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17 April 2021

[My submission covers these topics:](#)

- Planned burn smoke pollution.
- The basic human right to clean air.
- Vulnerable people: I nearly died from planned burn smoke.
- The impact on tourists and businesses of East Gippsland.
- Evidence that links covid19 spread to air particle pollution.
- Evidence that shows how smoke pollutants can suppress the immune system.
- Concerns about planned burn particle pollution & immune suppression during covid19.
- DELWP's industrial-scale planned burning & VicForests logging coupe burn-offs.
- Ignoring medical & environmental science about the risk to health & life of planned burns.
- Possible conflict of interest of the EPA's interim CEO Lee Mieziis – former DELWP Deputy Secretary of Forest, Fires & Regions.
- Greenhouse gas pollution from planned burns & logging coupe burn-offs.
- The protection of forests to aid oxygen generation, air purification & carbon sequestration.

Dear Parliamentary Committee,

I thought that clean air was not too much to expect in the relative wilderness of my East Gippsland home. Clean air is a basic human right, as stated in the United Kingdom's 'Clean Air Human Rights Bill' introduced in 2018 ([Appendix 1](#)). But in the Easter holiday period of 2015, I nearly died as a result of a planned burn close to my house near Lakes Entrance:

I have 22% lung capacity from a disease contracted in my twenty's, and I was almost asphyxiated in my bed from the smoke, and woke with early signs of the onset of cardiac arrest.

A few kilometers down the road, the owner of a Lakes Entrance B&B said that she experienced an unexpected and severe asthma attack from the planned burn, the first such attack since her youth. She had to send home her B&B guests and cancel up-coming bookings to protect her clients.

Fast-forward 6 years to this Easter 2021, and despite 80% of East Gippsland's state forests and national parks being burnt from last year's Black Summer Fires, and despite Lakes Entrance being full of tourists (economically much needed after covid19 lockdowns), planned burns were lit on Easter Thursday. These smothered Lakes Entrance and surrounding tourist hot-spots in smoke, creating not only a problem for the human beings,

but for the wildlife sheltering in some of the **last un-burnt forest refuges**. This was staggeringly inconsiderate on so many levels!

I was given a courtesy call (which I appreciated) however it came only 1 hour before the burns were lit up. I was in the middle of completing an assignment for my diploma and I was waiting for family to arrive for the Easter break, therefore I couldn't just pack-up and leave my house with 1 hour's notice.

The kind lady who called me said that **Forest Fire Management Vic** (FFMVic) calculated that the fires would not affect Easter tourists and would be out by Easter Saturday. I found this incredulous, as the town was already full. Of greatest concern to me were campers with asthma-prone children, who thought that they were escaping Melbourne for the clean sea-air. Campers cannot lock themselves in their house with an air-purifier and oxygen machine at the ready, as I have had to do many times over the years.

There is a lot of research that shows that the health effect of smoke from planned burns imposes a higher mortality than the direct impact of bushfire flames. Just one example is in the Medical Journal of Australia 2016, where Broome et al found that **14 deaths were attributable from a single week of prescribed burns in Sydney alone**. (Med J Aust. 205; 407-408)

Multiple studies on wood smoke have found it to be more toxic than cigarette smoke, and this supports my direct experience during month after month, year after year of planned burn smoke. It is like the Victorian government is forcing me to chain smoke, and it literally makes me sick!

The Australian Government's National Pollutant Inventory (2017-2018) listed **38 toxic substances released in wood smoke** including Carbon Monoxide, Acetone, Arsenic, Cyanide, Benzene, Formaldehyde and Mercury.

In 2018 the World Health Organisation said that small particulate pollution in wood smoke (PM 2.5) has huge health impacts, even at very low concentrations, and **THERE IS NO SAFE LIMIT FOR PM 2.5 EXPOSURE**. So why does the Victorian government continue to expose me?

COVID19 Respiratory Pandemic

The fact that the Victorian government is assaulting the respiratory systems of residents is even more alarming during a covid19 respiratory pandemic, especially with evidence that **acrolein in wood smoke suppresses the immune system**: Burning just 1 kg of wood produces as much acrolein as in the smoke of **880 cigarettes** (R. Stone, 1995, Society of Toxicology conference - Science March 24, v267). And this fits my personal experience, in that I had a completely unexpected and mystery health collapse in 2015, after my near death smoke inhalation experience. It took me 18 months to 'get back to my normal' but I then lived in constant fear of the next planned burn (and still do).

Last year, 12 international researchers wrote a paper: **Indications that High Levels of Air Pollution Exacerbate Covid19 Spread - Evaluation of the potential relationship between**

Particulate Matter (PM) pollution and COVID-19 infection spread in Italy. In their introduction they stated: It is known that Particulate Matter fractions both large and small (PM2.5 and PM10) serve as carriers for viruses. They can act as long-range transport to viruses.

Sara De Matteis at Cagliari University Italy, a member of the environmental health committee of the European Respiratory Society said: “Patients with chronic lung and heart conditions caused or worsened by exposure to air pollution are less able to fight off lung infections and more likely to die. This is likely also the case for Covid-19. **By lowering air pollution levels we can help the most vulnerable in their fight against this and any possible future pandemics.**”

My life is always on a knife-edge of discomfort and illness due to lack of oxygen. I spend a huge amount of time and money to keep myself as healthy as possible under difficult circumstances. But I feel that the Victorian government undermines my efforts and does not consider my life significant enough to even look at the vast quantity of environmental and medical science that challenges their current planned burns policy. ([View 30 research papers and studies showing the failure of planned burns to lower risk of wildfire and their detrimental impacts – Appendix 2](#))

Ignoring all this evidence, planned burns have increasingly been lit at alarming rates: John Thwaites, former Victorian Deputy Premier & Environment Minister said: “**Despite claims that the states were not doing enough; in Victoria fuel reduction burns had risen by 61% in the past 10 years after Black Saturday.**”

Fire frequency has increased 50 fold with the arrival of Europeans, according to researchers who examined over 2000 sediment cores of 70,000 years age or more.

East Gippsland residents have noticed that in the last 6 or more years, **planned burning has become a multi-million dollar tax-payer funded INDUSTRY of landscape-scale burning.** The burns are not cool or mosaic or like indigenous burns; and they are often huge in size. So much so, that many residents like me with health issues, have to suffer smokey autumns, early winters and springs - greatly affecting our health throughout the year and regularly causing asthma attacks, angina, nausea, stinging eyes and airways, to name a few symptoms.

A friend of mine who was badly effected this Easter said that the smoke was so acrid and he felt so sick (despite locking himself in his house for days) that he presumed the planned burns must have ignited illegally dumped tyres, pesticide containers and mattresses which are often strewn throughout the state forest back tracks.

Greenhouse Gas Emissions and State Policies

[Why aren't DELWP's planned burns subject to greenhouse gas emission laws and targets?](#)

Does this government's fuel reduction policy work against its own VICTORIAN AIR QUALITY STRATEGY 2019 and the CLEAN AIR FOR ALL VICTORIANS - VICTORIA'S AIR QUALITY STATEMENT?

Is planned burning increasing the risks to the most vulnerable Victorians (the disabled, elderly, pregnant women and unborn babies) driving up hospital admissions and putting more pressure on the Victorian health system throughout the whole year in all regions - not just in one region during a summer bushfire emergency?

In his 2020 submission to the Royal Commission into Natural Disaster Arrangements, fire behaviour scientist Adjunct Assoc. Professor Zylstra stated: Prescribed burning is the most widely-used tool for hazard reduction **yet it imposes high rates of mortality on human populations relative to direct bushfire impacts**, while threatening the survival of many flora and fauna.

I therefore ask you to protect my life and lungs through this Parliamentary Enquiry, by challenging the false notion that planned burns keep Victorians safe, when the medical and environmental science says the opposite.

VicForests & Logging Coupe Refuse

For years Gippsland residents have called for the removal of secrecy in regard to the burning of logging coupe waste. These burns are falsely 'advertised' to the public as planned burns on the Vic emergency websites. **Why?**

VicForests is a government-owned corporation with Treasurer Tim Pallas as the sole shareholder, so shouldn't the same or even more stringent environmental rules for air pollution and CO2 emissions apply; as they do for non-government corporations?

Also, why is logging allowed to destroy the OXYGEN GENERATING, AIR-PURIFYING and CARBON SEQUESTERING ability of Victoria's TREES and FORESTS?

EPA & concerns about potential conflict of interest from Lee Miezi (interim CEO of EPA)

On numerous occasions, Gippsland residents have called for permanent or temporary air quality monitors to be installed in towns subject to planned burn smoke. We are continually ignored on this issue by DELWP and the EPA.

In March this year, during the Moomba long weekend, Forest Fire Management lit several planned burns that badly effected people in Lake Tyers, Orbost and surrounding areas. In exasperation, this is what I wrote to DELWP Secretary John Bradley on 10 March 2021:

Dear Mr Bradley,

I called your office today to inform you that I was at a community event in Lake Tyers Beach - East Gippsland this long-weekend, that was marred by choking smoke from DELWP planned burns. The event was supposed to give the people of East Gippsland and the visiting tourists some joy after a horrific year. The physical effects from the smoke on me and others in the

audience included wheezing, asthma onset, chest pain, sore throat and eyes, choking sensations. It also had a post traumatic stress triggering effect on those in the audience who had lost homes, stock etc in last year's fires. Three days on, and my physical and emotional health are still suffering.

The written response on behalf of John Bradley (by Chris Hardman) included this statement: *FFMVic work closely with the Department of Health and the Environment Protection Authority to actively schedule and/or modify burns to reduce direct impact of smoke on populated areas.*

Firstly I would like to say that IF this statement is true, then FFMVic/DELWP are failing miserably to reduce the impact of smoke pollution on populated areas. And the EPA is negligent in not installing air quality monitoring equipment.

Secondly, I would like to raise my concerns about the potential conflict of interest that could arise now that Lee Miezis has become interim CEO of the EPA, given that he was previously DELWP Deputy Secretary of Forest, Fires & Regions - the person in charge of the logging and planned burning operations across Victoria. I am concerned that if the issues I have raised here are passed on to the EPA, Mr Miezis may be in a position to influence an outcome that protects his former colleagues and favors the continuation of his previous work – unchallenged by his subordinates in the EPA.

I would like to request that Mr Miezis declares this potential conflict of interest before any participation in discussions about planned burn and logging coupe burn-off pollution.

To conclude: It is my right to breathe clean air, and not to have this taken away from me by a Victorian government agency or policy. If the government is truly concerned about the lives and health of Victorians and the need to keep us safe; then it would listen to the science, it would stop lighting fires, and it would stop the air pollution from planned burns, which contributes to many more deaths than direct bushfire impacts.

The result of the last 10 years of unprecedented levels of planned burning in Gippsland was the unprecedented wildfire of Black Summer - just as the science predicted would be the consequence. Thus clearly demonstrating that FFMVic's operations are not working on ANY level – safety, health or biodiversity!

Speedy suppression at fire-ignition sites (aerial and on-ground) is much more achievable nowadays with satellite technology. And perhaps a government subsidised home sprinkler installation scheme or bunker scheme (like the solar homes scheme) could be considered in bushfire risk areas, rather than the hundreds of millions of dollars spent on FFMVic in the past decade.

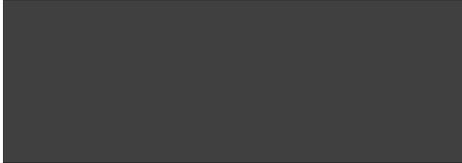
So, dear Parliamentary Committee, can you advocate for me and ask Premier Andrews to pass a 'Clean Air Human Rights Bill' such as that introduced in the UK? Can you ask him to

cease industrial-scale planned burning and logging, because protecting trees and forests - the natural air generators and purifiers - is one of the best ways to combat air pollution.

Thank you for hearing my concerns.

Sincerely,

Angelique Stefanatos



APPENDIX 1

Clean Air Human Rights Bill 2018:

A Bill to establish the right to breathe clean air; to require the Secretary of State to achieve and maintain clean air in England and Wales; to involve Public Health England in setting and reviewing pollutants and their limits; to enhance the powers, duties and functions of the Environment Agency, the Committee on Climate Change, local authorities (including port authorities), the Civil Aviation Authority, Highways England, Historic England and Natural England in relation to air pollution; to establish the Citizens' Commission for Clean Air with powers to institute or intervene in legal proceedings; to require the Secretary of State and the relevant national authorities to apply environmental principles in carrying out their duties under this Act and the clean air enactments; and for connected purposes.

The first reading of the Clean Air (Human Rights) Bill was unusual because it 'introduced' 30 pages of proposed legislation that could be adopted in full immediately to address air pollution outdoors and indoors, local pollution and greenhouse gases and protect health and the environment.

APPENDIX 2

Research papers indicating the failure of fuel reduction burns to mitigate risk:

- 1- *"Fatalities were dominated by a few bushfires that have occurred under **catastrophic weather conditions**. These conditions should be used as the context for discussing appropriate defensive actions for communities faced with a bushfire threat."*

Blanchi R, Leonard J, Haynes K, Opie K, James M, Dimer de Oliveira F. (2014) Environmental circumstances surrounding bushfire fatalities in Australia 1901–2011. *Environmental Science & Policy* 37 (2014) 192-203

- 2- *“An increase in fuel treatment, such as prescribed burning, may reduce crown fire risk but it has also been shown that fire severity in these fires was **not reduced** by recent burning (reduced fuel) under very **severe weather** [26].”*

Price O, Bradstock R. (2013). Landscape scale influences of forest area and housing density on house loss in the 2009 Victorian Bushfires. PLoS One, 8 (8), e73421-1-e73421-6

- 3- *“Since house loss was most likely under these (**severe weather**) conditions (67%), effects of prescribed burning across landscapes on house loss **are likely to be small** when weather conditions are severe. Fuel treatments need to be located close to houses in order to effectively mitigate risk of loss.”*

Price O, Bradstock R. (2012) The efficacy of fuel treatment in mitigating property loss during wildfires: Insights from analysis of the severity of the catastrophic fires in 2009 in Victoria, Australia. Journal of Environmental Management, Volume 113, 30 December 2012, Pages 146-157

- 4- *“The influence of prescribed burning on subsequent fire behaviour diminishes within 2 to 10 years.”*

Wilson N, Cary G and Gibbons P. (2018) Relationships between mature trees and fire fuel hazard in Australian forest. International Journal of Wildland Fire 2018, 27, 353–362

- 5- *“Overall **fuel hazard was higher** in forests and woodlands burned 6–12 years **previously** than those unburned for at least 96 years” and “Frequent burning can maintain forest understorey in an early successional ‘shrubby’ state, leading to higher overall fuel hazard than forests where a lack of fire is associated with the senescence of shrubs.”*

Dixon K, Cary G, Worboys G, Seddon J and Gibbons P. (2018) A comparison of fuel hazard in recently burned and long-unburned forests and woodlands. International Journal of Wildland Fire. July 2018

- 6- *“...increasing fire frequency has the potential to accelerate by producing an increasingly flammable landscape.”*

“Across the Australian Alps, recently burnt forests have been on average more flammable than mature forests, consistent with historic observation and the mechanistic understanding arising from plant growth and species’ change.”

Zylstra P. (2018) Flammability dynamics in the Australian Alps. *Austral Ecology* (2018)

- 7- *“Our study found that for these sites, plant traits were more important for predicting flame height than was surface fuel load.” ... “Conventional approaches to modelling fire behaviour based on the mass of surface litter and simple measures of above-ground fuel strata may therefore be unable to predict aspects of fire behaviour that arise from variations in forest composition.”*

Zylstra P, Bradstock RA, Bedward M, Penman TD, Doherty MD, Weber RO, Gill AM, Carey GJ. (2016). Biophysical Mechanistic Modelling Quantifies the Effects of Plant Traits on Fire Severity: Species, Not Surface Fuel Loads, Determine Flame Dimensions in Eucalypt Forests. *PLoS ONE* 11(8): e0160715. doi:10.1371/journal.pone.0160715

- 8- *“Results of this study demonstrate that treatment of fuels at the interface [ie close to buildings] is not only the best means of reducing risk, it is also the most cost-effective.”*

Penman T, Bradstock R, Price O. (2013) Reducing wildfire risk to urban developments: Simulation of cost-effective fuel treatment solutions in south eastern Australia. *Environmental Modelling & Software* 52 (2014) 166e175

- 9- *“Our results imply that a shift in emphasis away from broad-scale fuel-reduction to intensive fuel treatments close to property will more effectively mitigate impacts from wildfires on peri-urban communities.”*

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

10- “In conclusion, our simulation study has shown that realistic, implementable prescribed-burning plans to reduce fine fuel loads in fire prone Tasmanian grasslands, sedgeland and dry eucalypt forests **have little potential to substantially reduce the extent and intensity of wildfires at a state-wide scale.”**

Furlaud J, Williamson G, and Bowman D. (2007) Simulating the effectiveness of prescribed burning at altering wildfire behaviour in Tasmania, Australia. *International Journal of Wildland Fire*

11- “In extreme weather, even 1-year-old (burnt) patches have a low likelihood of stopping unplanned fires.”

“Some studies from forests in south-eastern Australia report that fine fuels are back to significant levels (i.e. likely to lead to fire intensities that are unsuppressible) after between 3 and 5 years.” (Conroy 1996; Adams and Simmons 1995; Morrison et al 1996; Annon 2003; Gould et al 2007).

“The present study suggests that the modest effect of fuel reduction on ability to stop a subsequent unplanned fire is essentially gone after 5 years.”

Price O, and Bradstock R. (2010) The effect of fuel age on the spread of fire in sclerophyll forest in the Sydney region of Australia. *International Journal of Wildland Fire* 19(1) 35-45; doi.org/10.1071/WF08167

12- “In all bioregions, **weather was a stronger predictor than past-fire extent of area burnt in a particular year.”**

*“In most bioregions **prescribed burning is likely to have very little effect** on subsequent extent of unplanned fire...”*

Price O, Penman T, Bradstock R, Boer M and Clarke H. (2012) Biogeographical variation in the potential effectiveness of prescribed fire in south-eastern Australia. *Journal of Biogeography (J. Biogeogr.)* (2015) 42, 2234–2245

13- “Weather and ignition management effort were more important than fuel management approach and effort in determining total area burned in five landscape fire models.”

Cary, G. J., Flannigan, M. D., Keane, R. E., Bradstock, R. A., Davies, I. D., Lenihan, J. M., Li, C., Logan, K. A. & Parsons, R. A. (2009). Relative importance of fuel management, ignition management and weather for area burned: evidence from five landscape-fire succession models. *International Journal of Wildland Fire*, 18 (2), 147-156

14- *“Despite policy imperatives to expand fuel treatment, a reduction rather than an elimination of risk will result. Multifaceted strategies will therefore be required for the management of risk.” ... “Feasible fuel treatment strategies are likely to leave considerable residual risk in many Australian forested ecosystems and this risk may be expected to increase in the future. Explicit recognition of this fundamental conclusion and its attendant consequences, including costs, will be needed to build a more comprehensive approach to the management of risks to people and their infrastructure.”*

Bradstock R, Cary G, Davies I, Lindenmayer D, Price O, Williams R. (2012) Wildfires, fuel treatment and risk mitigation in Australian eucalypt forests: Insights from landscape-scale simulation. *Journal of Environmental Management* 105 (2012) 66e7

15- *“Since European occupation, many areas have experienced dramatic changes in fire regime, ranging from reductions in the incidence of fire to increases in the frequency, extent and intensity of fire.” ... We highlight that if Australia is to conserve its globally significant biodiversity, a better-planned response supported by adequate funding and effective policy and legislation is urgently needed.”*

Kearney SG, Cawardine J, Reside A, Fisher D, Maron M, Doherty T, Legge S, Silcock J, Woinarski J, Garnett S, Wintle B and Watson J (2018) The threats to Australia’s imperilled species and implications for a national conservation response. *Pacific Conservation Biology*. CSIRO; doi.org/10.1071/PC18024

16- *“Early growth stages can be created far more easily than can late (mature) stages. Recently burnt vegetation can be created in a single season. Some important habitat features occur only in mature to senescent vegetation and thus take decades, or even centuries, to develop.”*

Cheal D (2010) Growth stages and tolerable fire intervals for Victoria's native vegetation data sets. Fire and adaptive management report no. 84. DELWP 2010

17- *“For example, the long-unburned sites in our study area are disproportionately more important for reptile and mammal richness and abundance than those with a shorter time-since-fire” and “Regardless what management action is applied for reducing overall fuel hazard, our results suggest that long-unburned forests should be protected from fire”.*

Dixon K, Cary G, Worboys G, Seddon J and Gibbons P. (2018) A comparison of fuel hazard in recently burned and long-unburned forests and woodlands. International Journal of Wildland Fire. July 2018

18- *“Additionally, prescribed burns carry significant side effects, such as ecological harms, both through degrading faunal habitat (Catling et al. 2001; Andersen et al. 2005) and disadvantaging some plant species that require long fire-free intervals to complete their life cycle.”*

Furlaud J, Williamson G, and Bowman D. (2017) Simulating the effectiveness of prescribed burning at altering wildfire behaviour in Tasmania, Australia. International Journal of Wildland Fire

19- *“Our review reiterates the vulnerability of ‘fire sensitive’ obligate seeder forests, but also highlights similar threats to ‘fire tolerant’ resprouter forests posed by multiple recurrent wildfires of high severity.” ... “Our review highlights that even in forest types well adapted to fire the consequences of increasing wildfire frequency are worth renewed and directed attention.”*

Fairman T, Nitschke C and Bennett L. 2015) Too much, too soon? A review of the effects of increasing wildfire frequency on tree mortality and regeneration in temperate eucalypt forests. International Journal of Wildland Fire. 14 September 2015

20- *“There is little evidence for any ecological benefit from the planned burns, at least in the short term. ... In contrast, there is evidence that burning results in depletion of habitat resources for a range of faunal species.” ... “Given the commitment to*

increased levels of burning on public land annually, it is critical to undertake strategic planning to develop a vision and target for the post-fire, age-class structure of these forests. ... A high priority is to determine those areas to be maintained as the 'long unburnt' growth stage."

Holland G, Bennett A, Clarke M and others (2015) Box-Ironbark Experimental Mosaic Burning Project. Report to the Department of Environment, Land, Water and Planning and Parks Victoria, 2015

21- *"We conclude that infrequent extensive fires are a feature of alpine Australia. For both the flora and the fauna, there is no quantitative evidence that the 2003 fires were an ecological disaster, and we conclude that the flora and the fauna of alpine Australia are highly resilient to infrequent, large, intense fires."*

Williams R, Wahren CH, Tolsma A, Sanecki G, Papst W, Myers B, McDougall K, Heinze D and Green K. (2008) Large fires in Australian alpine landscapes: their part in the historical fire regime and their impacts on alpine biodiversity. *International Journal of Wildland Fire* 17(6) 793-808; doi.org/10.1071/WF07154

22- *"Charring effects on hollow formation, increasing hollow size but decreasing overall hollow presence, demonstrates the complex effect of fire on this resource."*

Stares M, Collins L, Law B and French K. 2018) Long-Term Effect of Prescribed Burning Regimes and Logging on Coarse Woody Debris in South-Eastern Australia. *Forests* 2018, 9, 242; doi:10.3390/f9050242

23- *"Longer-term impacts of prescribed burning will be strongly influenced by the return interval, given the slow rate at which some structural components accumulate (decades to centuries)" and "Replacement of components such as large logs, first requiring older trees with large trunks/limbs, potentially requires a century or more ... A key point is that, despite being relatively mild and patchy, prescribed burns may continue to influence forest structure for more than a century into the future."*

[This is important, given that] *"More than 150 years of European settlement and diverse land use has left the box-ironbark forests of southeast Australia in a highly*

disturbed and simplified state, with structural components such as large logs and deep litter layers being extremely scarce (ECC 1997)."

Holland G, Clarke M, and Bennett A. (2017) Prescribed burning consumes key forest structural components: implications for landscape heterogeneity. *Ecological Applications*, 27(3), 2017, pp. 845–858

24- *"Our work highlights the need for management of fire regimes to be complemented by an understanding of the underlying environmental gradients and key elements of habitat structure that influence resource availability for plants and animals." ... "Time since fire influenced vertebrates, particularly bird abundance, more than plants. Of species that responded to time since fire, most were associated with older fire ages (e.g., rose robin, golden whistler, yellow-faced honeyeater)." ... "Fire type, a surrogate for fire severity, had a relatively minor influence at the long temporal scales and large spatial scales of this study. In particular, there is a need for data and analytical approaches that can provide guidance on the fire responses of rarer or more cryptic species, often those of greatest conservation concern."*

Kelly, L. T., A. Haslem, G. J. Holland, S. W. J. Leonard, J. MacHunter, M. Bassett, A. F. Bennett, M. J. Bruce, E. K. Chia, F. J. Christie, M. F. Clarke, J. Di Stefano, R. Loyn, M. A. McCarthy, A. Pung, N. Robinson, H. Sitters, M. Swan, and A. York. (2017). Fire regimes and environmental gradients shape vertebrate and plant distributions in temperate eucalypt forests. *Ecosphere* 8(4):e01781. 10.1002/ecs2.1781

25- *"Tree hollows are a key habitat component for some 300 Australian vertebrate fauna species, of which a third have formal conservation status (Gibbons and Lindenmayer 2002)." "This study has demonstrated that planned burns in Gippsland increase the collapse risk of HBTs [hollow-bearing trees] significantly and, by implication, are likely to cause loss of habitat for hollow-dependent fauna in areas where hollows are needed."*

Bluff L. (2016) Reducing the effect of planned burns on hollow-bearing trees. Victorian Government Department of Environment, Land, Water and Planning, Melbourne, February 2016

26- *“For birds the strongest relationships related to fire frequency, with nectarivores responding negatively to frequent fires, and two other guilds showing weaker positive responses. Ground nesting birds were scarce at sites that had been burnt below the minimum Tolerable Fire Interval.” .. “The study examined a subset of the biota and so a precautionary approach is warranted to fire planning and implementation, taking account of other studies and future work dealing with groups such as lichens, fungi, owls, arboreal mammals, microbats and invertebrates.” ... “Frequent burning will benefit some plant and bird groups and disadvantage others (and probably also mammals). Hence it is important to continue generating a mix of fire regimes across the landscape, and a mix of age-classes.”*

Muir A, MacHunter J, Bruce M, Moloney P, Kyle G, Stamation K, Bluf L, Macak P, Liu C, Sutte Gr, Cheal D and Loyn R. (2015). Effects of fire regimes on terrestrial biodiversity in Gippsland, Victoria: a retrospective approach. Arthur Rylah Institute for Environmental Research, DELWP 2015

27- *“Large trees with cavities provide critical ecological functions in forests worldwide, including vital nesting and denning resources for many species.” ... This large cavity tree crisis in Mountain Ash forests is a product of: (1) the prolonged time required ([greater than] 120 years) for initiation of cavities; and (2) repeated past wildfires and widespread logging operations.” ... “Significant negative ecological consequences will arise from the Mountain Ash-wide absence of large cavity trees [including] impaired key ecosystem processes like the recruitment of large logs to the forest floor [7,89]. In the particular case of Mountain Ash forests, a paucity of large-diameter dead trees will deplete the nesting and denning resources required by, ~ 40 species of cavity-dependent vertebrates in these ecosystems.”*

Lindenmayer DB, Blanchard W, McBurney L, Blair D, Banks S, Likens GE, et al. (2012) Interacting Factors Driving a Major Loss of Large Trees with Cavities in a Forest Ecosystem. PLoS ONE 7(10): e41864 doi.org/10.1371/journal.pone.0041864

28- *“All species remained in the broad landscape, and most were found on at least some sites that had been burnt and were far from suitable refuge sites. Nevertheless, it is*

likely that unburnt forest has contributed substantially to the survival and persistence of these species in the landscape.”

McNabb E, Cheers G & Loyn R. (2012) Persistence of owls and arboreal mammals after severe wildfire in the Goulburn Broken catchment. Arthur Rylah Institute for Environmental Research, March 2012

29- *“Our results point to an urgent need for comprehensively designed studies to address the impacts of prescribed burns on hollow-bearing trees.” ... “We conclude that low intensity prescription burns may cause levels of destruction of hollow-bearing trees that are substantial enough to warrant immediate attention from managers.”*

Parnaby H, Lunney D, Shannon I and Fleming M. (2010) Collapse rates of hollow-bearing trees following low intensity prescription burns in the Pilliga forests, New South Wales. *Pacific Conservation Biology* 16(3) 209 – 220

30- A well-researched book, [*The Victorian Bush: its 'original and natural' condition*](#) by Ron Hately, published in 2010, has looked at early colonial records to try and establish the pre-European nature of the Victorian bush. It points out that while large areas were clearly grasslands and open grassy woodlands, other areas were forests with thick understory.