets have not yet been established.

The time since the last treatment was undertaken is also generally a critical factor in determining whether fuel loads will sustain a fire, but this is very dependent on weather conditions on the day and the weather conditions in the months leading up to ignition of the fire. It should also be noted that fuels also encompass garden vegetation and flammable infrastructure around dwellings such as fencing, wood piles, mulch and other garden-based infrastructure. Houses are also flammable and may pose a threat through house to house ignition.

Different vegetation types accumulate fuels at different rates but studies in woodland and forest vegetation show the rate of accumulation of litter initially exceeds decomposition, and then reaches a steady state condition sometime after the last fire, stabilising at a fuel load specific to

the plant community[13]. Hence, if fire can be excluded from an area, surface, near surface and elevated fuel loads will decrease somewhat after a certain time dependent on the vegetation type, as decomposition occurs and understorey plants are out-competed as trees mature and a denser canopy is established [14,15].

For many locations mapped as a high risk to life and property or specific environmental assets, the timeframe required to allow fuel loads to stabilise may be too long and the vegetation will sustain a high intensity wildfire. It is these areas that NCC believes should be prioritised for treatment for the protection of communities and other assets. Areas identified as APZs, which occur immediately adjacent to assets are where the major effort to managed fuel loads should be concentrated, rather than broad area burning in natural areas such as parks and reserves managed by the National Parks and Wildlife Service (NPWS). It should be noted that provided it is appropriately designed and maintained, effective APZs can still provide different types of habitat and offer food, shelter and water for native animals. APZs do not have to be sterile, cleared areas of land.

NPWS reserves are mostly designated as LMZs or SFAZs and the impact of fuel management on the ecosystem components within these zones should continue to be an important consideration.

The bushfires this season have shown that weather conditions can override the lack of fuel on the ground. There are many examples of grazed paddocks, dry lawns and orchards and vineyards with very little surface and elevated fuel levels still sustaining fire of sufficient intensity to ignite outbuildings, vehicles and dwellings. This also occurred during the Victoria Black Saturday fires in 2009.

The University of Melbourne undertook a desktop analysis of the firegrounds in NSW to compare the size and severity of this season's bushfires area with hazard reduction burns over the past five years. That analysis found the majority of the area in which there had been prescribed burning had been burned again by bushfires over this fire season. This suggests that reduction of fuel on the ground has little effect on reducing the rate of spread of fire, nor the ability of firefighters to undertake direct suppression activities during extreme to catastrophic fire bush fire danger rating conditions.

A quick analysis of fire severity maps of the Gospers Mountain, 3 Mile and other smaller fires in the Central Coast hinterland in 2019-20, shows containment being assisted in only the most recently treated areas (i.e. burnt in the last 18 months), whilst areas treated by burning in the last 3-6 years were largely unsuccessful in containing the spread of these fires. Most of the 2013-14 wildfires recorded in the Central Coast hinterland had little effect on reducing fire severity and spread of the 2019-20 wildfires. In just six relatively dry years, the 2019-20 fires re-burnt the same areas with high fire severity values being recorded in many areas.

Further research into the effectiveness of previous fuel treatments in containing the 2019-20 fires, while taking advantage of the GEEBAM fire severity analysis, would seem to be a worthwhile

[13] Watson P., Penman S. & Horsey B. (2012) *Bushfire Fuels in NSW Forests and Grassy Woodlands. Fuels Modelling Project Final Report*. NSW Rural Fire Service. Homebush

[14] Wilson, N., Cary, G. J. & Gibbons, P. (2018). Relationships between mature trees and fire fuel hazard in Australian forest. International Journal of Wildland Fire, 27 (5), 353-362.

[15] https://theconversation.com/contrary-to-common-belief-some-forests-get-more-fire-resistant-with-age-95059?fbclid=IwAR0BvGddx2ONlFi48bpGO88QX0gd-6Wez4uUJVSWL_fCTU-glV5lsl6WMOY

research project, and similar to that recently undertaken in the USA[16].

A good example of community perception of unacceptable fuel levels is reflected in the number of hazard complaints lodged with the RFS under s.74A of the RF Act. The RFS Annual Reports since 2011 have recorded the number and outcome of complaints lodged.

The recent targeting of NPWS and the need for more fuel reduction burning in protected areas[17], ignores the progress and contribution made by NPWS in undertaking hazard reduction in NSW and of exceeding Government targets. More than 1,000,000ha of park and reserve has been treated since 2011-12 and more than 150,000 properties have been protected over that time.

NPWS has more than satisfied the state government targets that have been established for both 'area treated', with 103% of target achieved; and for 'properties protected' with 120% of the target achieved. Over the same period up to June 2019, NPWS has demonstrated that it is also been twice as successful as its neighbours in preventing wildfires from crossing reserve boundaries[18].

Interestingly of the 16,954 hazard complaints lodged to the RFS between July 2010 and June 2019, only 1.3% were lodged against NPWS managed lands. However, 90% of all these complaints were lodged against either private land or Council managed reserves.

Once inspected though, the small number of complaints that were made against NPWS over that 9-year period, reduced from 24 to 8 (slightly less than 1% of the total average annual number). Whereas the number of complaints against private land holders jumped from 63% of those received to 80% of those that were eventually identified.

The NCC believes that an expanded number of RFS hazard management officers, an expanded role for Community Fire Units, together with additional investment in the RFS/NCC Hotspots program and an expanded RFS AIDER[19] program would provide for an increased focus on reducing hazards, improving community resilience and reducing risk within the asset protection zone of bushfire prone lands, particularly on private property.

RECOMMENDATIONS

- **Revised targets for hazard reduction treatment are now overdue, particularly in terms of accounting for the exceptional 2019-20 fire season. Revised targets for hazard reduction treatments are best developed in the context of a holistic approach to risk reduction and communicated via the development of a State-wide bush fire risk management plan (see ToR 2).**
- **Areas identified as APZs in Bush Fire Risk Management Plans, especially on private property, should continue to be the focus for reducing fuel loads, rather than undertaking broad area hazard reduction activities in natural areas far from built assets.**
- **There is a demonstrable need to allocate more resources to enabling the safe and effective reduction of fuel on private property, e.g.:**

[16] Pritchard, S. et al (2020) 'Fuel treatment effectiveness in the context of landform, vegetation, and large, wind-driven wildfires'. Ecological Applications. 22 February 2020. https://doi.org/10.1002/eap.2104

[17] https://www.theguardian.com/environment/2020/jan/11/factcheck-are-national-parks-locked-up-and-more-vulnerable-to-bushfires

[18] NPWS (2019) Fire Facts 2018-19. NSW National Parks and Wildlife Service. Sydney.

[19] The AIDER program (Assist Infirm, Disabled and Elderly Residents) program is a free, one-off service which supports some of our most at-risk community members. The program helps people live more safely and confidently in their home in areas where bush fires may start.

    - **Improving the communication of hazard reduction approval processes;**
    - **Establishing and supporting more RFS community fire units and RFS AIDER units;**
    - **Expanding and supporting the operation of RFS hazard management officers (s.65 and s.66 of the RF Act); and**
    - **Further investments in the RFS/NCC Hotspots Program; and**
- **Encourage further research into the effectiveness of previous fuel reduction treatments on limiting the spread and severity of the 2019-20 wildfires.**

4.0 ToR 2: The preparation and planning by agencies, government, other entities and the community for bushfires in NSW, including current laws, practices and strategies, and building standards and their application and effect.

4.1 Bush Fire Planning

The most relevant bushfire planning documents, from most strategic to more tactical, are the State Bush Fire Plan, District Bush Fire Risk Management Plans (DBFMPs), District Operations Plans, Community Protection Plans, Annual Works Programs, FAFT Plans, Property Incident Plans, Reserve Fire Management Plans, Incident Action Plans and internal agency fire management policies and strategies. However, there is no obvious hierarchy of bushfire management planning in NSW, and it is not currently outlined in any government policy or strategic planning document.

From an operational perspective, it might be possible to trace a clear hierarchy starting with the State Bush Fire Plan, to District Operations Plans, Community Protection Plans, Property Incident Plans and Incident Action Plans. However, even the State Bush Fire Plan as an operational planning document, does not cover state-wide coordination of non-emergency bushfire incidents, and does not involve the NSW Bush Fire Co-ordinating Committee in either its preparation or its review. It is a document that is prepared as a sub-plan of the State Emergency Management Plan (EMPLAN 2018) in accordance with section 12 of the *State Emergency and Rescue Management Act 1989*.

The RF Act does not prescribe the preparation of state-wide strategies for bushfire management, either operational or for bushfire risk management. Therefore, there is no state-wide strategic document to give guidance to the development of DBFRMP's. While there is a model DBFRMP template and an associated policy document, these are not strategic documents.

A strategic document prepared under the auspices of the RF Act would provide government imprimatur, an opportunity for community input and state-wide direction and consistency of approach for fire management across NSW. A state-wide bush fire risk management strategy would provide context for addressing climate change impacts, education programs, inter-district coordination, state-wide ignition prevention strategies, hazard reduction treatments including the development of guidelines and key performance indicators etc. Such a document would not only be a guiding document for the preparation of DBFRMP's, but also for District Operations Plans and agency strategic fire documents. This strategic state-wide bush fire risk management plan should ensure that it does not restrict the input of local knowledge into plans prepared at a District or agency level.

Section 48 of the RF Act defines the functions of the NSW Bush Fire Co-ordinating Committee, which includes a) responsibility for planning in relation to bush fire prevention and co-ordinated bush firefighting, and (b) responsibility for advising the Commissioner on bush fire prevention, mitigation and co-ordinated bush fire suppression, and (c) other such functions as are conferred or imposed on it by or under this or any other Act. The BFCC could be charged with a statutory responsibility to prepare a State Bush Fire Risk Management Plan under this section.

Many of the 2019-20 bushfires affected NPWS managed parks and reserves. Fire management in NPWS is guided by the NPWS Fire Management Manual, the Living with Fire in National Parks 2012-2021 strategy and reserve fire management strategies for all fire prone parks and reserves.

It is worthy and important to note that all fire management planning in parks and reserves is done in consultation with community groups, neighbours and district bush fire management committees. Fire strategies for major bush fire prone parks are also placed on public exhibition. All

strategies are available for downloading from the NPWS web site[20].

The Manual is updated annually, the Living with Fire strategy is now due for a major review and strategies for affected parks and reserves are now due for a major review in accordance with NPWS policies (2.1.7NPWS FMM 2018-19).

Future reviews of strategic bushfire planning documents give an opportunity to consider the context and impacts of the exceptional 2019-20 fire season, to utilise the results of the Independent Inquiry, Section 44 reports and regional after action reviews, to update strategies associated with contemporary sustainability guidelines, climate change projections and the future conservation of natural and cultural heritage values and to give direction to any future funding enhancements.

RECOMMENDATIONS

- **The BFCC be charged with the statutory responsibility of preparing a state-wide level bush fire risk management plan and the hierarchy of bushfire management planning in NSW be better clarified.**
- **The NPWS Living with Fire Strategy be reviewed in close consultation with the BFCC; and**
- **A major review be undertaken of those fire management strategies prepared for parks and reserves affected by the 2019-20 bushfires in close consultation with DBFMC's.**

4.2 Bush Fire Risk Management Plans

The NSW bush fire management model of local Bush Fire Management Committees (BFMCs) preparing Bush Fire Risk Management Plans (BFRMPs) and Operations Coordination Plans which are then reviewed and approved by the Bush Fire Coordinating Committee (BFCC) is a process which has served NSW well. The process is legislated under the RF Act.

BFRMPs are prepared in collaboration with all members of BFMCs. BFMCs may include fire authorities, land management agencies, peak conservation, farmer and Aboriginal organisations and infrastructure managers as representatives. The aim of BFRMPs is to provide details of risk to specific assets and provide details of a variety of treatment options for addressing bushfire mitigation within the plan area.

As well as built assets, these plans are meant to incorporate ecological assets to a level that can provide agency, operational staff and volunteers the best possible information to minimise adverse environmental impacts when conducting bushfire operations. However, from an environmental perspective, the recent fires have revealed that the database of environmental assets is clearly inadequate.

Nor have efforts to prevent damage to environmental assets been successful or in most cases even undertaken, with notable exceptions being the protection of the Wollemi Pine and the protection of the Nightcap Oak for the recent fires. This exemplifies the threats that unique biological and cultural assets face when extreme fire weather conditions prevail. The burning of rainforests in both Queensland and NSW shows that vegetation formations that have not evolved to tolerate fire and which have previously been considered incapable of sustaining fire for any length of time are now susceptible. It is another clear indication of the impact of climate change. The near certainty of increasingly dangerous fires due to climate change requires significant changes in planning how to better mitigate against further loss and possibly extinction of these

[20] https://www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/fire/fire-management-strategies

irreplaceable assets.

Similarly, there is also a need to include pre-fire weed management programs in the bushfire planning stage. A huge economic and environmental benefit is provided following a bushfire in being able to more easily tackle weed infestations. Consideration should be given to the inclusion and funding of pre-fire season weeding programs by accredited practitioners in BFRMPs, incorporating coordination with local Bushcare and Landcare groups.

BFRMPs must contain guidelines for post-fire restoration and rehabilitation standards developed and reviewed in consultation with Local Government and other land management agencies, fire authorities and other relevant government agencies including utilities, academics and conservation and community stakeholder groups.

Funding to enable post-fire recovery, management and restoration works to date has been delivered via an ad-hoc process of agency funding ability, grants and agreements. This is not sustainable for fires of such significant environmental impact. To surmount this problem Section 44 of the RF Act should be amended to include a Recovery Plan component, with its administration coordinated by relevant BFMCs. The recovery funding provided should encompass aspects such as: burnt area protection; pest and weed management; erosion control and sediment run off; threatened species and threatened species habitat management.

The current State Bush Fire Plan (2017) is a sub-plan of the State Emergency Management Plan (NSW EMPLAN 2018). It primarily addresses roles and responsibilities under bushfire emergencies declared under section 44 of the RF Act, not hazard reduction or bushfire mitigation strategies and targets. A State-wide document that addressed bushfire planning and preparation, response and recovery strategies would provide guidelines in areas that are currently lacking.

RECOMMENDATIONS

- **Current resourcing to be reviewed to ensure that information on flora and fauna and their associated habitats, particularly specific locations and population numbers of threatened species and endangered ecological communities, are identified and mapped.**
- **Ensure that all available flora and fauna information is included as assets in BFRMPs and where possible, treatments identified to mitigate against fire. This may include implementing ecological prescribed burns in adjacent areas to protect environmental assets such as rainforest.**
- **Bush Fire Risk Management Plans to include guidelines for pre-fire weed management programs and post-fire restoration and rehabilitation standards to be developed and reviewed in consultation with all BFMC members and other relevant conservation and community stakeholders.**
- **Funding under Section 44 of the *Rural Fires Act 1997* to be made available for post-fire recovery and restoration works administered by Bush Fire Management Committees.**
- **Government to develop a State Fire Management Strategy in consultation with peak stakeholder groups including NCC, which is similar in content and process to the NPWS "Living with Fire in NSW Parks – OEH Strategy for Managing Bushfires in National Parks and Reserves 2011-2021". The strategy should aim to address bushfire planning, preparation, response and recovery strategies.**

4.3 Planning for Bush Fire Protection

The incursion of bushfires into areas not previously identified as Bushfire Prone Land strongly suggests that the current identification of bushfire prone land is inadequate. Rural dwellings,

towns and suburbs not previously assessed as bushfire prone have been substantially impacted by the fires of 2019-20. The assessment of new areas currently identified for development in Bushfire Prone Lands needs to be upgraded to ensure that:

- mapped areas reflect the full extent of bushfire impact including on existing developed areas.
- unburned remnant natural vegetation and native species habitat of high conservation value within and adjacent to burned areas and areas recognised as Bushfire Prone Lands are identified and protected from clearing, rezoning and approval for urban sub-divisions and large-scale development.
- expansion is prohibited for urban sub-divisions of existing and new towns and villages where there is only one access way in and one way out.
- outdoor Neighbourhood Safer Places should not be considered as justification or approval of urban subdivisions in Bushfire Prone areas.
- Aboriginal lands are protected from clearing and rezoning and approval for urban sub-divisions.

Human assets and natural assets typically converge at the urban – bushland interface. Although one perspective holds that bushland itself poses a fire threat to property, planning documents such as Planning for Bush Fire Protection 2019 (updated from its 2006 version) recognises that householders can do much by building dwellings, preparing properties and maintaining them to aid in protection from bushfire. Similar practices can be applied to rural villages and properties.

Management of fuels in close proximity to assets has been shown to be the most effective strategy to achieve fire protection to a particular asset. Fuel reduction at the interface must be combined with strategies to increase the ability of a house, structure, or other economic asset to withstand a bush fire.

Planning for Bush Fire Protection 2019 (PBP 2019) identifies the key measures to be incorporated in developments in bush fire prone areas: building construction and design; Asset Protection Zone; access; landscaping; water supply and utilities; and emergency management arrangements. The implementation of these measures has been shown to improve the resilience and adaptation of communities to the impact from bushfires. Dwellings and properties that are constructed and maintained over time to the required development standards are able to better withstand bushfire impacts under bushfire danger ratings up to severe.

However, incorporation of these measures is only compulsory for new developments or existing developments being substantially altered. Even for these new developments there is no formalised follow-up inspection process to ensure measures required as part of development consent are adhered to over time, whether they be compliance with the building standards e.g. window shutters remaining in place, or appropriate maintenance of APZs. Compliance with development conditions is necessary not just for the safety of residents but also to ensure that neighbours and nearby public lands are not made to undertake the clearing and modification of vegetation just because residents are not meeting their legal requirements. Systems need to be put in place to ensure that dwellings and properties developed in bush fire prone areas maintain their ability to protect the lives of residents over time. In particular, buyers of properties developed under Planning for Bush Fire Protection should have pre-purchase surety that the property is compliant with the bushfire standards.

The key measures for new developments provide a guideline for existing developments such as dwellings but there is no requirement for those developments to be upgraded to meet the building standards. Where APZs are implemented by land management agencies for the protection of adjacent properties, residents are only encouraged to upgrade their dwellings by incorporating appropriate bush fire protection measures.

Since 2001, versions of Planning for Bush Fire Protection (PBP) have been considered industry best practice in the provision of bush fire protection standards. PBP 2019 is the latest version. Since most of the dwellings and other buildings destroyed or damaged by bushfires were constructed prior to the introduction of PBP, it is probable that many of them do not include the bush fire protection measures required by new developments. Consideration needs to be given to ensuring that existing structures which benefit from the implementation of adjacent APZs are upgraded to include appropriate bush fire protection measures.

Appendix 1 in PBP 2019 sets out a site assessment methodology for undertaking a site bush fire attack assessment in relation to the application of appropriate APZs and associated construction levels. For all development requiring an APZ, the relevant Forest Fire Danger Index (FFDI), which measures the degree of danger of fire in Australian vegetation, must be identified. For the purposes of the document the 1:50 year fire weather scenario for most of the state was determined as FFDI 80, however, a number of areas along the Central and South Coast have higher FFDIs which are set at 100.

Given the impact of climate change, and in particular the intensity of fires which now regularly occur in the North Coast and Central West regions, the FFDI for both these regions of NSW should be reviewed for an upgrade to FFDI 100.

RECOMMENDATIONS

- **A comprehensive assessment of lands to be included as Bush Fire Prone needs to be undertaken to ensure that all lands are considered in future bushfire protection processes.**
- **Areas of conservation value identified as Bushfire Prone Land should not be cleared or rezoned to enable the development of urban sub-divisions and other inappropriate developments.**
- **Investigation into an inspection system needs to be undertaken which results in a system which at least ensures that residents and purchasers of properties developed under Planning for Bush Fire Protection can be assured such properties are compliant with the building standards.**
- **The Rural Fire Service in consultation with Local Councils, to pursue ways to ensure that developments which receive an adjacent protection benefit such as an Asset Protection Zone are upgraded to incorporate appropriate bush fire protection measures.**
- **Review the impact of climate change on the FFDI for the North Coast and Central West regions of NSW.**

4.4 The 10/50 Vegetation Clearing Code of Practice

The 10/50 Vegetation Clearing Code was introduced in August 2014 as a self-approval process, enabling the clearing of trees and other vegetation by landholders on their own land within set distances of habitable buildings. NCC opposed its introduction at the time because it undermines the value of the Bush Fire Environmental Assessment Code.

The land proposed for clearing under the 10/50 Code currently has to be identified as eligible for clearing on a map-based website. The code was reviewed in 2015 and revised to address

shortcomings, including that clearance of vegetation was occurring for purposes other than bush fire protection.

The Code now lists a number of categories which do not allow vegetation to be cleared. However, the onus is on the landowner to comply with the Code and NCC remains concerned that the self-assessment process is still too complex for landowners to fully determine whether their clearance is legal and whether valuable environmental assets are being unknowingly removed.

There has been no data provided to enable evaluation of the value of the 10/50 Code, simply because none has been gathered. How extensive has been the use of the Code by landowners is therefore not reportable and the use of the Code is largely unaccountable.

Assessment by qualified bushfire and environmental practitioners of proposals to clear vegetation for bush fire management would be more appropriate than self-assessment to ensure compliance with the Code, improve bushfire mitigation outcomes and minimise liability issues.

RECOMMENDATIONS

- **In consultation with Local Councils, the Rural Fire Service to undertake a review of the operation of the 10/50 Vegetation Clearing Code of Practice to determine the extent of its use and its value in mitigating bush fires.**
- **If the Code is to be maintained, transfer administration of the Code from a self-assessment process to one undertaken by qualified bushfire and environmental practitioners.**

4.5 The Bush Fire Environmental Assessment Code

There have been suggestions that “green tape” is hindering hazard reduction activities by landholders on private property, with claims that the application process to do a burn or clear vegetation for hazard reduction purposes is too onerous and takes too much time.

The Bush Fire Environmental Assessment Code provides a streamlined assessment and approval process for hazard reduction activities such as mechanical methods and prescribed burning.

Applicants do not have to undertake the assessment as it is performed by trained staff from the Rural Fire Service. Private landholders are able to apply via a simple 2-page application to the Rural Fire Service. The application form is on-line and is simple to complete. Providing the works are not excluded or restricted for the purposes of the Code, and are consistent with the District Bush Fire Risk Management Plan including the zoning provisions, a streamlined, one-stop, no cost and ecologically sustainable approval will be determined within 7 days.

Guidelines are available to assist in completing the application form and the RFS assessment is able to confirm or otherwise much of the information on the form. Information on completing the activity is also available. The certificate lasts for 5 years. If the activity is to be undertaken during the Bush Fire Danger Period a fire permit will also be required.

The Bush Fire Environmental Certificate process is a sound way of ensuring that hazard reduction works comply with all relevant legislation provided the activity is carried out as per the issued certificate. With a legislated timeframe for assessment it does not stop or delay genuine hazard reduction works. A less regulated approach to hazard reduction is likely to create more adverse impacts than benefits including:

- Escape of fires and damage to neighbouring property;
- Damage to important habitat through frequent or high intensity burning;

- Destruction of Aboriginal sites and heritage values;
- Significant erosion and sedimentation and deterioration of water quality; and
- Smoke impacts and reduction of air quality.

Encouraging landholders to undertake hazard reduction works without a certificate places them at risk of liability should environmental damage occur. The certificate process should continue to be supported and promoted by the Rural Fire Service and by Government.

RECOMMENDATION

- **Government to support a level of staffing resources that ensures the issuing of Hazard Reduction Certificates assessed under the Bush Fire Environmental Assessment Code is correctly undertaken in a timely manner.**

4.6 Hazard Reduction Burning

There have been a substantial number of formal public inquiries, reviews and royal commissions related to bushfires and fire management since 1939. In particular the value of hazard reduction as a preventative fire management tool has been raised in many of those inquiries, with its widescale application proposed by many in the community as the answer to reducing the intensity of bushfires and providing an opportunity for firefighters to better manage them.

However, hazard reduction is not a panacea to bushfire risk reduction particularly in catastrophic fire weather conditions as were experienced in 2019-20. This is a view supported by NSW's Rural Fire Service Commissioner, Shane Fitzsimmons[21] and Victoria's Country Fire Association chief officer, Steve Warrington[22]. Professor Ross Bradstock, director of Wollongong University's Centre for Environmental Risk Management of Bushfires, had said that "hazard reduction burning can be an effective tool to reduce forest fuel loads, but to have a significant reduction in bushfire risk would require hazard reduction burning on an immense scale in risky areas near towns, which would be cost prohibitive".[23,24]

Professor Bradstock has estimated that due to increasing weather risks funding for hazard reduction burns would need to increase fivefold just to hold the threat to lives and property at current levels. That means NSW alone would have to spend $500 million a year to maintain the status quo, and even more to reduce the risk of repeating the death and destruction of this summer's fires. This is a considerable annual cost, and its effective success is predicated on a bushfire occurring and burning into areas which have been hazard reduced not too long prior to the bushfire.

Hazard reduction burns carried out within one kilometre of properties are a more effective approach as they address reducing fuel loads immediately adjacent to the lives and property which are to be protected. They can be effective under extreme fire conditions up to four years or so after being implemented, but under catastrophic conditions the effectiveness of burns is reduced to only one year. Areas treated by prescribed burns will not stop bushfires in extreme and catastrophic fire weather conditions, weather events which are predicted to increase in frequency under climate change.

[21] https://www.theguardian.com/australia-news/2020/jan/08/hazard-reduction-is-not-a-panacea-for-bushfire-risk-rfs-boss-says
[22] https://www.abc.net.au/news/2020-01-07/fuel-reduction-burn-debate-rubbish-says-vic-fire-chief/11849522
[23] https://www.smh.com.au/politics/federal/hazard-reduction-burn-benefits-undercut-by-weather-costs-20200108-p53pu0.html
[24] Bradstock, R, Davies, I, Price, O and Cary, G. (2008) Effects of Climate Change on Bushfire Threats to Biodiversity, Ecosystem Processes and People in the Sydney Region. Final Report to the New South Wales Department of Environment and Climate Change: Climate Change Impacts and Adaptation Research Project 050831.

Rather, an emphasis on intensively modifying fuel closer to houses (up to 40 m) and managing fuel within one kilometre of assets is a more effective way to reduce loss of houses built prior to Planning for Bush Fire Protection, instead of broad acre burning which is distant from houses. This is supported by research conducted after the Victorian fires[25] .

The Royal Commission following the Victoria Black Saturday fires in 2009 recommended that the State fund and commit to implementing a long-term program of prescribed burning based on an annual rolling target of 5% minimum of public land. This approach was not supported by the NSW Government primarily because it was felt that it would lead to perverse outcomes, which was subsequently found to occur, with burning carried out in remote areas to more easily meet the annual burning target rather than around built assets where hazard reduction burning is more complex and often relatively small in size. In its response (NSW 2010) NSW adopted a different approach. The State Plan NSW 2011-16 Goal 28 was followed i.e.

- to increase the number of properties protected by hazard reduction works across all bush fire prone land tenures by 20,000 per year by 2016; and
- increase the annual average level of area treated by hazard reduction activities by 45 per cent by 2016.

These hazard reduction targets were modified in 2015-16 to:

- the protection of 600,000 homes over four years through hazard reduction works, and
- 750,000 hectares of hazard reduction activities across NSW firefighting and land management agencies.

The new targets had a four-year timeframe (01 April 2015 to 31 March 2019) for implementation. The outcomes for the State Plan targets for NSW over the 4 years from 1st April 2015 to 31 March 2019 show that 92.12% of the 600,000 homes target were provided through fuel management works and 92.43% of the targeted 750,000 hectares were treated. It should be noted that since the state-wide targets were introduced in 2011-12 the National Parks and Wildlife Service (NPWS) has met or exceeded its targets for the number of properties protected and for the area treated in fuel management programs.

NPWS only manages 9% of NSW in parks and reserves but have contributed a very significant 75% of the total target area for hazard reduction treatments and 20% of the target for properties protected adjacent to its boundaries. Spreading the burden of hazard reduction targets more equitably across all land tenures across the State would be more beneficial, particularly when hazard reduction is more effective immediately adjacent to the assets being protected.

Other shortcomings of hazard reduction burning:

- some vegetation types either do not burn readily or cannot safely be treated when they are dry enough to burn. An example is wet sclerophyll forest which can accumulate high fuel loads, particularly during dry conditions when decomposition rates are reduced, but due to the high fuel loads prescribed burns can be difficult to contain. Alternatively, during the winter months when hazard reduction burns often take place for safety reasons, the ground fuels are often too damp to accomplish an effective burn.
- With climate change generally causing drier and longer fire seasons, the weather windows of opportunity to undertake prescribed burns are shortening. Increases in hazard reduction targets will place additional pressure on fire managers and prescribed burn supervisors to implement burns when conditions are not entirely safe to do so, raising the risk of escaped

[25] Gibbons P, van Bommel L, Gill AM, Cary GJ, Driscoll DA, Bradstock RA, et al. (2012) Land Management Practices Associated with House Loss in Wildfires. PLoS ONE 7(1): e29212. https://doi.org/10.1371/journal.pone.0029212

hazard reduction burns becoming uncontained bushfires. This has already occurred on numerous occasions, causing significant loss and damage to property and damage to the environment.

- A major concern arises when hazard reduction burns are implemented during the cooler months in proximity to Sydney and major regional centres. The Sydney Basin is prone to temperature inversion layers during the cooler months which traps smoke from hazard reduction burns occurring around the Basin. During 2019 air pollution caused by hazard reduction burns was well above hazardous levels. It is often the catalyst for respiratory diseases such as asthma and bronchitis and exacerbates heart disease and lung infections, with the very young and elderly particularly at risk of being affected.

None of the above is to suggest that hazard reduction burning does not have a place in the toolkit of bushfire management. It means that fire management as a whole, and prescribed burning in particular, is very complex and it is not a "silver bullet".

Regular burning as a treatment in peri-urban bushland is becoming increasingly difficult due to the narrowing of windows of opportunity to conduct burns safely, the associated operational costs, the impacts of bushfire smoke and community acceptance of burning. Other hazard reduction methods to be considered for use in APZs and along SFAZ corridors may be worth further investigation. These could include carefully designed and tested mechanical treatments or a combination of methods, including manual and selective removal of litter and woody material, pile burning and the use of slashers and tritters.

RECOMMENDATIONS

- **The focus of the next decade of hazard reduction effort should be on APZs and private property that forms part of the APZ around assets and strengthening of linear SFAZs.**
- **Provide greater investment in cost-effective hazard reduction programs, including mechanical treatment of APZs immediately adjacent to built assets.**

4.7 Logging and Thinning

Since last year the forestry industry and its supporters have been calling for the selective logging or thinning of national parks. Indeed, in August 2019 the National Parks and Wildlife Amendment (Tree Thinning Operations) Bill was introduced into the NSW Parliament, with its purpose to authorise tree thinning operations in the Murray Valley and Pilliga National Parks. Part of the justification for logging these National Parks is to reduce fuel loads. Since the bushfires this season, there have been further calls for salvage logging in national parks to enable the forestry industry to take trees that have been burned.

In January this year the timber industry's peak body, the Australian Forest Products Association, was quick to advocate for possible salvage logging in state forests and national parks affected by bushfires, including in NSW. The reasons given for the call to salvage timber *"from all burnt forests across all impacted tenures"* was to minimise fuel loads – as well as help meet timber supply requirements.

The industry is ignoring the science that shows post-fire logging would significantly impair regeneration. The bigger trees that were not burnt are extremely important for arboreal mammals, including koalas and birds that require hollows for nesting. The impacts from logging are likely to seriously impair the recovery of animal, bird and insect populations – all of which play key roles in soil turnover, pollination and seed and spore dispersal.

In the recent fires it has been reported that recently logged areas have burnt more intensely than neighbouring unlogged areas. Canopy reduction and the opening up of the forest by logging has the resulting impact of increased wind speed and reducing fuel moisture content. Logging also redistributes fuels, with a greater surface and near-surface fuel contribution from what would otherwise be highly elevated fuels. It opens up previously wet gullies to drying winds, reducing their ability to be useful barriers in lessening fire rate of spread and intensity.

Research suggests that harvesting timber does not necessarily translate simply into reducing risk, as it will often depend on the nature of the slash that is left behind and any subsequent growth of shrubs, fire adapted tree species and weeds[26,27,28]. It might be noted that some of the largest fires in 2019-20 have started from lightning strikes on state forest or private property (e.g. Badja Fire 302,500 ha and Dunn Road fire 333,940 ha).

The bushfires have been so extensive that the status of many threatened species, threatened ecological communities and even some common species have been severely affected, to the point where some species may have become extinct. Many of these threatened fauna, flora and ecological communities are known to occur in State Forests.

Extensive surveys are needed in burnt and unburnt areas of threatened species, endangered ecological communities and of common species to assess the current status of populations, with the gathered data used to re-evaluate plans of action, identify priority locations for immediate conservation, and list new species and communities as threatened where necessary. Ongoing monitoring should also be undertaken to ensure that the decisions and actions taken are incorporated into existing programs as well as newly established programs.

Included among these species is the koala, an iconic species brought to the brink of extinction on some firegrounds, particularly in northern NSW. Koalas are known to occur in State Forests along the North Coast. To enable a full impact assessment of fires on koala habitat, populations, current refuges and the potential for koala recolonisation it is essential that logging ceases immediately in mapped koala habitat as well as more broadly to all logging in NSW. Rather than logging for short-term gain, the addition of current State Forests to existing protected areas in the Coffs Harbour region would see declaration of the Great Koala National Park, which is designed as the key component of a larger strategic koala reserve network for the north coast, and would provide koalas with the best chance of a secure future in NSW.

Logging and associated practices are obviously in conflict with the objects of the *National Parks and Wildlife Act 1974* i.e.

(1) the conservation of nature;
(2) the conservation of objects, places or features of cultural value within the landscape;
(3) fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation; and
(4) providing for the management of land reserved under the Act in accordance with the management principles applicable for each type of reservation.

There is no evidence to support any proposals for thinning of vegetation and salvage log post-fires

[26] Stone, C., Hudak, A., Morgan, P. Forest (2003) Harvest Can Increase Subsequent Forest Fire Severity. Proceedings of the Second International Symposium on Fire Economics, Planning, and Policy: A Global View. p.525 General Technical Report PSW-GTR-208. US Forest Service.
[27] Lindenmayer, D.B., Hobbs, R.J., Likens, G.E., Krebs, C.J. and Banks, S.C. (2011) Newly discovered landscape traps produce regime shifts in wet forests. Proceedings of the National Academy of Sciences, Vol. 108, No. 38, pp15887-15891.
[28] https://www.abc.net.au/news/2014-08-04/logging-greatly-increases-fire-risk-black-saturday:-study/5646220

as an effective way to reduce fuels in forest.

RECOMMENDATIONS

- **Logging, thinning or salvage logging are not viable hazard reduction treatments in National Parks and other protected areas of native vegetation, but removal of some trees may be required in regularly maintained APZs and on the edges of SFAZs across other land tenures.**
- **To ensure that refuges are available to koala populations across all land tenures, a moratorium should be put in place to halt all native forest logging in NSW, particularly in known koala habitat, to enable a full impact assessment by local experts of koala populations and of other threatened species.**
- **Across all land tenures, extensive surveys should be undertaken on threatened species, threatened ecological communities and common species with the data to provide valuable information for re-evaluation of species status, assignment of priority works and ongoing monitoring within recovery programs.**
- **Relevant areas of State Forest lands should be transferred and gazetted as National Park to form the Great Koala National Park in the Coffs Harbour region.**

4.8 Grazing

Major fire events of the past (1916, 1926, 1939, 1967 and Victoria in 2002-03, 2006 and 2009 (11,800 head destroyed) have destroyed thousands of stock such as sheep, cattle and horses on grazed paddocks. The current fire season has also seen paddocks with very little feed available due to the drought burn with intensity, causing high stock losses. History informs that during severe to catastrophic fire weather conditions grazing does not stop blazing, otherwise paddocks with little to no feed would not burn.

General scientific opinion is clear that grazing has adverse impacts on National Park values. For example, the report of the Victorian Alpine Grazing Taskforce states that; “on the evidence before it, the taskforce concurs with the conclusions of the 1998 Groves report, that the scientific research is adequate and consistently reveals that grazing has a deleterious effect on biodiversity”. The work of the Victorian Alpine Grazing Taskforce following the 2003 fires led to the ban on grazing in their alpine parks. They determined that “grazing did not reduce blazing” because it was shrubby understorey species that fuelled the fires and such species are not palatable for grazing and were promoted by frequent fires and grazing. Major components of available bush fire fuel are unpalatable grasses and shrubs, fine fuel and bark which are not consumed by grazing.

Alpine grasslands are not the locations of highest fire hazard in the mountains. They are slow growing and generally wetter than other vegetation types, and only become a fire hazard after very dry “El Niño” years, such as 2002. Fuel loads and greatest potential fire hazards occur in sub-alpine forest and woodland vegetation. Cattle grazing in these communities would be of little value, since grass is only a minor component of the vegetation and hence would only marginally reduce fuel loads.

Alpine vegetation is highly susceptible to grazing. For example, one of the recognised threats to the Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps Endangered Ecological Community is soil disturbance, trampling and grazing by domestic stock. Any activity that would threaten these endangered communities would require environmental assessment at state and federal levels.

The Kosciuszko National Park Fire Management Strategy (2008) addresses fire management across

the park including management of wildfire and identifies appropriate fire regimes in the context of possible climate change for the protection of identified park values. Grazing, due to its proven deleterious impacts and ineffectiveness in fire management in the alpine situation, is not included as an appropriate fire management strategy.

A study[29] of the patterns of burning across the alpine (treeless) landscapes of the Bogong High Plains in Victoria, following the extensive fires of January 2003 found that whatever effects livestock grazing may have on vegetation cover, and therefore fuels in alpine landscapes, they are likely to be highly localised, with such effects unlikely to translate into landscape-scale reduction of fire occurrence or severity. The use of livestock grazing in Australian alpine and subalpine ecosystems to reduce fire risk is not justified on scientific grounds.

RECOMMENDATION

- **Grazing of bushland should not be considered as a viable hazard reduction option in Alpine or other National Parks and protected areas in NSW.**

4.9 Cultural Burning and Working on Country

Aboriginal people's cultural values and practices are increasingly being recognised by landowners and land managers as important in contemporary land and natural resource management. The impacts of colonisation have undoubtedly affected Indigenous people's ability to openly implement their cultural practices and to pass on Traditional Knowledge in the way it has been done for thousands of years. However, across Australia there still exists strong Cultural Lore, including knowledge of burning practices and with it a connection to country.

NCC has previously administered the Firesticks Project, a project aimed at empowering Aboriginal people to learn and be involved in cultural burning on Aboriginal lands in the North Coast of NSW.

Cultural burning means different things to different people. It describes the myriad ways that fire can be implemented under cultural authority to achieve either similar or alternative objectives to those sought from contemporary use of fire by other practitioners. It is not the same as hazard reduction burning, and very often involves low intensity burning of understorey vegetation to enhance the health of the land and its people.

NCC therefore considers cultural burning has an important place to play in contemporary fire management. However, given the changes in the landscape over the last 230 years and the mismanagement of fire over that time, it is not going to be the solution that meets all the fire management challenges faced now or in the immediate climate change future.

NCC sees cultural burning as important for:

- engendering responsibility for country and encouraging people to plan and implement fire based on their cultural connections to the land.
- people to see the importance of being on country and learn about it through observation and sharing;
- teaching young people and passing down knowledge;
- providing training, encouraging partnerships and teaching practices and techniques; and
- embedding cultural connections into contemporary natural resource management.

NCC also considers that funding support is required for Aboriginal people in NSW, as the First

[29] Williams, R.J., Wahren C., Bradstock, R.A. and Muller, W.J. (2006) 'Does alpine grazing reduce blazing? A landscape test of a widely held hypothesis'. Austral Ecology, Vol. 31, pp 925-936.

Nations Knowledge Holders, to reignite, maintain and expand working on Country including the application of cultural burning, the maintenance of APZs, bushfire suppression and pre and post-prescribed burn preparatory works such as the removal of hazards adjacent to Aboriginal art sites.

There are many good examples and current models to build on, including the pre-burn preparatory works at Aboriginal sites in Ku-ring-gai Chase NP, the operation of the Wreck Bay Rural Fire Brigade, the native American fire crews who are contracted by the US Department of Interior to fight fires in Summer and to undertake pest and weed control and re-afforestation programs in Winter[30], the APZ maintenance works undertaken by the Muru Mittigar Aboriginal Cultural and Education Centre[31] based in Western Sydney and the post-fire Aboriginal site surveys undertaken in Victoria after the 2003 wildfires[32].

RECOMMENDATION

- **Government provide ongoing support to the expansion of existing and new Aboriginal groups specialising in a range of fire management activities, planning, preparation, response and recovery activities, on Country.**
- **Ensure that with consultation and approval of First Nations Knowledge Holders, cultural asset information is included in BFRMPs and where possible, treatments identified to mitigate against fire. This may include implementing cultural burns in adjacent areas to protect cultural sites.**

4.10 Ecological Burning

Currently, prior to their implementation hazard reduction burns in NSW are assessed against the Bush Fire Environmental Assessment Code 2006. It provides a process to ensure that hazard reduction burns are carried out with regard to the principles of ecologically sustainable development. Ecological burns are undertaken for specific ecological outcomes e.g. for the maintenance of habitat of a threatened species or for protection of a threatened species. These types of works are not included under the provisions of the Bush Fire Environmental Assessment Code. This is significant as there is no streamlined approval process or priority for the allocation of fire-fighting assets and personnel to conduct this type of burn.

Few burns are carried out by land managers where the main purpose is for a specific ecological outcome. Hazard reduction is generally the main aim, and ecological benefits may accrue from the burn, depending on time since the previous burn, whether specific fire intolerant environmental assets will be protected from fire, or protection of waterways will occur.

Programs such as the joint RFS and NCC administered Hotspots Project provide valuable information to rural landholders about what fire management activities should be undertaken for optimal property protection and biodiversity conservation management. Greater support for the implementation of ecological burns across the State by government agencies and private landholders would be a step forward in better understanding the role of fire in the Australian landscape. Ecological burns are carried out for positive outcomes, recognising the role of fire and how our biota responds to it. A streamlined process similar to the Bush Fire Environmental Assessment Code would facilitate ecological burning, particularly on private landholdings under conservation agreements.

[30] https://www.bia.gov/bia/ots/dfwfm/bwfm/responding-wildfires/hotshot
[31] https://www.murumittigar.com.au/caring-for-country/
[32] Roberts Evaluation (2005) Evaluation of the Bushfire Recovery Initiative Volume 1: Final Report. Victorian Department of Sustainability and Environment.

However, many inexperienced and under resourced property owners have difficulty safely implementing their fire plans. RFS volunteers cannot be expected to assist with the extensive number of property owners wishing to implement appropriate, safely conducted fire management and the few contractors available for such work are prohibitively expensive.

Given the wider community benefits of appropriate hazard reduction and ecological fire management there is a need for paid, government-funded professionals to carry out this work. The cost of this initiative would likely be largely offset by the savings in fighting escaped wildfires and the environmental benefits of appropriate fire management. The existing RFS State Mitigation Crews program which focuses on carrying out hazard reduction activities and providing operational support could be given a substantial funding increase to carry out work across the landscape for private landholders on rural properties who wish to implement genuine hazard reduction or ecological works that involve the application of fire.

RECOMMENDATIONS

- **Prepare a streamlined assessment process to enable ecological burn proposals to be readily undertaken, particularly by private landholders.**
- **Draft and fund a fire management research prospectus prepared in consultation with peak stakeholders to encourage tertiary institutions to focus on conservation research priorities relating to ecological fire management.**
- **Government to provide substantial additional funding and professional personnel to assist landholders on rural properties use fire for legitimate hazard reduction and ecological outcomes.**

5.0 ToR 3: Responses to bushfires, particularly measures to control the spread of the fires and to protect life, property and the environment, including:

a. immediate management, including the issuing of public warnings
b. resourcing, coordination and deployment
c. equipment and communication systems.

5.1 Rapid Response to Remote Bushfires

NCC is not a bushfire response organisation and considers that bush fire emergency management and response issues that have arisen from the recent fires is an area in which fire authorities and other relevant emergency managers have the relevant expertise.

However, the obvious difficulties encountered by traditional firefighting based on vehicle access to suppress bushfires which ignite in remote areas, generally by lightning, and quickly become significantly large and difficult to contain raises questions about how remote ignitions are best approached. Remote Area Firefighting Teams (RAFT) have operated in NSW for several years to suppress bushfires in remote and difficult terrain.

The Rapid Aerial Response Teams (RART) programme involves placing specially trained RAFT firefighters on standby as appropriate and transporting them by air to the remote ignition/fire and transferring them to the ground to undertake suppression work as needed, but in particular for dryland firefighting. RAFT firefighters may be paid operators e.g. NPWS personnel or include volunteer personnel from the RFS. Investigation may be required to determine whether dedicated paid teams are necessary to ensure standby teams are readily available for action throughout extended fire seasons.

With the considerable number of lightning strikes during dry storms which caused ignitions this fire season, funding to comparatively analyse the fire management approaches between the United States and Australia, including the effectiveness of rapid response firefighting teams would provide valuable information on the most cost-effective ways to suppress bushfires.

The use of RART teams could be extended to undertake other fire management activities including hazard reduction work, pest control work and soil conservation works in steep terrain.

RECOMMENDATIONS

- **Undertake a comparative analysis of fire management strategies and operational procedures to deal with remote ignitions between the United States and Australia.**
- **As RAFT are now recognised as an important part of remote firefighting strategies, particularly with the urgency required to extinguish ignitions which may threaten large tracts of land, increased funding should be allocated to the training and maintenance of RAFT.**

5.2 Backburning

Backburning is undertaken as a strategy to reduce fuel so there is less material that can be burnt by an oncoming bushfire. By considering factors like the wind it is possible to mitigate a major fire front by burning sections ahead of the fire that might be more in the line of property or housing.

It is also important to consider factors like geography e.g. how hilly the area is. It can only be performed by firefighters with considerable planning.

During the fires in 2019 that occurred along the ranges of the North Coast large backburn fire were initiated as a strategy to mitigate the impact from bushfire to economic assets e.g. State

Forest plantations. Bushfire backburning operations come with inherent problematic issues, the main one being how much will the backburn contribute to the extent and intensity of the bushfire and what will be the impact on environmental and other assets. When these backburning operations were proposed in northern NSW there was considerable consternation about their potential impact on rainforest communities in their path.

In the aftermath of the backburns being implemented, it has been revealed that backburns as mapped, did burn into rainforest communities managed by Forestry Corporation. Forestry Corporation does not have a legislative entitlement to burn identified and mapped rainforest communities as part of its bushfire response.

A practical way to ensure that unintended consequences to valuable natural assets are less likely to occur as a result of proposed backburning and other suppression strategies, would be to appoint a Natural Values Officer to Incident Management Teams when they are initially assigned. This would provide Incident Management Teams with valuable information and knowledge about environmental assets within firegrounds which is frequently missing in their deliberations in NSW. The inclusion of such roles is a model that is being adopted in South Australia and Victoria.

RECOMMENDATIONS

- **Undertake a review of backburning as a strategy during the 2019-20 bushfires to determine its effectiveness and the environmental assets it may have helped destroy.**
- **Initiate the appointment of Natural Values Officers to Incident Management Teams to better plan for and safeguard environmental assets during major bushfire events.**

5.3 Community Engagement

NCC has been a leader for many years in community engagement programs such as the Hotspots Fire Project and the Bushfire Program's workshops, and as such has a great deal of experience in the value of community engagement and in delivering programs that work.

The Hotspots Fire Project is an education and training program run with the NSW Rural Fire Service to increase understanding of the role of fire in the bush and how it can be best managed for a variety of outcomes. NCC believes that well-informed and well-prepared communities complement the roles of land managers and fire agencies, and that a shared approach to fire management is critical for effective planning.

Since 2005, the Hotspots team has run more than 110 workshops for over 1,400 landholders. These have resulted in 670 property fire management plans covering about 140,000 hectares. The workshops, which are held over two days, are based on the latest science and practical, on-the-ground experience of fire management professionals. They give landholders the knowledge and skills they need to develop fire management plans and conduct burns that reduce the risk of dangerous wildfire damaging their property, while also enhancing wildlife habitat.

NCC's Bushfire Program "Preparing for Fire" and "Fire and Biodiversity" interactive workshop series is designed for communities on the urban-bushland fringe where the risk of bushfire is high, and the bushland is important for wildlife conservation. The Bushfire Program has delivered over 90 workshops and forums since 1994, bringing together fire and land managers, scientists, NCC bush fire representatives and community members.

Through these workshops people become more aware of their local natural environment, the role

of fire, and ways to better prepare for bushfires. Topics include fire behaviour, bushfire survival plans, house and property preparation, and fire ecology.

Through collaboration with local agency representatives, NCC plays an important facilitation and coordination role that enables other agencies to highlight local bush fire issues and to hear from residents and stakeholders about their fire management concerns.

NCC believes that community engagement is an extraordinarily valuable component in fire management. A community that does not have ongoing contact with fire authorities and land managers is less likely to take heed of those authorities during bushfire events. NCC also believes that greater emphasis needs to be placed on community engagement. Much funding, time and effort is devoted to hazard reduction and other on-ground actions. However, a community that is willing to take actions to prepare and become involved in fire management all year round is more likely to be better informed about fire, more able to make informed decisions, and be more resilient to bushfire events.

RECOMMENDATIONS

- **Increased commitment and funding by Government for bushfire community engagement programs, including those in which NCC is involved.**

5.4 Post-Fire Environmental Recovery

As of 6th February 2020, the Department of Planning, Industry and Environment (DPIE) had no firm estimate of the number of animals killed in the 2019–2020 fires. However, the department website states that the fires have had a devastating impact on native animals and have impacted the habitat of at least 84 of the most vulnerable animals (as of 28 January 2020)[33].

Up to 28 January 2020, the fires in NSW had burnt 5.4 million hectares (6.7% of the State), including 2.7 million hectares in national parks (37% of the State's national park estate). The severity of fire within this total area varies. The following information from NSW DPIE further emphasises the impact on wildlife.

- More than 80% of the World Heritage listed Greater Blue Mountains Area and 54% of the NSW components of the Gondwana Rainforests of Australia World Heritage property have been affected by fire.
- The most affected ecosystems are rainforests (35% of their state-wide extent), wet sclerophyll forests (41%) and heathlands (53%).
- More than 60 threatened fauna species have been affected by the fires, including 32 species for which 30% or more of all recorded locations occur in the burn areas.
- Many individual national parks have been seriously impacted:
  - 55 parks or reserves have had more than 99% of their area affected by fire
  - 70 parks or reserves have 75-99% of their area affected
  - 29 parks or reserves have 50-74% of their area affected.
- As of 10 January 2020, fires impacted:
  - 6 threatened species at more than 70% of their historically observed locations. These include the long-footed potoroo*, Philoria pughi* (a frog), Hastings River mouse and brush-tailed rock-wallaby
  - 30% of the bushland where 32 threatened animal species were previously sighted
  - 5% of the bush areas where 114 threatened species were previously sighted.

[33] https://www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/fire/park-recovery-and-rehabilitation/recovering-from-2019-20-fires/understanding-the-impact-of-the-2019-20-fires

- As of 6 January 2020, more than 24% of all koala habitat in eastern NSW was within fire-affected areas. The total area of high or very high suitability koala habitat affected by fire in eastern NSW was more than 19%.
- An initial analysis has identified that more than 95% of recorded locations for threatened plants has been impacted.

In February 2020 an expert panel provided the Federal Government with a report identifying 113 species which have had at least 30 per cent of their range burnt, therefore requiring urgent action. The list includes 13 birds, 19 mammals, 20 reptiles, 17 frogs, 5 invertebrates, 22 spiny crayfish and 17 freshwater fish species. The panel has not determined the full extent of the damage as many areas are too unsafe to visit.

It is clear that wildlife populations within the firegrounds along the Great Dividing Range and coastal areas are going to struggle to recover over the next several years. Some species listed as threatened may become extinct, if not completely then populations may not exist or be unviable in localised areas. Some threatened native plant species may also not recover[34].

Effective recovery and restoration of such a large affected area will take a very significant injection of funds, qualified and trained practitioners in ecology and site restoration, and a long-term commitment by Governments. Such assessments will need to be undertaken across land tenures, both public and private in some cases, depending on the extent of the area required for recovery of species. It will also require collaboration between public land managers and private landowners to maximise the value of pest management and weed management programs.

Work by ecologists and others from NPWS and other organisations is currently being undertaken to understand the impact of the fires. It is a very big and difficult task.

For future fire seasons, the Department of Planning, Industry and Environment should lead and coordinate with other organisations to form teams of trained people to assess the ecological impact of fires and design rehabilitation plans. These teams could be coordinated and operate in a similar way to the Building Impact Assessment teams led by the Rural Fire Service. Funding will be required to fund training and delivery.

It is also important that post-fire activities undertaken as safety measures, such as the felling of hazardous trees, are conducted only when absolutely necessary. This is particularly so when the trees felled are valuable assets like hollow-bearing trees potentially used by threatened species such as large forest owls and greater gliders. Prior to the felling of all large trees, an assessment should be undertaken by experienced tree assessors with relevant qualifications, in conjunction with an ecologist/natural resources officer.

RECOMMENDATIONS

- **Knowing that these types of large-scale fires are predicted in future, to assist recovery the following actions are required immediately following these events:**
  - Initiate measures to protect the refugia across all land tenures that have not been affected by bushfires over the last few years.
  - NPWS reserve fire management plans need to be revised with a much greater focus on conservation and bushfire risk management, particularly for those areas badly affected

[34] https://www.scientificamerican.com/article/australias-bushfires-have-likely-devastated-wildlife-and-the-impact-will-only-get-worse/

during the 2019-29 fire season and address high frequency fire (a key threatening process under the *Biodiversity Conservation Act 2016*) as a threat to those refugia and the threatened species and communities relying on them.,

- Focus restoration efforts on threatened species and communities which are listed as either vulnerable, endangered or critically endangered species or as vulnerable, endangered or critically endangered ecological communities with priorities on:
  a) protected areas and voluntary conservation agreement areas most severely affected by the recent fires; − arboreal animals such as owls, bats, koalas and gliders;
  b) aquatic animals and habitats such as those that support platypus and water rats;
  c) continue with a bolstered investment in pest management programs over at least the next 5 years (and the same period following future major fires) focusing on reduction on populations of red fox, feral cat, deer, goats, feral pigs and wild horses in severely affected parks and reserves and across land tenures where appropriate;
  d) work with the Australian Association of Bush Regenerators to reduce weed populations and undertake regular bush regeneration work in those affected areas which will be subject to invasion from invasive plants such as exotic vines, Orange Hawkweed, Lantana, Coolatai Grass etc;
  e) focusing on fire affected areas to undertake ongoing treatments to reduce the incidence and spread of Bell Miner Associated Dieback (BMAD), particularly those fire-affected areas where BMAD was known to be active.

- **Continue and extend the NSW Government Saving our Species program beyond June 2021**
- **Land management agencies and fire authorities to put in place protocols which ensure that prior to the felling of large trees in the post-fire period, a joint assessment is undertaken by an ecologist and an experienced tree assessor to determine the environmental value and level of hazard of trees.**

5.5 Community Recovery and Resilience

NCC is part of an alliance between Macquarie University and NSW RFS to develop and deliver a bushfire recovery and resilience program. The focus of this program is to work with fire impacted communities where relations are already established through the Hotspots Fire Project. Hotspots supports this process with mapping of community needs by engaging with previous workshop participants and evaluating the effectiveness of the program in community preparedness.

Community recovery from a disaster requires a coordinated approach across four integrated environments: social, economic, built and natural[35]. A connection to the natural environment has a protective effect on wellbeing[36]. Thus, if the physical environment is changed in a way as to affect people negatively, we respond intuitively. The changes are linked to and can determine behavioural, emotional and physiological wellbeing[37]**.**

RECOMMENDATIONS

- **Government to support a coordinated approach to work across and forge multi-disciplinary community recovery collaborations. Critically, these collaborations engage with people in**

[35] AIDR 2018. *Australian Disaster Resilience Community Recovery Handbook*, 3rd ed. Australian Institute of Disaster Resilience, Commonwealth of Australia.
[36] Gibbs, L. Alkemade, N. Baker, E. MacDougall, C. Ireton, G. Forbes, D. 2019. The role of the natural environment in disaster recovery: "We live here because we love the bush", *Health & Place*, vol. 57, pp. 61-69.
[37] Block, K. Molyneaux, R. Gibbs, L. Alkemade, N. Baker, E. MacDougall, C. Ireton, Walker, B. 2019. *Finding Resilience*, CSIRO Publishing, Victoria.

the affected communities to be leaders in the decision making of the recovery work.

- **Government support this coordinated approach to recovery and improving community resilience to natural disasters including bushfires, which includes the built, environmental, social and economic elements of recovery.**

6.0 Conclusion

In summary, NCC urges the NSW Independent Expert Inquiry into the 2019-20 Bushfire Season to address the issues raised by the extraordinary events this season with full consideration of the principles of ecologically sustainable development. It is so important ensure the conservation of biodiversity – already impacted severely by these fires and by longer term impacts such as land clearing and poor land management, and to put forward recommendations that maintain ecological integrity across these firegrounds and beyond for the benefit of present and future generations.

Across Australia, the future frequency and severity of bushfires is predicted to increase significantly. The long drought with greatly reduced rainfall, the length of the fire season, the size and longevity of many of the major fires and the coincidence of a high number of large-scale fires at the same time all combined to be major factors, making this the worst fire season in recorded history in NSW.

However, the Bureau of Meteorology has confirmed that climate change has been the primary reason why this year's bushfire season has been so severe. This season has been a weather-driven series of events and predicted worsening fire weather conditions in the future will be driven directly and irrefutably by climate change. Increased actions to meet the challenge of limiting greenhouse gas emissions and a strong and rapid response to significantly limit the global rise in temperature will be necessary if other actions to adapt and make human communities and the environment more resilient to bushfires are to have any significant effect.

NCC anticipates the Independent Expert Inquiry will result in recommendations to Government that tackle the core reasons behind the devastation to life, property and the environment of the 2019-20 bushfires in NSW. Landmark decisions that recognise the ongoing role and impact of fire in Australia's natural environment, the underlying increasing influence of climate change and which accept that increased resources and funding that is targeted toward outcomes that are supported by scientifically-based evidence will provide much needed guidance to the community about responsible fire management in a rapidly changing world.