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Inspector-General for Emergency Management
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Via email igem@igem.vic.gov.au

5 May 2020

Submission to the Inquiry into the 2019-20 Victorian Fire Season: The examination of Victoria's preparedness, response, relief and recovery concerning the 2019-20 fire season

Dear Inspector-General

Thank you for the opportunity to make a submission to the Inquiry into the 2019-20 Victorian Fire Season. In providing this submission WWF-Australia express our sincere condolences for the loss of life and for the homes and community infrastructure that perished as a result of the 2019-20 bushfires in Victoria. Our sincere appreciation is extended to the efforts of the Victorian Government for its response to the bushfire crisis, and to all the fire services, their members and volunteers.

WWF-Australia is part of the WWF International Network, the world's largest independent conservation organisation. WWF's global mission is to 'stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature'. WWF-Australia has approximately one million financial and non-financial supporters.

WWF-Australia as an organisation has a 40-year history of working on wildlife conservation in Australia with scientists, communities, farmers, business and government. During the 2019-20 bushfire crisis we doubled our efforts to support our partners who have been impacted on the ground. We have provided advice and recommendations to federal and state governments on possible future actions to recover the wildlife populations lost during the crisis.

WWF-Australia harbour deep concerns that the recent fires may have triggered extinction events for a range of threatened species and ask that the Victorian Government respond at a speed and scale worthy of the crisis at hand. Although the fires are now extinguished, we ask that the Government recognise that timing remains critical for the communities, landscapes and threatened flora and fauna in need of recovery support.

WWF-Australia is grateful for having been invited to the Bushfire Response Roundtable hosted by the Honourable Minister Lily D'Ambrosio in April 2020 and look forward to continuing a constructive collaboration in response to the 2019-20 bushfire crisis. On 8 January 2020 WWF-Australia launched the WWF-Australia international appeal to establish an \$30m Australian Wildlife and Nature Recovery Fund. This fund allowed WWF-Australia to contribute to a national response effort, capacitating threatened species impact assessments, emergency food drops, wildlife detection with drones and dogs, and support wildlife carers, to name a few of our interventions to date. WWF-Australia remains committed to harnessing further funds received to assist bushfire response efforts that benefit both people and nature.

Our submission addresses three Terms of Reference (*see Attachment A*) with the following recommendations:

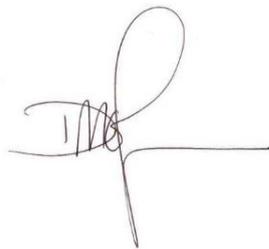
- 1. Ensure that State Government bushfire response plans are well capacitated.** Victoria's ability to access and respond to injured wildlife during the bushfires was at times hampered due to the availability of well-trained veterinarians and/or volunteers. Ensuring that well-coordinated and resourced wildlife veterinary and emergency response training takes place at least annually is advised. Also, ensuring that wildlife response experts form part of a core bushfire response team to allow access within a timebound window to injured wildlife is advised to ensure that lessons from the recent bushfire season are well harnessed. Building agility into State-based plans will also provide opportunities to better utilise the support from non-government organisations and accelerate interventions within the emergency window, particularly regarding wildlife response and threatened species protection and recovery.
- 2. Conduct rapid assessments of threatened species affected by the fires** (and potentially now threatened species) to identify which most urgently need attention. Develop supporting emergency response plans for all species identified considering refugia requirements, invasive species interventions, supplementary feeding and water sources post-fires, ex-situ captive breeding considerations and other interventions as required.
- 3. Develop a strategy to stabilise and reverse population declines of threatened species** whose habitats have been destroyed by fires. Strategies should require species' surveys and designate new protected areas for threatened species where required.
- 4. Immediate cessation of native forest logging for 24 months within fire affected landscapes** until assurances can be made regarding the health and security of wildlife populations within. This is a critical intervention if Victoria is to take a precautionary approach to ensure that species severely impacted by the fires are not pushed further towards the brink of extinction.
- 5. Accelerate the development of a timber transition plan** that maps the environmental and economic costs/benefits of transitioning Victoria out of native forest logging and towards fire-guarded plantations or Forest Stewardship Council-certified forestry well before 2025 given the impacts of these fires and significant loss of wood source, ensuring that wood volumes committed to industry are immediately revised.
- 6. Victoria should lead Australia in an energy transition to become a renewable energy superpower** to cut domestic carbon emissions and support global trading partners cut carbon pollution. The climate science is clear. Bushfires will increase in frequency and severity as our climate continues to warm. Victoria has an opportunity to lead critical and swift action to help stabilise our climate and should harness this watershed moment to do so.
- 7. Establish a Carbon-focussed land restoration fund** to help achieve net-zero carbon by 2050 and support landholders and regional communities with new diversified and sustainable revenue streams.
- 8. Fund a Climate Preparedness & Adaptation Innovation Hub** to ensure that species adaptation and fire recovery interventions as well as community engagement platforms that mobilise citizen science and fire response efforts constructively disrupt business as usual and aim to increase efficacy and new standards of practise. WWF can share our Panda Labs approach to innovation and provide case studies achieved through building the innovation capacity of other Australian States and/or international communities if it could be of value.

9. **Implement sediment and erosion control measures** on priority steep slopes, riparian zones, wetland buffers and highly erodible soils in firegrounds to stabilise soils and prevent sediment and nutrient pollution of waterways.
10. **Further restrict and ban entry into forests during extreme and catastrophic fire days** to reduce and avoid the risk of human induced ignitions, whether accidental or deliberate.
11. **Expand remote surveillance cameras networks in forests**, particularly at key entry points, to enable monitoring and rapid response to ignitions caused by lightning, long distance ember attack, accidental fires from forest users, and suspicious activity that could lead to arson.
12. **Significantly increase funding for the hiring and purchase of large aerial water bombers** to enable their rapid deployment to extinguish low and moderate intensity fires before they can develop into severe, extreme and catastrophic fires.
13. **Exclude large-scale tree thinning, livestock grazing and post-fire salvage logging** from burnt areas in public conservation reserves and state forests.
14. **Recognise and utilise Traditional Ecological Knowledge (TEK) and ensure it informs government** and corporate responses to ecosystem and community recovery post-bushfire and particularly in longer-term management responses around climate and nature.
15. **Ensure that a broad group of Indigenous fire practitioners and Indigenous rangers are involved in the development and implementation of any effort to incorporate traditional land and fire management into Victoria's disaster preparedness planning.** WWF-Australia would welcome the opportunity to assist in convening such a group.
16. **Ensure that efforts to promote and support Indigenous fire management are rooted in broader cultural and natural resource management frameworks** and include long-term funding for Indigenous rangers and other Indigenous CNRM groups, with targeted funding to support women's participation and leadership.
17. **Recognise the unique impacts that natural disasters can have on Social and Emotional Wellbeing** and ensure Indigenous representation on relevant committees involved in all decision-making, planning and implementation of disaster risk management.
18. **Protect all high conservation value (HCV) forests** by phasing out major deforestation from these areas irrespective of tenure and statutory regime and ensure the immediate protection of all known Greater Glider habitat across Victoria.
19. **Establish a lead nature-based fire recovery coordinating body** with clear roles and responsibilities to develop and oversee a five-year plan that ensures a well-coordinated forest and wildlife recovery effort that compliments federal coordination efforts and actively seeks to ensure that responses benefit both people and nature.
20. **Develop a large-scale reforestation plan** with financing to restore at least 1.2 million hectares of Victorian burnt forests and damaged wildlife habitat, with a focus on cultivating habitat connectivity and core habitat. The plan should:

- a. **Support large scale natural regeneration of forests post-bushfires.** This should include removing livestock grazing, eradication of feral herbivores, weed eradication, and cessation of bulldozing regrowth vegetation.
- b. **Catalyse large-scale tree planting in strategic locations** on cleared land to reconnect fragmented landscapes, where natural recovery is inadequate and other enhanced recovery options are unsuited. This could include trialling innovative approaches, for example, large-scale drone direct seeding into, or adjacent to, burnt vegetation where natural revegetation is hampered by tree deaths and reduced viability of soil seedbanks, or in remote or steep lands where safety concerns prohibit access by people for standard tree planting.

WWF-A welcomes the opportunity to discuss our submission with the IGEM. Please contact Rachel Lowry, Chief Conservation Officer, WWF-Australia at rlowry@wwf.org.au or on [REDACTED]

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Dermot O'Gorman'. The signature is stylized with a large loop at the top and a horizontal line extending to the right.

Dermot O'Gorman
Chief Executive Officer

Attachment A

Term of reference: Consider all challenges and implications for bushfire preparedness arising from increasingly longer and more severe bushfire seasons as a result of climate change.

The unprecedented bushfires must be a rallying call to hasten a transition to renewables to create a safe climate, pursuant to the UN Framework Convention on Climate Change.

Victoria's total net greenhouse gas emissions in 2017 were 110.3 million tonnes (Mt) of carbon dioxide equivalent (CO₂-e).¹ The state's emissions are contributing to global heating, which is driving more extreme weather systems, including the extreme heat and dry conditions which precipitated the extreme and catastrophic bushfires in Victoria in 2019-20.

In response to the Black Summer fires, WWF-Australia recommends that the Victorian Government should work with the Australian Government in rapidly transitioning its economy to become a renewable energy superpower² which would assist achievement of a 1.5°C climate outcome consistent with the Paris Agreement.

Without a rapid energy transition, plus steep cuts in emissions from the land and agriculture sectors, Australia and the world will experience increasing prevalence of extreme and catastrophic fires regardless of on-ground hazard reduction, fire preparation and fire suppression.

Catastrophic bushfires are essentially impossible for firefighters to stop once burning. Concerted global action to prevent dangerous global heating, including by Victoria and Australia, is required to mitigate the impacts of extreme and catastrophic fires, which are fuelled by declining rainfall, rising air temperatures and declining humidity. Global heating is reducing the number of days per year suitable for safe hazard reduction burns. Spring and autumn are rapidly becoming unsafe for planned burns, thereby limiting the safe window to winter. This window will continue to shorten as Earth heats. A 2015 review of climate-induced variations in global wildfire danger from 1979 to 2013 found an 18.7% increase in the length of the fire season in large areas of the Americas and Europe.³ The risk of cool season burns escaping containment and creating major bushfires will continue to grow, thereby further limiting reliance upon hazard reduction.

'Hazard reduction' refers to cool season burns or killing trees but the hazard most in need of reduction is global heating. Heating of Earth's atmosphere is drying out forests and land in south east Australia, causing drought and bushfires to be more intense, more frequent and more dangerous.^{4,5} Climate change is increasing the likelihood of large fires with severe, extreme and catastrophic forest fire danger index scores.

Increasing atmospheric concentrations of greenhouse gases are also indirectly fuelling bushfires through strengthening the climate signals of two key regional weather systems: the El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD). The IOD index peaked at almost +2 in October

¹ Department of Environment, Land, Water and Planning, Victorian Government, 2019. *Victorian Greenhouse Gas Emissions Report 2019*. Melbourne, Victoria. 62 pp, see page 3 Available for download at https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0016/443014/Victorian-Greenhouse-Gas-Emissions-Report-2019.pdf

² Beyond Zero Emissions, 2015. *Zero Carbon Australia. Renewable Energy Superpower*. Fitzroy, Victoria, Australia. 100 pages. Available for download at <https://bze.org.au/wp-content/uploads/renewable-energy-superpower-bze-report-2015.pdf>

³ Jolly, W., Cochrane, M., Freeborn, P. *et al.* Climate-induced variations in global wildfire danger from 1979 to 2013. *Nat Commun*, 6, 7537 (2015). <https://doi.org/10.1038/ncomms8537>

⁴ CSIRO, *Climate change information for Australia*. Viewed 7 April 2020. Available for viewing at <https://www.csiro.au/en/Research/OandA/Areas/Oceans-and-climate/Climate-change-information>

⁵ Climate Change in Australia, *Projections for Australia's NRM Regions*. See projections for *Eastern Australia* and *Southern Australia* clusters. Viewed 7 April 2020. Available for viewing at <https://www.climatechangeinaustralia.gov.au/en/climate-projections/future-climate/regional-climate-change-explorer/super-clusters/>

2019, a near-record, which meteorologists say significantly contributed to the Black Summer fires in eastern Australia. Significantly, the 2019-20 bushfires could have been more severe if eastern Australia had also experienced an El Niño, which was neutral.

Given this context, emergency bushfire response plans that are well capacitated and poised for immediate implementation, and that consider the protection of responding to the needs of wildlife and threatened species more broadly will become increasingly important as our climate continues to warm.

Recommendations

- 1. Ensure that State Government bushfire response plans are well capacitated.** Victoria's ability to access and respond to injured wildlife during the bushfires was at times hampered due to the availability of well-trained veterinarians and/or volunteers. Ensuring that well-coordinated and resourced wildlife veterinary and emergency response training takes place at least annually is advised. Also, ensuring that wildlife response experts form part of a core bushfire response team to allow access within a timebound window to injured wildlife is advised to ensure that lessons from the recent bushfire season are well harnessed. Building agility into State-based plans will also provide opportunities to better utilise the support from non-government organisations and accelerate interventions within the emergency window, particularly regarding wildlife response and threatened species protection and recovery.
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- 6. Victoria should lead Australia in an energy transition to become a renewable energy superpower** to cut domestic carbon emissions and support global trading partners cut carbon pollution. The climate science is clear. Bushfires will increase in frequency and severity as our climate continues to warm. Victoria has an opportunity to lead critical and swift action to help stabilise our climate and should harness this watershed moment to do so.

7. **Establish a Carbon-focussed land restoration fund** to help achieve net-zero carbon by 2050 and support landholders and regional communities with new diversified and sustainable revenue streams.
8. **Fund a Climate Preparedness & Adaptation Innovation Hub** to ensure that species adaptation and fire recovery interventions as well as community engagement platforms that mobilise citizen science and fire response efforts constructively disrupt business as usual and aim to increase efficacy and new standards of practise. WWF can share our Panda Labs approach to innovation and provide case studies achieved through building the innovation capacity of other Australian States and/or international communities if it could be of value.

Inquiry term of reference: Review of all opportunities and approaches to bushfire preparedness, including different methods of fuel and land management (for example ‘cool burning’, mechanical slashing, integrated forest management, traditional fire approaches) to protect life and property as well as ecological and cultural values.

Hazard reduction measures have a role to play in reducing the likelihood of fires of low and moderate intensity, particularly using a risk-based approach that prioritises protection of infrastructure and key environmental assets such as protected areas, threatened species habitat and rainforest. However, they do not stop fires developing into *severe*, *extreme* and *catastrophic* fires once they escape containment, become crown fires, or are fanned by hot temperatures and strong gusty winds.

Forest fires switch from being fuel-dominated to weather-dominated when the McArthur Forest Fire Danger Index exceeds 50, on a scale of 1 to 100+. For such *severe* fires, and *extreme* fires (FFDI of 75+) and *catastrophic* fires (100+), previous hazard reduction measures are rendered ineffective. Eastern and southern Australia experienced FFDI values well above average in spring and summer, with values at or well above 100 (*catastrophic*).⁶ Under these conditions crown fires spread regardless of how much fuel is on the forest floor and in mid-story vegetation.

This is particularly so when pyrocumulonimbus, or flammagenitus, weather systems form above bushfires.⁷ These fire clouds produce extremely strong and gusty winds, fanning flames that cannot be contained by fire suppression. Ember attacks now causes spot fires to ignite bushfires many kilometres beyond fire fronts.

Clearing wider fire breaks and buffers around built and natural assets can help reduce the risk of low and moderate intensity fires escaping containment lines. However, deforestation is a primary cause of biodiversity decline. Bulldozing or falling trees to establish wider fire breaks and buffers, if implemented at scale across Victoria’s forest estate, would inevitably further fragment landscapes and destroy threatened species habitat and dispersal corridors.

The response to the Black Summer bushfires should be to increase the nett area of Victoria’s and Australia’s forests and woodlands rather than more deforestation and forest degradation. Forests are a natural climate solution that are fundamental to reducing national and global greenhouse gas emissions to secure a stable climate. Accordingly, the impacts of additional cool season burns and any widening fire breaks and buffers, in terms of lost habitat or ecological integrity, must be far

⁶ Bureau of Meteorology, Australian Government. *Special Climate Statement 72—dangerous bushfire weather in spring 2019, 18 December 2019*. Viewed 8 April 2020. Available for viewing at <http://www.bom.gov.au/climate/current/statements/scs72.pdf>.

⁷ Bureau of Meteorology, Australian Government. *When bushfires make their own weather*. Viewed 28 April 2020. Available for viewing at <http://media.bom.gov.au/social/blog/1618/when-bushfires-make-their-own-weather/>

outweighed by policies and programs to significantly expand the area of forests and woodlands across Australia.

Fire ecologists have stated that forests subject to planned cool season burns can still burn in extreme and catastrophic fires only several years later due to climate change drying out vegetation. Examples include forests scorched in Victoria's Black Saturday fires, Black Summer fires, in southwest Western Australia,⁸ and in general in southeast Australia.^{9,10} Forest fragmentation, such as from native forest logging and weed invasion, increases fire severity as it increases penetration of light and winds, and reduces humidity, on the forest floor. In turn this dries the canopy, thereby predisposing a forest to an extreme or catastrophic canopy fire. Taylor *et al.* (2104) found that logged forests were prone to higher severity fires because opening up closed forests makes them drier and more flammable.¹¹

Priority should be given to restoring the natural fire resistance of forests by reducing fragmentation. This is particularly critical for naturally moist and fire-sensitive forests such as rainforests, which burnt during the Black Summer fires, as well as other fires in previous years, such as in Central Queensland in December 2018¹² and Tasmania in early 2019.¹³

Further restricting and banning entry into forests during extreme and catastrophic fire days is warranted to reduce and avoid the risk of human induced ignitions, whether accidental or deliberate. This would require further expansions in the installation and monitoring of remote surveillance cameras in forests, particularly at key entry points, to enable monitoring and rapid response to ignitions caused by lightning, long distance ember attack, accidental fires from forest users, and suspicious activity that could lead to arson.

Firefighters are increasingly reliant upon aerial bombardment of fire retardant to suppress fires. This is essentially the only option for fire suppression in remote or inaccessible forests with no – or unsafe – road access for fire appliances and trucks. Yet Victoria arguably lacks enough large aerial water bombing planes and heavy lift helicopters to suppress the increasing numbers of large, intense and fast-moving bushfires. The Australian and Victorian government should significantly increase funding for the hiring (or purchase) of large aerial water bombers to enable their rapid deployment to extinguish low and moderate intensity fires before they can develop into severe, extreme and catastrophic fires.

Land-use planning, land-use zoning and development assessment processes should be reformed to provide enhanced protections from bushfire for built and natural assets. Approval of development of houses and other infrastructure, for example, deep in forests requires forest destruction beyond the development footprint to create large asset protection zones. The Black Summer bushfires show that even when houses in forested landscapes are surrounded by large cleared and grassed buffer zones, firestorms and ember attacks from very hot and fast-moving fires quickly overwhelm such defences. For severe, extreme and catastrophic fires, they will increasingly become ineffective

⁸ Enright, N.J., and Fontaine, J.B. (2013). Climate Change and the Management of Fire-Prone Vegetation in Southwest and Southeast Australia. *Geographical Research*, 51. Available at <https://doi.org/10.1111/1745-5871.12026>

⁹ Morton, A. *Hazard reduction burning had little to no effect in slowing extreme bushfires*. The Guardian, 6 February 2020. Available for viewing at <https://www.theguardian.com/environment/2020/feb/06/hazard-reduction-burning-had-little-to-no-effect-in-slowing-this-summer-bushfires>

¹⁰ RMIT ABC. *Are hazard reduction burns effective in managing bushfires? The answer is complicated*. 20 Dec 2019. Available for viewing at <https://www.abc.net.au/news/2019-12-20/hazard-reduction-burns-bushfires/11817336>

¹¹ Taylor, C., *et al.*, 2014. Nonlinear Effects of Stand Age on Fire Severity. *Conservation Letters*, 7, 355-370. Available for download at <https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/conl.12122>

¹² Queensland Reconstruction Authority, Queensland Government, April 2019. *Central Queensland Bushfires Recovery Plan 2018-2021*. Viewed 28 April 2020. Available for download at https://www.qra.qld.gov.au/sites/default/files/2019-05/0330%20QRA%20CenQLD%20Bushfire%20RecPlan%202018-21%20HRes_0.pdf

¹³ Fire Centre Research Hub, University of Tasmania. *The 2019 Tasmanian fires so far: what has burned and where?* Viewed 28 April 2020. Available for viewing at <https://firecentre.org.au/the-2019-tasmanian-fires-so-far-what-has-burned-and-where/>

bushfire mitigation measures. Rather, greater separation should be established through development assessment processes between valuable infrastructure and forests.

For more than a decade, WWF-Australia has partnered with Indigenous communities and organisations to co-design and deliver conservation and sustainable land and sea management outcomes. We have seen firsthand the significant environmental, social and economic benefits of properly resourced, Indigenous-led traditional management approaches. We have been encouraged by the increased interest in traditional land and fire management practices during and in the aftermath of the 2019-20 bushfires.

There are many ways in which these practices could improve Australia's resilience to natural disasters. For example, data collated by the Darwin Centre for Bushfire Research at Charles Darwin University, has shown that since cultural burning was reintroduced on a large scale in Northern Australia, "the area of land destroyed by wildfires has more than halved, from 26.5m hectares in 2000, to just 11.5m hectares in 2019."¹⁴ The revival of cultural burning in Australia's southeast is at a much earlier stage than in Northern Australia, and faces some different challenges, but has great potential to allow "Indigenous groups to re-establish access to and connect with Country, rebuild cultural knowledge, and protect animals and ecosystems that are important to them"¹⁵. WWF-Australia, and many of our Indigenous partners, are confident that these approaches can play a vital role in strengthening Australia's resilience to natural disasters.

Cultural burning, however, is not a silver bullet. Traditional land and fire management represents a "holistic set of practices that link the management of conservation and productive values to the environmental and cultural services upon which they depend."¹⁶ There are concerns that the growing interest in "Aboriginal people's fire management may be limited to specific burning techniques, without appreciating that this is deeper knowledge about how to live with Country that can inform state, territory and national policy and practice more broadly."¹⁷

It is crucial that these practices not be considered in isolation of the cultural and operational contexts in which they function and not be seen as a one-size-fits-all approach. Incorporating traditional fire management approaches into Australia's disaster risk reduction regime will require increased investment in broader Indigenous cultural and natural resource management (CNRM), including increased long-term funding for Indigenous ranger groups, land councils, Aboriginal corporations, grassroots community organisations and other groups delivering cultural authority in managing Country.

It is also important to recognise that within that cultural and operational context, Indigenous men and women may have different roles in fire management¹⁸. Investment should, therefore, include targeted measures to promote the increased participation of women in Indigenous land and fire management.

Moreover, any consideration of drawing on Indigenous traditional practices to strengthen Australia's resilience to natural disasters should be complemented by concerted efforts to ensure that Australia's disaster management regime better responds to the unique impacts of disasters on

¹⁴ Allam, L (2020, 19 January) *Right fire for right future: how cultural burning can protect Australia from catastrophic blazes* The Guardian. <https://www.theguardian.com/australia-news/2020/jan/19/right-fire-for-right-future-how-cultural-burning-can-protect-australia-from-catastrophic-blazes>

¹⁵ McKemey, M et al (2019) "Cross-cultural Monitoring of a Cultural Keystone Species Informs Revival of Indigenous Burning of Country in South-Eastern Australia" *Human Ecology* 47, 893-904.

¹⁶ The Victorian Traditional Owner Cultural Fire Knowledge Group (2019) *The Victorian Traditional Owner Cultural Fire Strategy*

¹⁷ Williamson, Markham & Weir (2020) *Aboriginal peoples and the response to the 2019-2020 bushfires*, Working Paper No. 134/2020, Centre for Aboriginal Economic Policy Research, Australian National University, Canberra

¹⁸ See, for example, CSIRO and NAILSMA (2016) *Report on the National Indigenous Fire Knowledge and Fire Management Forum*, Darwin.

Indigenous wellbeing. Indigenous people have been uniquely and disproportionately affected by the 2019-2020 bushfires. While comprising only 2.3% of the total population of NSW and Victoria, Indigenous people represented nearly 5.4% of the 1.55 million people living in fire-affected areas of those states¹⁹.

For many Indigenous people, connection to Country is a significant factor in Social and Emotional Wellbeing²⁰ and the destruction of key cultural sites and loss of cultural keystone species has been keenly felt by many of our partners. We encourage the Royal Commission to consider not only how Indigenous traditional practices may improve disaster preparedness, but also how Australia's approaches to disaster response could better address the needs and priorities of Indigenous people.

Recommendations

- 9. Implement sediment and erosion control measures** on priority steep slopes, riparian zones, wetland buffers and highly erodible soils in firegrounds to stabilise soils and prevent sediment and nutrient pollution of waterways.
- 10. Further restrict and ban entry into forests during extreme and catastrophic fire days** to reduce and avoid the risk of human induced ignitions, whether accidental or deliberate.
- 11. Expand remote surveillance cameras networks in forests**, particularly at key entry points, to enable monitoring and rapid response to ignitions caused by lightning, long distance ember attack, accidental fires from forest users, and suspicious activity that could lead to arson.
- 12. Significantly increase funding for the hiring and purchase of large aerial water bombers** to enable their rapid deployment to extinguish low and moderate intensity fires before they can develop into severe, extreme and catastrophic fires.
- 13. Exclude large-scale tree thinning, livestock grazing and post-fire salvage logging** from burnt areas in public conservation reserves and state forests.
- 14. Recognise and utilise Traditional Ecological Knowledge (TEK) and ensure it informs government** and corporate responses to ecosystem and community recovery post-bushfire and particularly in longer-term management responses around climate and nature.
- 15. Ensure that a broad group of Indigenous fire practitioners and Indigenous rangers are involved in the development and implementation of any effort to incorporate traditional land and fire management into Victoria's disaster preparedness planning.** WWF-Australia would welcome the opportunity to assist in convening such a group.
- 16. Ensure that efforts to promote and support Indigenous fire management are rooted in broader cultural and natural resource management frameworks** and include long-term funding for Indigenous rangers and other Indigenous CNRM groups, with targeted funding to support women's participation and leadership.

¹⁹ McKerney et al.

²⁰ Gee, G., Dudgeon, P., Schultz, C., Hart, K., & Kelly, K. (2014). Social Determinants of Aboriginal and Torres Strait Islander Social and Emotional Wellbeing; In Purdie, Dudgeon, Walker (Ed.), *Working Together: Aboriginal and Torres Strait Islander Mental Health and Wellbeing Principles and Practice | History and Contexts/Aboriginal and Torres Strait Islander Social and Emotional Wellbeing*.

- 17. Recognise the unique impacts that natural disasters can have on Social and Emotional Wellbeing**, ensure Indigenous representation on relevant committees involved in all decision-making, planning and implementation of disaster risk management.

Inquiry term of reference: In considering effectiveness of Victoria’s operational response to the 2019-20 fire season, IGEM should particularly consider, “planning and response mechanisms to protect biodiversity threatened by bushfire”.

Much of Victoria’s terrestrial wildlife and forests are adapted to coping with fire. However, the unprecedented 2019-20 bushfires were devastating for the state’s wildlife due to their extent, intensity and longevity.

Governments need to invest in protecting refuge areas for wildlife that did not burn due to high natural resistance to fire and climate change. Protection should either be via legislative designation of critical habitats, covenants with landholders or purchase to bring critical refuge areas into the public reserve system. WWF-Australia has advocated for the Australian Government to restore \$170 million per year in funding to the National Reserve System Program from the existing Natural Heritage Trust budget, which would be budget neutral, to enhance the capacity of state national parks agencies to manage fuel loads, plan for hazard reduction burns and implement fire suppression.²¹

Nationally, the fires are estimated to have killed more than 1.25 billion vertebrate animals.^{22,23} This estimate was derived by the extrapolation of the methodology and results from a 2007 report to WWF-Australia assessing the loss of fauna from land clearing in NSW.²⁴ WWF-Australia will soon release a subsequent report by independent faunal ecologists based that updates and amends the assumptions underpinning the 2007 report to estimate the mortality of vertebrate fauna from the 2019-2020 bushfires.

The impact of the bushfires on wildlife was exacerbated by prior deforestation and forest degradation, and the lack of rainfall and increasing air and soil temperatures experienced across much of eastern Australia in recent years. Wildlife which survived the flames and smoke subsequently died due to lack of unoccupied habitat, starvation, dehydration, disease, predation and stress.

WWF-Australia is partnering with conservation experts to assess fire impacts upon Greater Glider and other forest fauna in Eastern Gippsland. Koala abundance fell 80 to 85% in burnt forests in six locations in north-eastern NSW, based upon comparisons by expert koala consultancy Biolink of pre- and post-fire koala survey data.²⁵ The analyses will be published in the scientific literature, with a manuscript able to be provided from June 2020.

²¹ WWF-Australia, 2017. *Building Nature’s Safety Net 2016: The state of Australian terrestrial protected areas 2010-2016*. Report by WWF-Australia, Sydney, p3, 18 pp. Viewed 24 April 2020. Available for viewing at <https://www.wwf.org.au/ArticleDocuments/353/pub-building-natures-safety-net-2016-28jun17.pdf.aspx?Embed=Y>

²² The University of Sydney. *A statement about the 480 million animals killed in NSW bushfires since September*. Published 3 January 2020. Available for viewing at <https://www.sydney.edu.au/news-opinion/news/2020/01/03/a-statement-about-the-480-million-animals-killed-in-nsw-bushfire.html>

²³ WWF-Australia. *Statement from WWF-Australia on Australia’s bushfire emergency*. Published 7 January 2020. Available for viewing at <https://www.wwf.org.au/news/news/2020/statement-from-wwf-australia-on-australia-s-bushfire-emergency#gs.345ne7>.

²⁴ Johnson, C., Cogger, H., Dickman, C. and Ford, H. 2007. *Impacts of Landclearing; The Impacts of Approved Clearing of Native Vegetation on Australian Wildlife in New South Wales*. WWF-Australia Report, WWF-Australia, Sydney.

²⁵ Hannam, P, *Koala losses 'spectacularly huge' after NSW drought, bushfires*. Sydney Morning Herald, 18 February 2020.

WWF-Australia estimates the bushfires could have burnt up to two billion trees nationally.²⁶ The number of burnt trees that died is unknown. However, the figure could tally many hundreds of millions of trees, including hollow-bearing old growth trees many hundreds of years old, ancient Gondwanan rainforest and threatened plants and ecological communities.

WWF-Australia is unaware whether the fires, particularly very hot long-lasting fires, have killed a significant proportion of the seedbank and propagule bank buried in the soil and on the soil surface. However, personal communications with fire experts and vegetation ecologists indicate a substantial loss of seeds and propagules may have occurred, which will hinder natural forest recovery.

Climate change risks Australia's native forests switching from a sink to a source of forest carbon emissions. Australia's 132 million hectares of native forests, including woodland forest, and store 22 billion tons of carbon.²⁷ This is the seventh largest forest biome on Earth.²⁸

WWF-Australia estimates the bushfires released an estimated 400 to 700 million tons of carbon dioxide equivalent of greenhouse gases nationally.²⁹ The Australian Government estimates a higher figure for emissions, up to 940 MtCO₂-e.³⁰ The latter assessment assumes 100% of forest fire emissions are reabsorbed, an assessment challenged by fire ecologists as reduced rainfall and increase temperatures hamper post-fire forest recovery. Indeed, forest ecologists have raised concerns that the world's great forests face a tipping point due to deforestation and climate change at which they start switching from being a net carbon sink to becoming net carbon sources.^{31,32}

The UK Met Office estimates Australia's Black Summer fires contributed 2% of the projected increase in atmospheric carbon dioxide concentrations from 2019 to 2020.³³ This significant carbon pollution event will contribute to further Australian bushfires through a positive feedback loop that escalates forest carbon emissions from fires and droughts driven by global heating.

Recommendations

In addition to consolidating the critical importance of recommendations, 1 to 5 listed above, WWF recommend that the Victorian State Government:

- 18. Protect all high conservation value (HCV) forests** by phasing out major deforestation from these areas irrespective of tenure and statutory regime and ensure the immediate protection of all known Greater Glider habitat across Victoria.

²⁶ This figure assumes an average of 154 trees growing per hectare of land burnt, based on average tree density data for Australia provided to WWF by the [Crowther Lab](#), across more than 12.6 million hectares of forest and woodland.

²⁷ Department of Agriculture, Australian Government. *Fast forest facts*. Viewed 8 April 2020. Available for viewing at <https://www.agriculture.gov.au/abares/forestsaustralia/fast-forest-facts#type-and-extent-of-australias-forests>

²⁸ Blanch, S, and Taylor, M, 2019. *Towards Two Billion Trees*. Report prepared for WWF-Australia, Sydney, 24pp, see p21. Available for download at <https://www.wwf.org.au/news/news/2019/wwf-s-towards-two-billion-trees-plan-to-aid-koala-bushfire-recovery#gs.377v1r>

²⁹ Bishop, J. 2020. *Valuing natural capital losses from bushfires*. Report prepared for WWF-Australia, Sydney, 13 pp.

³⁰ Australian Government Department of Industry, Science, Energy and Resources, 2020. *Estimating greenhouse gas emissions from bushfires in Australia's temperate forests: focus on 2019-20*. Canberra, 17 pages. Available for download at <https://www.industry.gov.au/sites/default/files/2020-04/estimating-greenhouse-gas-emissions-from-bushfires-in-australias-temperate-forests-focus-on-2019-20.pdf>

³¹ For example, Lovejoy, T and Nobre, C, 2019. Amazon tipping point: Last chance for action, *Science Advances*, 20 Dec 2019:

Vol. 5, no. 12, DOI: [10.1126/sciadv.aba2949](https://doi.org/10.1126/sciadv.aba2949)

³² For example, Redfearn G, 2019. Australia's bushfires have emitted 250m tonnes of CO₂, almost half of country's annual emissions. *The Guardian*, 13 December 2019. Available for viewing at <https://www.theguardian.com/environment/2019/dec/13/australias-bushfires-have-emitted-250m-tonnes-of-co2-almost-half-of-countrys-annual-emissions>

³³ Madge, G. *Australian bushfires help push forecast 2020 CO₂ rise*. Met Office, United Kingdom. Viewed 8 April 2020. Available for viewing at <https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2020/2020-global-co2-forecast>

- 19. Establish a lead nature-based fire recovery coordinating body** with clear roles and responsibilities to develop and oversee a five-year plan that ensures a well-coordinated forest and wildlife recovery effort that compliments federal coordination efforts and actively seeks to ensure that responses benefit both people and nature.
- 20. Develop a large-scale reforestation plan** with financing to restore at least 1.2 million hectares of Victorian burnt forests and damaged wildlife habitat, with a focus on cultivating habitat connectivity and core habitat. The plan should:
- a. Support large scale natural regeneration of forests post-bushfires.** This should include removing livestock grazing, eradication of feral herbivores, weed eradication, and cessation of bulldozing regrowth vegetation.
 - b. Catalyse large-scale tree planting in strategic locations** on cleared land to reconnect fragmented landscapes, where natural recovery is inadequate and other enhanced recovery options are unsuited. This could include trialling innovative approaches, for example, large-scale drone direct seeding into, or adjacent to, burnt vegetation where natural revegetation is hampered by tree deaths and reduced viability of soil seedbanks, or in remote or steep lands where safety concerns prohibit access by people for standard tree planting.