# Submission to the Victorian Parliamentary Inquiry into Fire Season Preparedness

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## Executive Summary

1. The change in policy away from hectare targets for planned burns towards a risk-based approach is a far more efficient use of available resources and will lead to increased asset protection and fewer lives lost in wildfires.
2. DELWP has no procedures in its planned burning management process that ensure that the requirements of threatened species are accommodated. As a result many rare species are further threatened by planned burning.
3. DELWP has no procedures in its planned burning management process that ensure that the requirements of the full array of habitats and vegetation types are accommodated. As a result some vegetation types (EVCs) are threatened by planned burning, notably including rainforests.
4. Climate change impacts and opportunities are not part of DELWP's current preventative burn planning.
5. DELWP is only partially applying the new risk-based approach to preventative that is current government policy. The new risk-based approach is neither widely understood, nor applied.
6. There are significant knowledge gaps in our understanding of the ecological impacts of fires. Some of these gaps are being addressed. Others are being ignored.

## Personal Background

Currently, Associate Adjunct Professor with the Centre for Environmental Management, Faculty of Science & Technology, Federation University, [redacted]

Formerly, Principal Scientist, Arthur Rylah Institute, Department of Environment, Land, Water and Planning[1], [redacted]. As a Departmental employee, my areas of interest focused on fire management and biological responses to fire, rare plants and their management, environmental weeds.

I have an extensive scientific publication record (see Appendix I, attached), including the seminal 2010 publication establishing the concept of **Tolerable Fire Intervals** for native vegetation. Furthermore, I have worked in a variety of post-fire environments (and pre-fire environments, having been in Marysville the day it burnt down in 2009).

Personal experience includes having lost my house in the 1983 Ash Wednesday fires.

I shall address only some of the Terms of Reference of the Inquiry. Overall, the change in fire management and planning from a focus on achieving hectare targets to a risk-based approach is thoroughly commended. A risk-based approach based on knowledge (the outcome of research) and intimate field experience is a determined improvement over the former policy orientation, which derived from the 2009 Royal Commission. The government is commended for this reform.

[1] reference to DELWP, includes reference to its antecedents DSE and DEPI

## Terms of Reference

**Effectiveness of preventative burns in achieving community safety** – Planned burning can achieve useful risk reduction, particularly close to built assets (towns, houses, communications towers, water reserves, escape routes) and close to susceptible biological assets. Recent research[2] has demonstrated that, by far, the most effective location for fuel reduction is close to those built assets. By far, the greatest loss of built assets and of human lives, has occurred in 'catastrophic' fires (fires burning under catastrophic conditions, so-called 'mega-fires'). Recent reviews[3] have again demonstrated that landscape-scale fuel reduction by planned burning has small to negligible effect on managing landscape-scale fires within forests. Landscape-scale fires in some large, contiguous, remote areas can be managed by strategic maintenance of narrow fuel breaks (as occurs thruout much of the Mallee region), but this strategy is problematic (largely useless) in the forested slopes and ranges.

The most effective and efficient location to focus on for fire protection, is the immediate vicinity of the infrastructure to be protected and the places where people live and work. A risk-based approach to fire planning (including the application of planned burns) is far preferable, as it enables utilization of the considerable fire management expertise now resident in both the CFA[3] and DELWP. This expertise is able to identify areas, infrastructure and residents at higher risk, and to plan works or strategies to reduce that risk (including the use of planned fires close to those assets). Of course, the risk can never be completely removed, but it can be reduced and managed.

A performance measure to replace the former hectare targets would include staff time & resources (budget) dedicated to fire protection and planning. Management structures already collect such data.

The risk from bush fires can never be eliminated. As with road travel and human disease, there will always be a finite chance of asset loss and loss of lives due to bush fires. However, that risk can be greatly reduced and thus the loss of assets and of human lives can be reduced. This must be the overriding aim of fire management, not any uninformative aim of achieving some pre-determined target of burnt hectares.

[2] References can be supplied if requested
[3] Country Fire Authority

**Impact of preventative burns on threatened species** – As currently practised threatened species have little impact on planned burning.

Many species are not harmed by fires and may even benefit from being burnt. These are not considered further.

However, some threatened species are adversely impacted, or even locally sent extinct, by fires, including planned burns. A single example will suffice[4]. *Astelia australiana* (Tall Astelia) is dramatic, tall lily endemic to Victoria (found nowhere else) in rainforest sites of the Beenak area, and a single population in the Otways. It is listed under the Victorian Flora & Fauna Guarantee Act and is rated as vulnerable in Victoria and vulnerable in Australia. Its populations are subject to continuing decline, mainly as a direct result of fires (both wild fires and planned burns). Recent DELWP proposals to burn adjacent to and into the last remaining stand of Tall Astelia in the Yarra River catchment (at Tomahawk Creek, where the plant was formerly locally common) gave scant regard to this highly threatened species. Submissions by a number of naturalists and others did not remove this planned burning proposal and interested parties who made submissions believed their information, evidence and submissions had little impact on burning plans.

Planned burning across the state can generate similar stories for species likely adversely affected by fires having scant to no impact on the planned burning.

DELWP biologists and planners are either aware of these site-specific occurrences of threatened species, or have access to databases that can be interrogated for threatened species records. Depending on the attitudes of the local fire planners and other regional staff, threatened species occurrences may have a determinative impact on planned burning (rarely) or (more usually) have little impact in planned burning. There is no DELWP planning process that compels giving threatened species a high and determinative profile when planning burns.

Listing of inappropriate fire regimes as a Potentially Threatening Process under the Flora & Fauna Guarantee Act has had negligible impact on planned burning by DELWP.

**Impact of preventative burns on Ecological Vegetation Classes** – As with threatened species, the requirements of vegetation receives scant consideration in much (not

[4] further examples , from a variety of habitats, can be supplied if requested

all) of DELWP's planned burning program. Many vegetation types demonstrate endemic strategies for recovery from fires, whether planned fires or wildfires. Some habitat/vegetation types require relatively frequent fires (eg. Basalt Grassland and Alluvial Plains Grassland[5]). Some vegetation types are damaged by any and all fires and thrive in the complete absence of fires (eg. Closed-forest and Chenopod Shrubland). Other vegetation types tolerate occasional fires, but have no ecological requirement for fires (eg. Ironbark-Box and Freshwater Wetland (ephemeral). Whereas, other vegetation types require occasional fires to prevent them from changing into other vegetation types (eg. Tall Mist Forest and Lowan Mallee).

Occasionally, DELWP implements a fire régime for ecological reasons, as happens (eg.) in the Patho Plains grasslands adjacent to, and part of, Terrick Terrick National Park in the northern plains.

However, despite departmental rhetoric, ecological requirements rarely impact on DELWP's régime of planned burning[6].

I here offer a single example of mis-management of an ecological asset. By Government policy, rainforest is excluded from planned burning. The surrounding forests are not excluded from planned burns. The surrounding forests for stands of Warm Temperate Rainforests are more susceptible to wildfires and are frequently included within planned burns. Part of this justification is to protect the sensitive rainforests from (damaging) wildfires.

When the adjoining forests are burnt in planned fires, fuel moisture differentials[7] are used to exclude the rainforests from being burnt in the planned burns. Mineral earth breaks and trittered (ie. slashed) fuel breaks are not used to prevent the planned burns from entering the forests. Nevertheless, the planned burn must enter some distance into the rainforest stands for these heightened moisture levels in the rainforests to extinguish the fires. Following the fires there is active regeneration, within the former rainforest margins, of fire-tolerant, sclerophyll species, and the undisturbed rainforest now covers a smaller area than before the planned burn. The sclerophyll species that regenerated after the previous planned burn, permit the next burn to burn into that (former rainforest) area and also into the rainforest now

[5] using the terminology of Ecological Vegetation Divisions (which are clusters of Ecological Vegetation Classes), see Cheal (2010) *Growth stages and tolerable fire intervals for Victoria's native vegetation data sets*

[6] references and examples can be provided if required

[7] the difference in vegetation moisture levels between the damp rainforest & the drier surrounding eucalypt forest

on the (new) margins, thus extending the area of flammable sclerophyll forest and decreasing the rainforest. This process, continued over a number of planned burn cycles, will eliminate, and has eliminated , rainforest stands in this state., as most rainforest occurs as narrow bands along drainage lines.

DELWP has become substantially deskilled in its capacity to research ecological fire impacts and is instead heavily reliant on contracted researchers, especially from Melbourne University. External contracted research has the advantage of being more remote from political pressures and thus less-inclined to 'reconsider' its recommendations in the light of such pressures. But, university-based research is subject to pressures to design projects that support current DELWP policy directions and also fulfil university requirements. The advantage of a substantial departmentally-based research capacity is that the Department would have ready access to more informed and literate ecological advice, that can be provided at very short notice (ie. without framing a new contract) and confidentially (facilitating the conceptual trial of a number of fire management strategies).

Fire planning within DELWP may, or may not, give due importance to vegetation types and habitats, but there are no formal procedures within DELWP's fire planning that compel consideration of ecological requirements and sensitivities. If regional staff are disinterested in ecological fire management they can easily ignore the ecological aspect.

**Impact of preventative burns on the Climate** – There is good evidence that in some vegetation types, significant amounts of carbon can be stored in long-unburnt stands. This applies to cool temperate rainforests and to alpine communities, such as peat beds. None of these occupies large areas in Victoria, so the amount of sequestered carbon in these communities is barely significant.

In addition, significant amounts of carbon can be stored in long-unburnt Tall Mist Forests. This ability to sequester carbon is not considered in fire planning, but Tall Mist Forests are not usually subject to planned burns. However, there is growing evidence[8] that other forest types, covering huge areas of the state, mature into a less flammable condition (and with significantly greater sequestered soil carbon) in the long-term absence of fire. This represents a major opportunity in current carbon accounting, but as yet has had negligible impact on DELWP's planned burning.

[8] despite scant studies and few data

**Knowledge gaps in preventative burning** – There are major knowledge gaps that prevent best practice fire management in Victoria. Some of the more significant are outlined below:

- **Soil Seed Store** – For most plant species, we know next-to-nothing of the longevity of viable seed in the soil. This is an essential requirement for informed fire and threatened species management.
- **Maturation to less flammability** – Many[9] eucalypt-dominated forests (and some other fire-prone vegetation communities) mature into a decidedly less flammable condition, in the long-term absence of fires. The low fuel levels immediately after planned burns are an attractive management outcome. Unfortunately, low fuel levels last for only three to five years or so (no longer) and are often succeeded by shrubby vegetation that is far more flammable than the forests were before the fire. We have scant data on which vegetation types can be managed for lower flammability by allowing or encouraging their maturity.
- **Hollow formation & loss** – Many important faunal assets (threatened species and keystone species) depend on tree hollows for nest or shelter sites. We have very few data on the rôle of fires in the creation of hollows and in the destruction of hollows, nor how fires may be used to engineer more hollows.

**Risk-based preventative burning** – Current government policy has wisely moved to a risk-based approach to preventative burning. There is no longer a requirement for DELWP to meet artificial and 'sledge hammer' hectare targets that militated against(!) protection of lives and assets. However, understanding of the meaning of 'risk-based' planning is far from universal within DELWP. Too many fire planners have simplistically synonymized 'risk' with 'high fuel' and even rebadged preventative burns planned under the superseded hectare targets as 'risk-based' burning. This is a failure to implement Government policy.

True risk-based burning requires a sequential process:

1. Identify and locate all the local assets (in the subject area or region); then
2. Identify which of those assets would be significantly degraded by being burnt; then
3. Identify which of these are currently threatened by high fuel loads in their vicinity; then

[9] not all, 'many' – there are vegetation types that remain relatively flammable well into maturity & beyond

4. Identify which of these would have that risk significantly reduced by fuel reduction within their vicinity; then
5. Plan and apply a planned burn, if that is the most efficient way of significantly reducing the identified threats (ie. if the cost of the planned burn is notably **less** than the replacement cost of the burnt, lost or degraded asset).

Despite the new risk-based policy, burns are still being planned and applied where there are no local assets of any significance that are threatened by purportedly high fuel levels.

Furthermore, burns are being planned and applied when the assets that are threatened are of low value (and less costly to replace than the costs of planning and applying the burn). This is a failure of public service budget models. In many cases, it would be far cheaper to bank some of the funds, that would otherwize be expended in planning and applying a burn, into a trust account. Then do not do the burn and afterwards use the funds in that trust account to compensate private losses if a wildfire passes from public land to private land and destroys or degrades the (low value) asset. For example, it is wasteful to plan and apply a broad-acre preventative burn when the only asset threatened by an (unlikely) wildfire is a 3-strand fenceline[10].

Too many DELWP fire planners do not understand the new risk-based policy approach to preventative burning and see the new policy as a restriction on their (former) freedom to burn large areas of forest. In fact, the new policy permits burning large areas of forest if that forest contains valuable assets that would be threatened by wildfires. Furthermore, the new policy frees up the planned burning program to concentrate on effective protection of lives and properties, where that preventative work is most effective, ie. adjacent to towns, water bodies, critical access or egress routes and other built assets.

[10] see proposed burns currently planned for the northern and eastern margins of the Pyrenees

# Appendices

## I Qualifications & Experience

**Qualifications** – B.Sc.(Hons.), M Sc. (both Monash University), Ph.D. (Melbourne University; thesis title *Fire and Soil Interactions in a Mallee Heathland – The generation of heterogeneity in an homogeneous landscape*)

**Expertise –** Formerly a member of DSE's Scientific Fire Reference Group and completed major research projects on fire ecology, including a fire-focused PhD.

**Personal Experience –** Assisted in bushfire recovery, as a member of recovery management teams and on-ground assessment and recovery actions (most recently following the 2009 Black Saturday fires).

**Publications –** Only fire-focused publications listed here. General ecological publications, in which fire is a component, are not listed.

**Cheal, D. C.**, Day, J. C. & Meredith, C. W. (1979) *Fire in the National Parks of North-West Victoria*. Report to Aust. National Parks& Wildlife Service, Canberra.

**Cheal, D. C.** (1981) Ecological Effects of Fire - North-West Victoria in *Fire Ecology in Semi-Arid Lands* eds. A. Heislers, P. Lynch & B. Walters (Nat. Parks Service, Victoria)

**Cheal, D. C.** (1983) Fire in the Dry Country in *Fighting Fire...with fire, a symposium on fuel reduction burning in forests.* ed. E. H. M. Ealey, Graduate School of Environmental Science, Monash University.

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**Cheal, D. C.** (1996) Fire Succession in Heathlands and Implications for Vegetation Management, pp. 67-79 in *Fire and Biodiversity The Effects end Effectiveness of Fire Management* (Biodiversity Unit, Biodiversity Series, Paper No. 6; also published online at <*http://www.environment.gov.au/life/general_info/biodivser_8/paper6.html*>).

**Cheal, D. C.** (2000) Seed Regeneration in Long-unburnt and Recently-burnt Heathland at Wyperfeld National Park. *Proceedings of the Royal Society of Victoria* 112(2), 111-118.

Russell-Smith, J., Ryan, P. G. and **D. C. Cheal** (2002) Fire regimes and the conservation of sandstone heath in monsoonal northern Australia: frequency, interval, patchiness. *Biological Conservation* 104, 91-106.

**Cheal, D.** (2003) Bogong High Plains After the 2004 Fires. *Victorian Naturalist* 120, 201-203.

**Cheal, D.** (2004) Plant Responses to Fires *Victorian Naturalist* 121, 107-115.

Carter, O. and **Cheal, D.** (2004) *Recovery of Rare and Threatened Flora after the 2002 Wildfire and Vital Attributes to Assist Ecological Fire Management in the Big Desert, Western Victoria* Arthur Rylah Institute Technical Paper Series No. 150 Pub. ARI, Heidelberg

**Cheal, D.** (2004) A Consideration of Victoria's Proposals for Ecological Burning, using Mallee Heathlands as a case study, *Bushfire 2004 Conference, Earth, Wind & Fire Fusing the*

*elements* Adelaide, South Australia (available on the Web at <*http://www.environment.sa.gov.au/biodiversity/pdfs/bushfire/cheal_david.pdf*>)

**Cheal, D. C.** (2007) Fire … a standard management tool that still frightens us. *Proceedings of the Royal Society of Victoria* 118(2), 379-393.

**Cheal, D.** (2010) *Growth stages and tolerable fire intervals for Victoria's native vegetation data sets Report no. 84 Fire and adaptive management* Department of Sustainability and Environment, East Melbourne, Victoria. 244 pp. (available online at <http://www.dse.vic.gov.au/fire-and-other-emergencies/publications-and-research/fire-research-reports/research-report-84-growth-stages-and-tolerable-fire-intervals-for-victorias-native-vegetation-data-sets>).

Zimmer, H., Green, P., **Cheal, D.** and Clarke, M. F. (2010) *Reconstructing Mallee fire history using* Callitris verrucosa *tree rings ARI Technical Report Series no. 215* Department of Sustainability and Environment, Melbourne, Victoria. 24 pp.

Lunt, I. D., Zimmer, H. C. and **Cheal, D. C.** (2011) The tortoise and the hare? Post-fire regeneration in mixed *Eucalyptus–Callitris* forest. *Australian Journal of Botany* 59, 575-581.

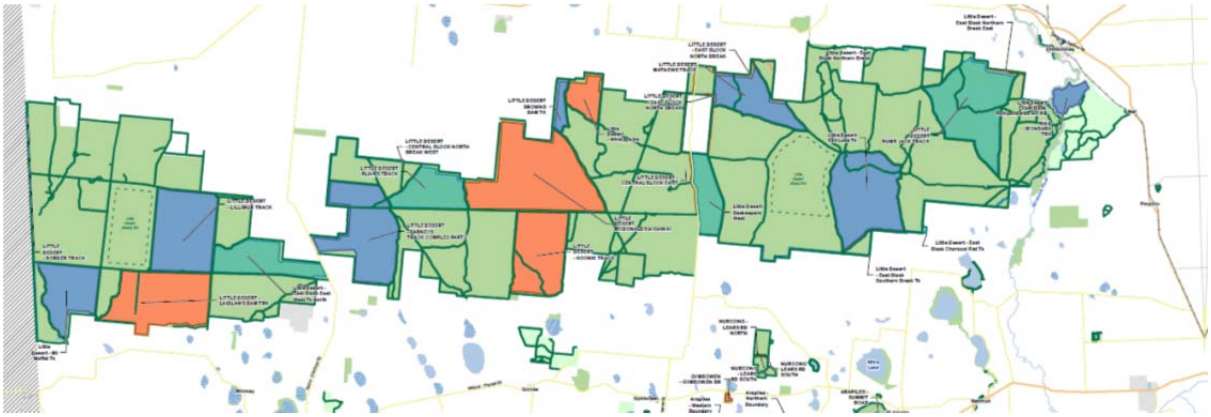
Zimmer, H., **Cheal, D.** and Cross, E. (2012) *Post-fire weeds triage manual Black Saturday Victoria 2009 – Natural Values fire recovery program* Rebuilding Together Statewide Bushfire Recovery Plan no. 23 (Department of Sustainability and Environment, East Melbourne, Victoria), 70 pp.

Zimmer, H., **Cheal, D.**, Lunt, I. and Johnson, G. (2012) *Black Cypress-pine* Callitris endlicheri *fire-sensitive vegetation recovery following high intensity bushfire. Rebuilding Together series, no. 10* (Department of Sustainability and Environment, Melbourne, Victoria), 23 pp.; available online at http://www.dse.vic.gov.au/__data/assets/pdf_file/0016/150307/VBRRA-P10-web.pdf

**Cheal, D.** (2012) A Biological Basis for Planned Burning. *Proceedings of the Royal Society of Victoria* 124(1), 7-19.

## II Fire Operations Plan (current seasons) for the Little Desert

Illustrating the application of planned burns in remote areas devoid of residents and with scant built infrastructure (the orange, blue and green polygons [patches] are planned burns over the next three seasons). These maps are available at http://www.depi.vic.gov.au/fire-and-emergencies/planned-burns/fire-operations-plans/current-approved-fop



## III Comment on the Former Hectare Targets

The former hectare targets derived from the Bushfires Royal Commission (2010, 2011). Hectare targets are attractive performance measures, as success or failure to achieve these targets is relatively easy to assess and requires little expertise.

Planned burns require considerable expenditure in resources and staff time, in both the planning and application stages, and further post-fire effort in monitoring and securing by mopping-up. Funding of the relevant government department (DELWP) was always limited and barely adequate to maintain the planned burning program and targets. The costs of planned burns vary greatly from burn to burn, depending on the staff time and equipment needed to ensure there are no fire break outs (planned burns that develop into bushfires) and that human lives and built infrastructure are not threatened.

Prior to the recent policy change to a risk-based approach, the principal performance measures for DELWP's planned burning program were the hectare targets deriving from the 2009 Royal Commission. DELWP had great difficulty meeting these targets. As a result, there was strong pressure on DELWP to choose areas for planned fires, that were relatively cheap to burn (ie. with little built infrastructure and with few or no local inhabitants).

A high number of burnt hectares is relatively cheap to achieve in remote areas. Concomitantly, there was a strong disincentive to apply planned fires in populated areas or where there is considerable built infrastructure, because of the expense (high staff input per hectare, intensive pre-fire planning and hefty workload in post-fire mop-up and monitoring). Thus the hectare targets worked against the protection of populated areas and built infrastructure. The economies of remote area burning (including economies of scale) enabled DELWP to come closer to its hectare targets within its limited budget. As a result, large areas remote from any substantial fire risk were burnt relatively frequently[11], and smaller areas adjacent to towns and built infrastructure slipped down the priority list.

This is not to say that there were no planned burns in areas where infrastructure and population were concentrated. There were planned burns in such high risk localities. But there was less budget and staff for such burns, as staff time was dedicated towards remote area burns and planning.

The hectare targets were derived from landscape-scale research, particularly in south-western Western Australia and far western Tasmania[2]. The landscapes, habitats and vegetation types of these two regions (SWWA & Tas.) are dramatically different to those of Victoria. Frequencies of planned fires derived from such different landscapes and for different objectives were not reasonably applicable in much of Victoria.

[11] references can be supplied if requested