



22 May 2020

Senate Finance and Public Administration Committees
PO Box 6100
Parliament House
Canberra ACT 2600

Re: Submission to the Lessons to be learned in relation to the Australian bushfire season 2019-20

Dear Committee Members,

HVP Plantations (HVP) makes this submission to the Committees' inquiry into Lessons to be learned in relation to the Australian bushfire season 2019-20 as a major stakeholder in the prevention and containment of bushfires, on the basis of three factors:

- HVP is the largest non-Government land manager and manager of forest plantation resources in Victoria, and a significant contributor to fire management and fire suppression resources in rural Victoria,
- HVP provides Victoria with a depth of operational resources and strategic experience in fire management through its Forest Industry Brigades, registered under The Country Fire Authority Act (Vic), and
- HVP has sustained considerable asset losses as a consequence of the bushfire events of 2019/20.

Our submission is deliberately succinct, and concentrates on specifically addressing only those terms of reference where we are confident HVP has considered and expert observations and recommendations. We make 19 recommendations which are presented under each of the Terms of Reference of the inquiry.

In making this submission, we also make a clear commitment to providing the Committee with evidence and further substantiation as may be requested or required.

Yours sincerely,

Stephen Ryan
Chief Executive Officer



2020

Lessons learned in relation to the Australian bushfire season 2019-20



Hancock Victorian Plantations Pty Limited

Contents

Introduction – HVP Plantations.....	2
What impact do bushfires have on plantations and the timber industry?	4
Submission to Senate Finance and Public Administration References Committees.....	6
Term of Reference A.....	7
Term of Reference B.....	10
Term of Reference C.....	12
Term of Reference D	13
Terms of Reference E and F	19
Term of Reference G	22
Term of Reference H	24
Term of Reference I.....	25
References	28
Appendix A – Glossary.....	30



Introduction – HVP Plantations

HVP Plantations (HVP) is a plantation forest owner and land manager based in Victoria. It is responsible for some 237,000 ha of land spread across the state, with a head office in Melbourne and regional offices located in Ballarat, Churchill and Myrtleford.

The land HVP manages includes approximately 180,000 ha of plantation (predominantly pine, some eucalypt species) and 48,000 ha of native forest (custodial land). The plantation land is actively managed as commercial forest. HVP produces over 3 million tonnes of harvested logs each year, which support a vibrant sawmilling and wood processing industry in Victoria and South East Australia. The annual harvest and replanting program is over 5,000 ha. Our native forest area is managed for conservation values - no harvesting activities are undertaken on this land. The remaining 19,000 ha is taken up in roads, tracks, firebreaks and other supporting infrastructure.

Fire can cause significant damage to plantations; hence fire risk management is a key strategy for the company. HVP carries responsibility for fire prevention and suppression across the whole of its estate.

HVP's location in the fire landscape

HVP has a wide geographic spread across Victoria with its plantations bounded by both agricultural and forested landscapes, and in some cases by residential properties. A significant proportion of HVP's estate is bounded by public land where fire management is conducted by Forest Fire Management Victoria (FFMVic). The management of fire in this public landscape is a key to reducing the fire risk in our plantations. Over 55% of the fires HVP attends commence outside our estate. The vast majority of plantation losses incurred by HVP have resulted from fires originating outside our estate.

Forest Industry Brigades and other HVP Arrangements

HVP has significant skills in forest firefighting and fire management. HVP has 7 Forest Industry Brigades registered under the Country Fire Authority (CFA) Act 1958. These industry-based fire brigades are operated by HVP but are under the operational control of CFA or Emergency Management Victoria (EMV) Incident Management Teams (IMT) during incidents. Industry brigades are only required to service the company's plantation assets for wildfire response and fire management planning; however the brigades are empowered to operate outside their designated area, if the brigade considers it is in their best interest.

HVP Brigades are spread across Victoria and reflect the location of the company's forest estate and management structure. HVP owns and maintains a fleet of dedicated fire tankers, smaller slip-on units and command vehicles fitted with radios compatible with CFA / FFMVic. Table 1 outlines relevant details. HVP has taken a risk based approach to fire, which results in the company providing far greater resources than is strictly required under the legislation.

The membership of each of these Forest Industry Brigades includes HVP employees as well as HVP-engaged contractors. All firefighters are trained to CFA qualification standards and become fully integrated into the incident command system for any event.



Table 1 HVP's firefighting resources

Brigade	Location	Firefighter Numbers	4x4 Fire Tankers > 3000 litres	4x4 Slip-on Units 300 - 400 litres
HVP Ballarat Plantations FIB	Ballarat	37	2	5
HVP Delatite Plantations FIB	Benalla	27	3	9
HVP Gippsland Plantations FIB	Churchill	109	9	22
HVP Otway Plantations FIB	Beech Forest	6		2
HVP Ovens Plantations FIB	Myrtleford	36	3	8
HVP Rennick Plantations FIB	Mount Gambier	27	2	4
HVP Shelley Plantations FIB	Shelley	15	1	7
Plantation Firefighters HQP HFM NZ	Qld / NZ	25		
	Total	282	20	57

HVP engages two dedicated fire-fighting helicopters on short term contracts each season and may also engage other aircraft on an occasional basis. The company maintains and resources 4 fire towers which are integrated with the FFMVic fire towers. HVP also contracts numerous bulldozers, graders and other plant and equipment for fire prevention and suppression activities each year.

In addition, HVP has associated plantation forestry companies in Queensland and New Zealand, who also maintain their own trained and qualified fire-fighting crews and resources. For major fire events, HVP also draws upon these resources from time to time, in addition to and in support of our own fire-fighting resources. Similarly, HVP resources may be requested to respond to assist fires in Queensland or New Zealand.

HVP is a member of the Forest Owners' Conference (FOC) in the Green Triangle area of the Victorian South Australian border. This organisation has been formed by the forestry companies in the region to foster mutual firefighting assistance, coordination and standards in the cross-border environment. FOC members respond to most wildfires in the region, regardless land tenure or ownership status and play a significant role in protecting the whole community.

Each year, HVP incurs expenditures in excess of \$5 million on fire prevention activities, including limited plantation fire insurance. In the Fiscal 2020 year, HVP will incur in excess of \$8.5 million on fire prevention and suppression costs. These figures exclude any plantation losses incurred.

On average HVP Brigades responded to over 60 fires each year. In recent years, the greatest number of responses in any one year was 135 in 2012/13 and the fewest was 19 in 2010/11. Over 55% of the HVP responses are to events on land outside the HVP estate; hence HVP plays a considerable role in community fire protection.

HVP has a close association with FFMVic and CFA and regularly assists both organisations with fuel management burning on land surrounding plantations. HVP custodial land has also been included in FFMVic burns to maximise their effectiveness. HVP gives active assistance to the CFA in the development and conduct of their annual burn training camps at Shelley in NE Victoria and Creswick in Central Victoria.

HVP uses burning to enhance ecological values on some custodial land and undertakes silvicultural burns to reduce some of the residual woody fuels remaining following harvesting operations.



What impact do bushfires have on plantations and the timber industry?

Inappropriate fire regimes (especially ones that predispose the landscape to catastrophic fires) exacerbate the risk of major economic impact on regionally critical industries.

- Plantation investment is a long term commitment - up to 30 years to grow from seedling to mature product.
- Plantations provide many direct and indirect jobs in rural and regional Australia.
- Timber processing involves multimillion dollar investments to create and operate mills that are competitive on a world scale.
- Bushfire can be a major disruptor to wood supply and the long term viability of wood processing industries.
- Due to the long term nature of the investment, the effects of bushfire may not become apparent for many years following a fire event. For example:
 - The Carter Holt Harvey Morwell mill closed in 2017 with the loss of 160 jobs, largely as the result of the damage to the Gippsland plantation resources from the Black Saturday fires in 2009.
 - The loss of ~20,000 ha of plantation in the Green Triangle region in the Ash Wednesday Fires in 1983 had major flow on effects until the early 2000s at least, reducing industry expansion potential in the Region.
 - The loss of nearly 28% (~52,000 hectares) of the plantation estate in the Murray Valley national plantation inventory region in 2020 will have significant short, medium and long term effects on the timber processing industry in north east Victoria and the Riverina Murray Region of NSW.

Shirmer et al (2017a, 2017b, 2018) document the socio-economic impacts of the timber industry in south east Australia. They show that within a number of local government areas the timber industry is a major employer. Forest industry directly generates 8% of the jobs in the South Australian part of the Green Triangle region; in southern NSW it contributes 22% of the employment in the Bombala Shire and 18% in the Snowy Valleys Council area.



Figure 1 HVP Board members and staff inspecting timber salvage operations at Shelley, near Corryong in March 2020



HVP Fire Commitment

When it comes to fire, for HVP...
Every person counts...and
Every tree counts...

In the urgency of response we will never forget the health, safety and welfare of ourselves, our firefighters and the community.

We value every tree that is threatened by fire and will do our utmost to minimise the impact on our investors, our forests and our customers.

All HVP personnel have a role to play in fire and our fire response will be swift, determined and thorough.

We are professional forest growers with specialist skills in forest fire management which we will use to enhance the community's response to fire.

Our responses will be structured, proactive and skilful and always within the overall command and control of the emergency services.

We will train hard, work hard and review our actions to ensure on-going learning from all incidents.

We commit to training and development and creating pathways for the fireline leaders of the future.

We will keep abreast of developments in fire science, adopt innovative ideas to investigate risk and mitigation and use mobile technology to keep people informed on and off the fireline.

And...

We will work Safer Together with the people of Victoria to ensure the resilience of our local communities in the face of fire.

Our Mission

Our mission is to manage the plantation estate in a safe and sustainable way to optimise the return to our investors, whilst balancing the needs of employees, customers and local communities.

Our Vision

- Safety – Zero Harm
- Continually invest in and care about our people
- Provide attractive long term returns for our investors
- Respect our communities and they value us
- Improve our business through new technology and innovation

Our Values

- **Integrity** – We do the right thing when no-one is watching
- **Respect** – We respect our people, stakeholders and the environment
- **Commercial & Customer Focused** – We make every tree count
- **Responsible & Accountable** – We take ownership of decisions
- **Innovation** – We will do things better tomorrow than we did today

Long Term Outcomes

Managing the fire risk ensures the long term viability of HVP as a company, a healthy return to our investors and minimise the impact on our communities. This strategy will result in:

- Safe & healthy firefighters
- Reduce the incidence and impact of fire on our trees and investors.
- Maintain the economic viability of regional timber industries
- HVP as highly trusted and respected forest managers with specialist skills in forest fire.
- A strong community presence which enhances the resilience of our local communities.



Submission to Senate Finance and Public Administration References Committees

HVP Plantations submits the following comments and recommendations to the Senate Finance and Public Administration References Committees' inquiry into the Lessons to be learned in relation to the Australian bushfire season 2019-20. In total, HVP's submission contains 19 Recommendations for actions and improvements.

If there is any further information or clarification the Committee seeks, HVP is willing to provide further information through written or verbal submission.

Contact Details:

Ruth Ryan
Corporate Fire Manager
HVP Plantations

Reading the body of this report

These boxes include the Inquiry Terms of Reference addressed in the current theme

Recommendations are numbered paragraphs in bold font

Standard text is a lived experience or an example.

In italics are quotes from previous inquiries.



Term of Reference A

Lessons to be learned in relation to the preparation and planning for, response to and recovery efforts following the 2019-20 Australian bushfire season, with particular reference to:

(a) advice provided to the Federal Government, prior to the bushfires, about the level of bushfire risk this fire season, how and why those risks differed from historical norms, and measures that should be taken to reduce that risk in the future;

HVP submits the following recommendations under Terms of Reference A

- 1. In relation to the National Bushfire Management Policy Statement for Forests and Rangelands, endorsed by Council of Australian Governments (COAG) in 2012;**
 - a. That COAG be requested to:**
 - i. Audit the progress towards implementation of the goals and strategies outlined in the Policy;**
 - ii. Revise and endorse a new National Bushfire Management Policy Statement, including the development of national metrics and performance measures for States to report annually.**
 - b. That Federal and State Governments allocate resources and priority to achieving the goals of the National Policy Statement.**
- 2. The Federal Government, through COAG, coordinate the development of the following Australian wide systems to ensure an integrated and coordinated approach to wildfire management across all States and Territories:**
 - a) National Wildland Fire Qualification System, which covers all levels of firefighter from base firefighter through to Incident Command personnel, with particular focus on the following qualifications:**
 - i. Wildfire firefighter**
 - **With Plantation Firefighter endorsement**
 - ii. Crew Leader**
 - iii. Taskforce / Strike Team Leader**
 - iv. Sector Commander**
 - v. Operations Officer**
 - vi. Plantation Technical Specialist Officer**
 - vii. Incident Controller**
 - b) Wildland Fire Reporting and Decision Support System**
 - c) National emergency services mobile communication systems that allow the response agencies to effectively communicate on the fireground and through incident command channels.**
- 3. That the Arrangement for Interstate Assistance, developed by the National Resource Sharing Centre, recognise the need for specialist resources such as plantation firefighters and facilitate the deployment of specialists when requested by plantation companies / Forest Industry Brigades.**
- 4. That State and Territory governments be encouraged to provide a hierarchy of legislation within a Code of Practice for forest fire management to better deal with situations where conflicting objectives for forest and rangeland management prevent sound fire management.**



5. The Government develop social research and communication programs to ensure that prescribed fire and mechanical fuel management practices remain legitimate (and socially acceptable) practices in Australia.

Background to recommendations

Recommendation 1

The National Bushfire Management Policy Statement for Forests and Rangelands was endorsed by all members of COAG in 2012 (Forest Fire Management Group, 2014.) The vision of this policy is that:

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

Actions to achieve this vision fall under four strategic objectives:

- Effectively managing the land with fire
- Involved and capable communities
- Strong land fire and emergency partnerships and capability and
- Actively and adaptively managing risk.

HVP believes that a National Bushfire Policy is important to ensure the development of a coordinated approach to bushfire management. Annual reporting by the States and Territories against common metrics will be a key aspect in ensuring that advancement is made towards achieving the goals and objectives of the Policy.

Recommendation 2

HVP's CFA Forest Industry Brigades are frequently involved in interstate firefighting activities, especially in the Green Triangle area of the South Australian / Victorian border and the North East Victoria / Southern NSW border. When employing firefighters who may have gained their qualification in another State, we are frequently frustrated in the time lags in getting their interstate qualifications recognised. In many cases, it is easier to retrain the firefighter than get recognition of prior learning. Even within Victoria, it is difficult to get the CFA to accredit a firefighter trained by Forest Fire Management Victoria (FFMVic).

Firefighter qualifications

In 2019 HVP Plantations requested assistance from HQ Plantations in Queensland for the provision of skilled plantation firefighters. One of the people deployed from Queensland originally commenced work for a forestry company in Victoria. He trained and qualified as a CFA Wildfire Firefighter. He then moved to a new job in South Australia where he had to retrain to gain the CFS Basic Firefighter (BF1) qualification. When he moved to Queensland, again his previous qualifications were not recognised and so he completed the QFES / RFS Firefighter Minimum Skills!

The United States National Wildfire Coordinating Group has developed the [Wildland Fire Qualification System](#), which ensures firefighters are able to deploy seamlessly across the country and their accreditations are standardised at a national level. The NWCG Standards for Wildland Fire Position Qualifications establishes minimum NWCG position qualification standards for training, experience, physical fitness, and currency for national mobilization to wildland fire incidents.



Personal qualifications need to be held in a centralised, Australia (and NZ) wide database to allow the easy transfer of personnel between jurisdictions.

Australia needs an integrated fire reporting and management system similar to the [US Wildfire Decision Support System](#) (WFDSS.) Such a system would ensure consistency in data and allow real-time reporting of the situation across the nation. This would make it easier to anticipate resourcing and community needs. A key feature of the US WFDSS is an archive of current situation and fire modelling scenarios when key decisions are being made. This allows firefighters to review the data on which they based their decisions and to reflect on the success or failure of the chosen strategies.

Recommendation 3

In 2020, for the first time, arrangements were made to get interstate and international specialist plantation firefighters via the Arrangement for Interstate Assistance (AIA), developed by the National Resource Sharing Centre. This request facilitated the deployment of plantation firefighters into north east Victoria from Queensland and New Zealand. To enable the ready deployment of specialist resources in the future, the AIA needs to recognise the specialist resources and map out the protocols for rapid deployment.

Recommendations 4 and 5

Fuel management is one of the few significant ways of influencing the outcomes of bushfires. It is proven to be effective in reducing fire impact and maintaining safety of fire responders. To ensure that fuel management objectives can be met, the Government needs to ensure that it is given an appropriate level priority. To maximise effectiveness, fuel management must be considered within a tenure blind framework. There is confusion however, especially amongst rural landholders, about regulatory constraints and their ability to undertake fuel management activities (Safer Together 2019.) There have also been times when fear of causing impact on rare or threatened species has resulted in defensive rather than pro-active strategies which in the longer term has resulted in a far greater impact on the environment.

The Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999 and State government legislation often cause confusion by referring to the same vegetation communities by different names and it is even possible for different penalties to be imposed for the same infringement under each State and Commonwealth Act. Governments need to develop a clear framework for implementation and hierarchy of legislation to guide fuel management and firefighting activities.

Further work needs to be done to develop the knowledge and acceptance of prescribed fire and mechanical fuel reduction by the general public. The trade-off between long-term gains and short term impacts need to be understood. The community needs to understand that managed fires do have risks, as they involve natural environment and uncontrollable weather patterns, and there will be times when all will not go to plan. Politicians need to acknowledge this and communicate this to the public and not bay for the blood of those tasked to implement this plan.



Term of Reference B

Lessons to be learned in relation to the preparation and planning for, response to and recovery efforts following the 2019-20 Australian bushfire season, with particular reference to:

(b) the respective roles and responsibilities of different levels of government, and agencies within government, in relation to bushfire planning, mitigation, response, and recovery;

HVP submits the following recommendations under Terms of Reference B

- 6. The Federal, State and Territory governments need to clarify Australia’s legal framework for emergency management and response to ensure that decision making is placed in closest proximity to where the actions are taken to produce the desired outcomes, i.e. follow the principle of subsidiarity.**
- 7. Federal, state and local governments should work together to develop publicly available fire risk maps. Australians need to be able to make genuinely informed decisions about where to live, and in what circumstances they should stay or leave during bushfire threat.**

Background to recommendations

Recommendation 6

Fire spread across the landscape, especially under extreme fire danger conditions, can be rapid, very dynamic and chaotic. This makes firefighting a very dynamic and complex decision making environment. The best decisions are those that are guided by clear statements of intent, with the emphasis on the outcome of the mission rather than the specific means of achieving it, and are made as close as possible to the firefight. This results in decisions based on local knowledge which are implemented in a timely manner. Having to refer decisions for backburning to regional or State control centres has resulted in lost opportunities as, by the time the decision is made, the field conditions for successful implementation have already passed.

Subsidiarity & proportionality Principles:

- Protect the sovereignty of the member state; Commonwealth legislation is only enacted when clearly necessary
- Legislation necessary to achieve the objectives of the action and no more.

Recommendation 7

Recently published research (Whittaker et al, 2020) of community understanding of bushfire risk shows that many people consider bushfire preparation as something that is undertaken when directly threatened by fire, not well in advance of an active threat. Many people within Tathra (threatened by the 2018 Reedy Swamp Fire) had not thought that a bushfire could impact the town, or had not considered the potential for fire to penetrate beyond the bush at the western edge of town. Australians need to be able to make informed decisions about where to live, the risks they face living there and how they can ameliorate some of those risks.



In particular:

- Governments need to facilitate good planning decisions:
 - Ensuring vulnerable people and communities are not placed adjacent to commercial plantations and forests, e.g. inappropriate subdivisions, etc.
 - Reducing urban and peri-urban sprawl, thereby reducing the number of urban homes exposed to bushfire threat.
- People living in rural, regional and urban interface areas must understand the fire risks and take appropriate actions to protect themselves, their families and their assets, including:
 - Appropriate building design
 - Adequate insurance
 - Good fire knowledge
 - Self-sufficient water supplies and means of delivery, e.g. sprinkler & pump systems
 - Leave early and live.



Term of Reference C

Lessons to be learned in relation to the preparation and planning for, response to and recovery efforts following the 2019-20 Australian bushfire season, with particular reference to:

(c) the Federal Government's response to recommendations from previous bushfire Royal Commissions and inquiries;

HVP submits the following recommendations under Terms of Reference C

8. **The current Inquiry use the resources of the [Bushfire and Natural Hazards CRC Disaster Inquiries Database](#) to review the recommendations of past bushfire inquiries to determine what previous recommendations are still relevant today and the reasons why many of these recommendations are still to be implemented.**
9. **For future fire inquiries, investigate and develop the model of restorative practice inquiries, which have a basic principle of no-blame to ensure full and frank discussion and the development of valuable lessons learnt.**

Background to recommendations

Recommendation 8

The Disaster Inquiries Database shows that between 2009 and 2017 there have been 55 inquiries, resulting in 811 recommendations for bushfires in Australia (Zito 2020). Many of the recommendations of the previous inquiries have not been fully implemented, with some not implemented at all, so it raises serious questions about whether another inquiry or royal commission will offer anything new or compelling.

Recommendation 9

A better approach may be to adopt 'restorative practice' inquiries—that is, inquiries that focus on the consequences of an event and which seek to understand why an event was important for those involved and how those involved can make sense, learn from and take responsibility for identifying and implementing learning from the event. Essential to the restorative process is consideration of making good financial losses without the need to blame (Eburn 2020).



Term of Reference D

Lessons to be learned in relation to the preparation and planning for, response to and recovery efforts following the 2019-20 Australian bushfire season, with particular reference to:

(d) the adequacy of the Federal Government's existing measures and policies to reduce future bushfire risk, including in relation to assessing, mitigating and adapting to expected climate change impacts, land use planning and management, hazard reduction, Indigenous fire practices, support for firefighters and other disaster mitigation measures;

HVP submits the following recommendations under Terms of Reference D

- 10. To improve Australia's resilience and adaption to climate change to mitigate the impacts of natural disasters, the Federal Government needs to:**
 - a. Support actions by governments and businesses to undertake actions to mitigate and offset greenhouse gas emissions.**
 - b. Support mechanisms to facilitate creation and monetisation of carbon sequestration credits from both existing and greenfield plantations.**
 - c. Support "The Ultimate Renewable" message on the benefits of trees and consequential wood products in capturing and storing atmospheric carbon dioxide. Of note, as plantation and native forest trees are sequesters of carbon, the greater the damage of burnt trees caused in bushfires, the lower the subsequent capability for these trees to continue to sequester carbon.**
 - d. Support research to better understand and quantify the impacts of climate change on fire risk, capacity for suppression, intensity, rate of spread and response to variable weather conditions.**
 - e. Support research to explore the impact of plantation design on fire prevention and suppression under progressively more severe conditions, including orientation, stocking, spacing, size and location of fire breaks, and mechanised tree pruning. Integrate design changes with plantation management activities that increase tree resilience to climate change.**
- 11. Prescribed fire programs along with mechanical fuel modification be strongly supported by all levels of Government and effectively implemented by Government agencies in order to:**
 - a) achieve fuel management targets to reduce community bushfire risk and greater manageability of fire;**
 - b) enhance the safety of firefighting personnel during significant fire events;**
 - c) provide valuable experience in fire suppression and fire management capability in regional and rural communities.**
- 12. Federal, State & Territory Governments build on the work done by AFAC in the National Burning Project to support the implementation of prescribed burning as a key component in managing fire in the Australian landscape. In particular focus should be given to:**
 - a) Implementing consistent performance measures across all jurisdictions to monitor the implementation of fuel management programs**
 - b) Supporting the continued development of the Centre of Excellence for Prescribed Burning to ensure best practice throughout Australia**
 - c) Developing a risk based approach to prescribed burning and mechanical fuel reduction which clearly considers regional economic, social, cultural and biodiversity impacts as well as life and property**



- d) Developing fire practitioners through financial support and incentives to appropriate tertiary institutions to revive specialist, field-based, applied education courses for forest and fire management. This would involve engagement at a number of different levels including:**
 - i. Burn camps where participants plan and execute prescribed burns**
 - ii. Tertiary education in forest ecology, fire behaviour, and fire and fuel management**
 - iii. On-going, long term research into forest ecology, fire behaviour, and fire and fuel management.**
- e) Ensuring legal and operational processes enable all prescribed burning practitioners (paid and volunteers) to operate without undue fear of prosecution or disciplinary actions**
- f) Achieving tenure blind management of bushfire fuel**
- g) Developing greater skills and knowledge in traditional landscape management and burning practices through engagement with aboriginal communities and experts.**

Background to recommendations

Recommendations 10.a, 10.b and 10.c

A recent study (van Oldenburgh et al. 2020) by an international team of 17 scientists from across Europe and the US used computer climate models to examine the impact of increased levels of greenhouse gases in the atmosphere on the risk of intense fires. Looking only at observations, the study found that the risk of Australia being hit by intense fire weather had already risen since 1900 by more than a factor of four. The study reported that hot and dry conditions that helped drive Australia's bushfire crisis in 2019-20 would be eight times more likely to happen if global warming since 1900 reached 2°C, with a lower bound of four times more likely.

The 195 countries and international bodies who signed the Paris climate agreement agreed to keep global average temperatures from rising "well below 2°C" and to try to keep limit rises to less than 1.5°C. According to Jim Skea of Imperial College London and an IPCC co-author, "limiting warming to 1.5°C is possible within the laws of chemistry and physics but doing so would require unprecedented changes". First, the world needs to start cutting emissions. Instead in 2017, the world's emissions reached a new record high. Second, we need to reduce those emissions very quickly. The latter is problematic. According to the IPCC, the world would need to cut fossil fuel emissions in half by 2030 to be on the trajectory. Further, we've delayed climate action for so long that, to hit our climate goals, the world will not just have to reduce emissions to zero but even pull some carbon dioxide from the air. There are a handful of "negative-emissions technologies" that we can deploy to do that, but the report says that "the effectiveness of such techniques are unproven at large scale and some may carry significant risks for sustainable development."

The IPCC notes that several regional changes in climate are assessed to occur with global warming up to 1.5°C compared to pre- industrial levels, including warming to extreme temperatures in many regions. In other words, even limiting average global warming to 1.5°C will not prevent weather extremes. 1.5°C is not an absolute line in the sand, but a general indicator of where many climate impacts – on balance – go from destructive to catastrophic.

Any actions that reduce atmospheric carbon dioxide, by both emissions reduction and carbon capture, are beneficial to meeting the target level of "well below 2°C". This includes actions that reduce fire severity, extent and intensity all lead to reduced emissions.



Expanding the capture of carbon dioxide in long lived plantations and wood products across the landscape should also be supported. A recent example is of the proposal to remove the rule requiring a water usage licence before carbon sequestration benefits could be claimed from commercial plantations under the Emissions Reduction Fund.

Governments should also actively support improved community education and understanding of the role of trees and wood products in addressing both overall sustainability and reductions in atmospheric carbon dioxide, including “The Ultimate Renewable” program from the Australian Forest and Wood Products Association.

Recommendation 10.d

HVP has strong practical experience in fire suppression and reasonable practical experience in fire prevention. However, there is much that HVP cannot do on its own to ameliorate risk from fire, in the face of steadily increasing frequency of extreme and catastrophic fire conditions. Government should support a range of researchers, modellers and land management agencies to improve their understanding of and skills in fire suppression and prevention. Components of that improved capacity include:

- Working with CSIRO to adapt and refine the resolution of tools to predict future climate changes.
- Working with experts in fire modelling to improve the utility of tools such as Phoenix Rapidfire modelling to predict the impact of a range of potential weather situations on fire ignition, rate of spread, intensity and response to various suppression approaches. This would include a better understanding of the impact of landscape level fuel reduction on the risk to HVP’s plantations from fires starting outside its estate.

Recommendation 10.e

A wide range of plantation management practices impact on the resilience of trees against the damaging effects of climate changes of tree growth and vitality. Plantation management practices that mitigate the effects of climate change on fire risk are likely to have some effect on increasing tree resilience, but the impact is likely to be marginal.

Governments should support work with other forest growers and researchers to better understand the implications for fire suppression and prevention of factors such as plantation orientation, size and distribution of fire breaks and access tracks, stocking, thinning, understorey density/distribution and pruning status. The reference to pruning status refers to low cost mechanical pruning (which is not currently available) that reduces ladder fuels between ground fires and the upper canopy, as well as improving visibility within a stand to assist fire suppression.

Recommendations 11 and 12

Bushfires are a natural part of the Australian landscape. Naturally occurring fires and fires used by aboriginal people are increasingly understood to have played important roles in shaping the distribution and composition of much of Australia’s native flora and fauna. Much of our vegetation and biodiversity is dependent on fire disruption to maintain healthy ecosystems. We cannot and should not try to eliminate fire from our landscape. However bushfires can be extremely destructive, causing loss of life, homes, assets and industries. They can also have major degrading impacts on habitat, biodiversity, soils and nutrients, and smoke may affect human health and damage crops such as grapes. We need to learn to live with and manage the risk of fire in our environment and to our communities.



The management of fire across Australia requires policies and practices that suit regional needs. Bushfire management policy must be adaptive to be able to anticipate and respond effectively to drivers such as shifts in climate and new knowledge.

Observational experience and research over a long period provides strong evidence that reduced fuel loads can directly improve the capability to suppress most bushfires.

Burning. – It has already been recommended that the Forest Commission must recognise the necessity of protective burning in its areas...this method of prevention of outbreak and spread, cannot either in the public or private interest, be ignored.

1939 Royal Commission Bush Fires of January 1939; p31

Prescribed fire has been proven as an effective tool in the management of bushfire risk but is not a panacea for all fire management problems. No single fire regime can ever hope to optimise all biodiversity, fuel hazard reduction and community risk outcomes. If prescribed burning is to play a role in the management of landscape-scale fire, then the associated compromises will need to be based on the best known science and associated expertise (AFAC, 2015a.) Well planned and implemented prescribed burning is an essential, practical and cost effective tool for reducing risk to life, property and the environment (AFAC, 2015b.)

Stephen Pyne¹ frequently talks about how the absence of fire in the landscape, especially fire adapted landscapes such as many eucalypt forests, frequently leads to destructive megafires and an escalating reliance on emergency response rather than good land management. There is a notion that not disturbing a forest is saving a forest. However it has been proven time and again that inaction leads to catastrophic fires with huge environmental impacts.

The Victorian Bushfires Royal Commission (Parliament of Victoria, 2010) conclude that a target of 5 to 8 percent prescribed burning of public land is necessary for community safety and would not pose unacceptable environmental risks, particularly if priority is given to the dry eucalypt forests.

The panel was unanimous in its view that burning areas smaller than 500 or 1,000 hectares is 'usually of minimal value in reducing the scale of unplanned fires'. Dr Tolhurst indicated that the reference in the panel's summary to burning areas 1,000 hectares in size was not 'just a random number': it is the 'sort of size we are thinking of would be needed to capture the majority of embers falling within three kilometres of a wildfire'. It is not just to achieve a target of so many hectares. Professor Bradstock stated, '... bigger is better and if you are going to push ahead with a more vigorous approach to prescribed burning it is inexorable that you are going to have to achieve that by treating larger slabs of country'

2009 Victorian Bushfires Royal Commission Vol 2; p301

¹ [How fire shapes everything](#)



The current landscape risk modelling in Victoria only factors in human life and property (address point impact, i.e. potential homes) in developing their risk profiles (DELWP 2015.) Naturally this preferences risk reduction where we can avoid the greatest number of lives lost or homes burnt. But is this fair? This leads to an emphasis on areas of greater population, potentially to the detriment of rural and remote areas. It needs to be also understood that the residual risk profiles are largely based on fire running under a standard weather scenario for less than 24 hours. Hence the current risk profiles documented in the [Safer Together Program](#) do not factor in the risk of fires starting in remote locations and burning for multiple days and developing fire edges many hundreds of kilometres long, which then impact on regional communities such as Corryong and Mallacoota.

Prescribed burning impact on fire behaviour – Rosedale Fire January 2019

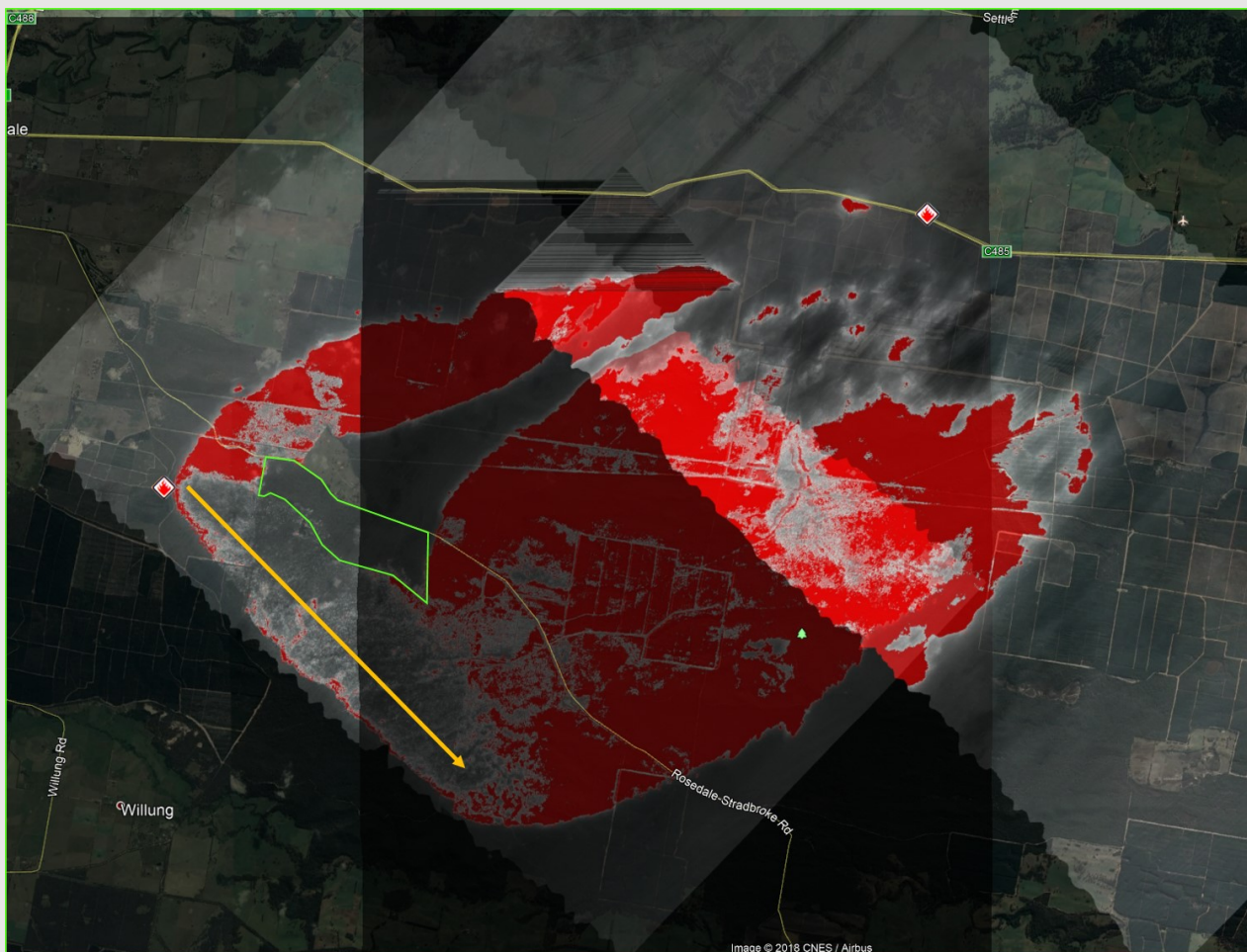


Figure 2 Rosedale - West Boundary Track South fire, January 2019

Figure 2 shows a very good example of the impact of prescribed fire on fire behaviour. The photograph is a composite of a number aerial infrared scans of the fire. The red indicates areas of intense fire activity. The fire commenced around 1 pm under severe fire danger conditions (FFDIs 30 to 70, temperature 40° C, RH 12%, wind 30 km/h) and ran under the influence of a north westerly wind for approximately six hours.

The initial run of the fire is indicated by the orange arrow. A south west change then blew the fire to the north east. These scans were taken approximately two hours after the change hit. In these two hours the fire increased in size from approximately 1,150 ha to 5,800 ha. The area highlighted in green was burnt by a prescribed fire in 2017. The scan clearly shows an absence of fire to the north east of the prescribed burn.



Broad scale and remote area burning are just as important as burning close to populated areas. Many of the landscape fires experienced in 2020 commenced as lightning strikes in remote areas. Prescribed burning increases the chance of first attack success and can significantly assist in the development of successful containment strategies. Florec et al (2020) concluded that only in limited circumstances does prescribed burning in the wildland-urban interface generate more net benefits than fuel management treatments across the landscape.

Morgan et al (2020) found that the use of prescribed burning in south-eastern Australia in the past 100 years has largely been driven by political and legal factors. This must be reversed to ensure that effective burning, supplemented by mechanical fuel reduction, achieves targets to reduce the fire risk to the whole community and enhances the safety of firefighters.

It must be acknowledged that prescribed burning will always have a level of risk associated with its implementation. This risk can be reduced to an acceptable level through careful planning and management of operations. To enable the successful implementation of fuel management on both public and private land, the Government needs to take ownership of the risk and develop legal and operational processes that enable prescribed burning practitioners to operate without undue fear of prosecution or disciplinary actions.



Terms of Reference E and F

Lessons to be learned in relation to the preparation and planning for, response to and recovery efforts following the 2019-20 Australian bushfire season, with particular reference to:

(e) best practice funding models and policy measures to reduce future bushfire risk, both within Australia and internationally;

(f) existing structures, measures and policies implemented by the Federal Government, charities and others to assist communities to recover from the 2019-20 bushfires, including the performance of the National Bushfire Recovery Agency;

HVP submits the following recommendations under Terms of Reference E

13. Risk mitigation in growing forests for timber harvesting is critical in addressing investment risk around the multi-million dollar investments needed for processing mills and for harvesting and transport machinery. Governments may have a role in capping or underwriting some of this risk. In particular, where there has been a major impact on timber resources, the Government may have to support:

- a. **Providing financial support to offset increased costs for harvesting, haulage and processing of fire salvage logs. This may include costs for storage of logs via irrigation or, in some cases, submersion, in order to preserve the log for later use**
- b. **Future subsidy of transport of logs from outside the region to maintain supply at critical levels for processing mills**
- c. **Financial support to assist mills to reconfigure processing to address significant changes in future log mix**
- d. **Underwriting or capping of some of the insurance risk. Consideration should be given to establishing a Government sponsored Natural Disasters Insurance pool, similar in some respects to the Future Fund, as operates in other countries such as the US and New Zealand.**

Background to recommendations

To minimise the short and long-term economic impact of fires on the plantation industry and local rural communities, it is prudent for the industry to maximise the volume salvaged from burnt areas. Experience with salvage harvesting of fire damaged plantations has demonstrated that burnt trees need to be harvested within 6 to 12 months of a fire to avoid deterioration in log quality to the point where the log is not merchantable. The rapidity with which logs deteriorate depends on fire intensity and weather conditions.

Lower quality and smaller logs are often unable to be salvaged because such logs typically serve markets for pulp, paper and reconstituted wood products; these markets can allow only small quantities of charcoal into their processes. The consequence of inability to sell smaller and lower quality logs is a high degree of wastage, higher harvesting costs and higher levels of material left on the ground to both hinder harvesting and add to the cost of site clean-up for replanting.

Depending on the size of the fire, there may be volumes of logs requiring salvage that are far greater than are normally harvested in a 6 - 12 month period within that region. Failure to harvest logs that are capable of salvage will exacerbate future supply of logs to mills in that region. Consequently, attempts to salvage larger volumes of logs will require additional harvesting and haulage capacity, which often needs to be brought in from more distant regions. The logs themselves are more



difficult and expensive to harvest for a range of reasons: fire intensity and associated winds entangle trees; hazardous trees are much more common; ground conditions are much different to normal harvesting; there is no slash material left to cushion ground surfaces from machinery; charcoal causes higher levels of wear and tear on machinery.

Large volumes of salvage logs may exceed the capacity of mills for processing. Experience from the Ash Wednesday fires in 1983, and on a smaller scale subsequently, has shown that the life of salvaged logs can be extended significantly by keeping the logs wet, either via irrigation or submersion. Setting up and operating an irrigation or submersion area for large volumes of logs is expensive. It is also very difficult to locate an area that has sufficient water for long term irrigation, and that also has the geologic conditions that enable the water to be captured on site and recycled.

All of the activities set out above incur additional costs in seeking to maintain supply of logs to regional wood processing centres and, as far as possible, to maximise the salvage of burnt wood and so limit the impact of the fires on future supply of logs. Governments should provide financial support to achieve these outcomes and thus sustain regional economies.

In the medium to long term, large fires create “holes” in the capacity of plantations to supply consistent volumes of logs to processing industries. Holes are caused by the loss of plantations that were too immature to be salvaged, and by the inability to salvage all of the volume of trees that were of merchantable age. In order to keep processing industries operating at a competitive scale, it may be necessary to try and fill these holes by transporting logs from more distant regions where there is additional capacity. However, this will incur significant additional transport costs. Government log transport subsidies would enable regional processing industries to continue operating, underpinning regional employment and economic sustainability. Government subsidies may also be necessary to assist wood processing industries to reconfigure their mills to more efficiently process a different mix of log sizes and quality under a post-fire wood supply regime.

It is becoming increasingly difficult and expensive to secure insurance against fire losses in plantations. A more carefully planned and landscape-wide approach to fuel reduction will assist in limiting the risk of large scale losses of plantation from fire. It is hoped that insurance companies will recognise the range of actions being undertaken to mitigate risk. Governments may be able to assist in risk mitigation by underwriting some of this risk, capping the risk level and/or supporting fire suppression priorities that recognise the key role of plantation assets in sustaining regional economic activities. A suite of actions such as these will be needed to address the multi-million dollar investment risks faced by harvesting and haulage companies and wood processing industries.

In addition, consideration should be given to establishing a government-sponsored Natural Disasters Insurance Pool, building funds in a similar manner to that of the successful Future Fund, and operated in line with similar funds overseas such as in the US and New Zealand.





Figure 3 Following the 2009 fires, this mill in Colac, processed more salvaged timber from fire impacted plantations than was required to rebuild all the homes burnt in the Victorian Black Saturday fires.



Term of Reference G

Lessons to be learned in relation to the preparation and planning for, response to and recovery efforts following the 2019-20 Australian bushfire season, with particular reference to:

(g) the role and process of advising Government and the federal Parliament of scientific advice;

HVP submits the following recommendations under Terms of Reference G

14. The Federal Government should establish an independent wildfire advisory panel who are able to give free and fearless advice to the Government. Members of this panel must be unconstrained by State or Territory political influences or Departmental protocols. This panel needs to be comprised of scientists and field based practitioners with a high level of knowledge and experience in forest and rangeland fire management.

To support the on-going technical and scientific skills of such a panel, the following also need to be implemented:

15. Federal, State and Territory Governments need to:

- a. allocate significant funding to ensure on-going long term research to assist forest fire practitioners better manage fire and enhance the community's understanding of fire.
- b. continue to provide support for on-going long term research into the effects of prescribed burning, mechanical fuel reduction and wild fire.
- c. Develop harmonised data collection to maximise the efficiency and robustness of scientific research.

16. That the Commonwealth Government support the continued development of experienced and skilled forest managers and forest firefighters through the following initiatives:

- a. Supporting a viable and vibrant forest (both native forest and plantation based) timber industry in Australia so that employment opportunities in a sustainable industry continue to exist in rural and regional communities
- b. Supporting tertiary education and professional development in forest science, developing foresters who are field based so they understand the environment in which they live and work, and gain a high level of proficiency through planning and conducting burning operations as well as bushfire fighting.

Background to recommendations

Recommendation 14

Fire management is a very complex issue and the Government needs to be advised by people who are knowledgeable and experienced in fire management. The Federal Government needs to establish a panel of scientists and fire practitioners who are experienced in both putting fire into the landscape and fire suppression. As many of the destructive fires commenced and had their biggest area impact in forests and rangelands, the majority of the panel members should be people who have many years' experience in the management of forests and rangelands.



Recommendation 15

Australia requires on-going and long term research into fire and land management. Developing new knowledge and learning is a fundamental requirement to doing our jobs better. Additional challenges are being constantly brought by changes in population, demographics, climate and the environment. Australia needs to continue to develop a cohort of researchers with skills and knowledge in fire and land management.

The nature of wildfires being infrequent, complex events that occur rapidly contributes to the difficulty in collecting good data and evidence for rigorous scientific research. Maximising the information obtained will help prevent repeat events in the future. Chong et al (2014) stated that the harmonisation of fire data management worldwide could increase the availability and quality of information for research. Appropriate data sharing between agencies would increase the value of the data and enable robust conclusions to be made.

Recommendation 16

An increasing reliance on technology and a more defensive strategy has been at the expense of rapid and aggressive early fire attack. Aerial suppression alone is not sufficient to improve effective suppression; a combination of fuel management, ground crew support and aerial firefighting resources are all significant in increasing the probability of first attack success (Plucinski et al 2007.) Aircraft are good to slow the progress of small fires, however firefighters on the ground are needed to effectively control the fire. In forest situations, this may be with virtually no water and only using hand tools such as rakehoes and chainsaws. Making a concerted effort with [night firefighting](#) can also be critical in fire control (IFA, 2018.) There is a real need to have effective fuel management and aggressive first attack in remote areas to ensure that small lightning strikes do not become the conflagrations that eventually overrun towns like Mallacoota and Corryong.

The forest industry is an important source of forest firefighting skills, knowledge and equipment. The heavy plant available within the industry, coupled with skilled operators and firefighters who have local knowledge and are used to working within the forested environment and frequently steep and dissected terrain, play a critical role in containing the fires. In Victoria this year, HVP alone was able to provide over 200 trained forest firefighters and facilitate the deployment of over 25 items of heavy plant. The recent announcement by the Victorian Government to phase out native forest harvesting will have a significant impact on the availability of skilled people and equipment for forest firefighting.

Forest management is a specialist science which takes in a range of disciplines including botany, ecology, ecosystems management, forest health, biometry, statistics, economics, forest production and most importantly fire science and management. The economic rationalism model that drives Australia's university funding means that courses that cater for small numbers of graduates largely cease to exist. In the 1970s around 100 graduates per year were came from the Australian National University (ANU) and the Victorian School of Forestry / University of Melbourne. Today the only University with a Bachelor of Forest Science is Southern Cross University. The Federal Government needs to support tertiary education in forest and fire science.



Term of Reference H

Lessons to be learned in relation to the preparation and planning for, response to and recovery efforts following the 2019-20 Australian bushfire season, with particular reference to:

(h) an examination of the physical and mental health impacts of bushfires on the population, and the Federal Government's response to those impacts; and

HVP submits the following recommendations under Terms of Reference H

- 17. The Federal Government needs to fund increased and on-going mental health and wellness support in rural and regional Australia to address the stress and trauma incurred by the impact of natural disasters.**

Background to recommendations

Heat, dust, long hours, demanding and sometimes chaotic conditions and normal family life put on hold creates significant stress for firefighters. Local communities experience disruption to their normal social fabric with the loss of homes, farms, their animals, their trees and their favourite places. The impact on small rural communities can be devastating. Rural people need help and assistance from people who understand the trauma they have been through. Divorces, suicides and domestic violence are known to rise following bushfire events. Long term mental welfare programs are required for firefighters and to assist community recovery in rural areas.



Figure 4 HVP Firefighter, a moment's rest and recovery



Term of Reference I

Lessons to be learned in relation to the preparation and planning for, response to and recovery efforts following the 2019-20 Australian bushfire season, with particular reference to:

- (i) any related matters.

HVP submits the following recommendations under Terms of Reference I

- 18. The Commonwealth, State and Territory Governments review the suitability of current and existing planned communications networks (voice, mobile, radio and data – including the NBN) and related infrastructure and consider the suitability of such networks in the context of this and other recent disasters, and recommendations from the 2009 Victorian Bushfires Royal Commission:**
- a. Maintain continuity of service and effective coverage so that regional businesses and communities can remain connected and informed (e.g. extended power continuity).
 - b. Ensure communications networks are sufficiently robust in their design and scalability to accommodate significant short term increases in demand.
 - c. Require communications networks providing voice services (i.e. mobile, VoIP) to guarantee access to essential services (e.g. triple zero).
 - d. Review the suitability of Fixed Wireless NBN and Satellite NBN services in high risk areas (e.g. adverse impact of high-density carbon particulate atmosphere during the fires rendered services unusable).
 - e. Consistent with Recommendation 22 from the 2009 Victorian Bushfires Royal Commission, ensure that agencies “standardise their operating systems and information and communications technologies with the aim of achieving greater efficiency and interoperability between agencies”. This extends to the radio communications networks and related infrastructure.
 - f. Consistent with Recommendation 23 from the 2009 Victorian Bushfires Royal Commission, ensure that the agencies review and improve their communications strategies as a matter of priority and develop a program for identifying and responding to black spots in radio coverage.
 - g. Ensure that agencies have a clear strategy for managing the operational obsolescence of existing radio communications equipment.
- 19. That the Commonwealth, State and Territory Governments:**
- a. Develop a sufficiently robust national emergency services radio communications network which is interoperable across all emergency service agencies; and
 - b. Develop a sufficiently robust national voice, mobile and data communications network – including the ability to dial triple zero as a universal service obligation.

Background to recommendations

Recommendation 18 and 19

As was the case during the 2009 Victorian Bushfires, and despite the recommendations from the subsequent royal commission, our critical communications infrastructure – voice, mobile and (to a lesser extent) radio – was again found wanting, further compounded by serious deficiencies in the design and implementation of the National Broadband Network (NBN).



The legislated transition from voice over copper services – where power is derived from the exchange – to Voice Over IP (VoIP) services delivered over the NBN – where power is provided on customer premises – creates two additional points of dependency and failure on the customer premises: power and the NBN connection.

Thousands of customer premises in Victoria lost power for more than a week, meaning they were unable to dial triple zero from their home phone – something previously considered a Universal Service Obligation (e.g. Corryong, Swifts Creek).

As was the case during the 2009 Victorian Bushfires, firefighting and support resources discovered regional voice, mobile, data and radio communications networks did not have sufficient capacity to service the increased demand they were placing on them. The extent of the disaster in Victoria meant that Telstra had to be selective in its placement of the limited number of portable Cells on Wheels, prioritising (appropriately) the deployment of these units to the highest density population centres.

15 of the 32 communications towers in the northern region of Victoria, which housed essential communications infrastructure for emergency radio communications for police, fire and ambulance, the emergency alerting system, the NBN, the mobile network and ABC radio, were either directly or indirectly impacted by fire:

- Six communications towers were directly impacted by fire (i.e. burnt over); and
- Nine communications towers were indirectly impacted by fire (infrastructure such as power supporting the tower burnt over; unable or unsafe to access the communications tower so unable to refuel backup generator resulting in loss of power).

The Gippsland and Northern regions of Victoria were covered in a thick blanket of smoke with limited visibility for days at a time:

- The resultant atmosphere was rich with carbon particulates which negatively impacted the effectiveness of Fixed Wireless and Satellite communications, to the extent these services were rendered effectively unusable.
- This also limited the availability and effectiveness of aircraft for fireground reconnaissance or assessment of directly or indirectly impacted communications infrastructure.

FFMVic and HVP entered into a Memorandum of Understanding in 2014 to develop common radio communications equipment and service standards. We have yet to see similar engagement and commitment from other agencies with strikingly similar operating profiles and objectives to achieve common purpose and avoid duplication of infrastructure and effort. The 2009 Victorian Bushfires Royal Commission recommended:

- Standardising operating systems and information and communications technologies, with the aim of achieving greater efficiency and interoperability between agencies – extending to radio communications networks and relating infrastructure; and
- Ensuring that agencies review and improve their communications strategies as a matter of priority and develop a program for identifying and responding to black spots in radio coverage.

This recommendation should go a step further to include network infrastructure and related technology convergence to avoid the unnecessary duplication of technology and infrastructure for what are essentially common operating models with slight variations on requirements. There is an opportunity to save the Federal and State governments hundreds of millions of



dollars per year here if we can step back from the institutional preferencing that has besieged this issue for decades.

Both FFMVic and HVP placed orders on Tait for new radio communications equipment in June 2019. Under the terms of Tait's contract this equipment was supposed to be delivered by September 2019. By November 2019 and then December 2019 the equipment had still not arrived.

FFMVic had 200 spare radios and by January 2020 all of these had been deployed. HVP had less than six spare radios available.

It is important that agencies have a clear strategy for managing the operational obsolescence for the existing radio communications equipment, including what its replacement will be. Penalties have, in this case, proven ineffective in addressing the supply chain delays.



References

- AFAC, 2015a, Overview of Prescribed Burning in Australasia, Report for National Burning Project – Sub-Project 1, Australasian Fire and Emergency Service Authorities Council, Melbourne
- AFAC 2015b, Risk Management and Review Framework for Prescribed Burning Risks Associated with Fuel Hazards, Report for National Burning Project – Sub-Project 3, Australasian Fire and Emergency Service Authorities Council, Melbourne
- AFAC (2016) National Position on Prescribed Burning (AFAC Publication No. 2036). East Melbourne, Vic: Australia. AFAC Ltd.
- Bushfire CRC 2009, Effectiveness and efficiency of Aerial fire fighting in Australia, Bushfire CRC Fire Note 50, Dec 2009
- Castellnou M, Prat-Guitart N, Arilla E, Larranga A, Nebot E, Castellarnau X, Vendrell J, Pallas J, Monturiol M, Cespedes J, Pages J, Gallardo C and Miralles M, 2019 Empowering strategic decision making for wildfire management: avoiding the fear trap and creating a resilient landscape, *Fire Ecology* (2019) 15:31
- Chong, DM, Cirulis BA, Duff TJ, Walsh SF, Penman TD and Tolhurst KG 2014, Gaining benefits from adversity: the need for systems and frameworks to maximise the data obtained from wildfires, in Viegas DX (Ed) *Advances in Forest Fire Research*, Coimbra University Press
- Cruz M.G., DeMar P., Adshead D. (2011) *Radiata Pine Plantation Fuel and Fire Behaviour Guide*. GHD and CSIRO
- DELWP, 2015, Measuring Bushfire Risk in Victoria, Victoria Government, Department of Environment, Land, Water and Planning, Melbourne, November 2015
- Eburn M. (2020) Looking to Courts of Law for Disaster Justice. In: Lukasiwicz A., Baldwin C. (eds) *Natural Hazards and Disaster Justice*. Palgrave Macmillan, Singapore
- Florez V, Burton M, Pannell D, Kelso J and Milne G (in press) Where to prescribe burn: the costs and benefits of prescribed burning close to houses, *International Journal of Wildland Fire*, WF18192
- Forest Fire Management Group 2014, National Bushfire Management Policy Statement for Forests and Rangelands
- IFA 2018, [Fire Fighting at Night](#), Position Paper, Institute of Foresters of Australia, August 2018
- McCarthy GJ, 2003 Effectiveness of aircraft operations by the Department of Natural Resources and Environment and the Country Fire Authority 1997-98, [Research Report No 52](#), Fire Management, Department of Sustainability and Environment Victoria.
- G.W. Morgan, K.G. Tolhurst, M.W. Poynter, N. Cooper, T. McGuffog, R. Ryan, M.A. Wouters, N. Stephens, P. Black, D. Sheehan, P. Leeson, S. Whight and S.M. Davey in press, Prescribed burning in south-eastern Australia: history and future directions.
- Parliament of Victoria 2010, 2009 Victorian Bushfire Royal Commission, Final Report, preparation response and recovery – Volume II.
- Plucinski M, Gould J, McCarthy G and Hollis J, 2007, The effectiveness and efficiency of Aerial Firefighting in Australia Part 1 Bushfire CRC Technical Report Number A0701, Bushfire Cooperative Research Centre



Safer Together 2019, Barwon South West Bushfire Management Planning, Phase Two Engagement Summary, The State of Victoria, Department of Environment, Land, Water and Planning

Salkin O 2017, A report for Hancock Victorian Plantations and the Department of Environment, Land, Water and Planning proposing improvements to Phoenix fuel curves and their subsequent use. Natural Systems Analytics, Unpublished report

Schirmer J, Gibbs D, Mylec M, Magnusson A and Morison J, 2017a, [Socio-economic impacts of the Softwood plantation industry in the South West Slopes and Bombala region, NSW](#). Forests and Wood Products Australia

Schirmer J, Mylec M, Magnusson A, Yabsley B and Morison J, 2017b, [Socio-economic impacts of the forest industry Green Triangle](#). Forests and Wood Products Australia

Schirmer J, Mylec M, Magnusson A, Yabsley B and Morison J, 2018, [Socio-economic impacts of the forest industry in Victoria \(exc. the Green Triangle\)](#). Forests and Wood Products Australia

van Oldenburgh, GR, Krikken F, Lewis S, Leach NJ, Lehner F, Saunders KR, van Weele M, Haustein K, Li S, Wallom D, Sparrow S, Arrighi J, Singh RP, van Aalst MK, Philip SY, Vautard R and Otto FEL 2020, Attribution of the Australian bushfire risk to anthropogenic climate change. World Weather Attribution (worldweatherattribution.org).

Whittaker, J, Haynes, K, Tofa, M, Wilkinson, C, Taylor, M 2020, Understanding bushfire risk, warnings and responses: lessons from the 2018 Reedy Swamp Fire, Hazard Note 69, March 2020, Bushfire and Natural Hazards CRC

Zito G, 2020 Database Crucial for learning lessons from the past. Fire Australia, Issue 1, 2020 Pg 28-29



Appendix A – Glossary

CFA – Country Fire Authority Victoria

EMV – Emergency Management Victoria – responsible for organising and overseeing Victoria’s emergency management system to protect and keep communities safe.

FFMVic – Forest Fire Management Victoria – are the lead agency for bushfire management on public land in Victoria. The workforce is made up of staff from the Department of Environment Land Water and Planning (DELWP) and other partners such as Parks Victoria, VicForests, Melbourne Water and other government agencies.

IMT - Incident Management Team – Management and planning team for emergency management in Australia. An incident Management Team is formed to work under the Australasian Inter-service Incident Management System (AIIMS)

