Victorian National Parks Association Inc.
Level 3, 60 Leicester Street Carlton Vic 3053,
Tel: (03) 9347 5188, Fax: (03) 9347 5199
Email: vnpa@vnpa.org.au website: www.vnpa.org.au

Submission to the Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria

Prepared by Jenny Barnett **May 2007**

Introduction

Fire in the Australian environment is complex, challenging, sometimes necessary, and sometimes downright dangerous. Along with our nation's aridity, it is probably the most difficult aspect of our environment to deal with and climate change adds to this problem. The solution to living in our environment will only come from a mature mix of actions which will deliver, where and when appropriate, fire control, fire accommodation and fire encouragement.

The blame-apportioning that often follows major fires will not yield a successful and sustainable relationship with our natural environment. Such a relationship will balance the needs of safety, biodiversity, tourism, agriculture and cost efficiency with the realities of where and how we live. The Victorian National Parks Association believes significant strides in this direction have been made in Victoria and that in general, both fire planning and suppression is intelligent and balanced. Improvements can be made, but we believe that the basic structures, processes and principles are correct and need to be respected and preserved.

Nonetheless we have some concerns about the extent, impacts and effectiveness of some of the major fire breaks currently being established or contemplated, and hope that more rational planning may resolve this. We also believe greater resourcing is essential to improve the capacity to tackle fires when they first originate, including simultaneous multiple fires. Resources are also needed to enable sufficient prescribed burning at strategic locations and where ecologically desirable in suitable seasons, largely autumn. We are strongly opposed however to broad-scale burning that is likely to alter ecological functioning and which does not take into account the extent of similar vegetation types that have been recently burnt by wildfire or other prescribed burning Far more resources are also essential to monitor the effects of fire (both prescribed and wildfire) on biodiversity including flora and fauna surveys before and after conducting prescribed burning.

Some points we make in this submission are:

- Fuel reduction burning is not a panacea for fire control. In certain, strategic circumstances it can assist asset protection, but in others it can increase fuel loads and it had a limited effect on the 2002-3 and 2006-7 fires.
- If current strategic fuel reduction burning is increased to broadscale burning, there will be concomitant losses in biodiversity and environmental services, such as water quality. In the medium term, some of the forests will be made more flammable by repeated burning.
- The firefighting services in Victoria were extremely successful in limiting human and property losses in recent large fires.
- Fires are not exacerbated by national parks:
  - The majority of lightning strikes that resulted in extensive fires in 2002-3 and 2006-7 were in state forest or land other than national park;
  - national park comprised only 38% and about 25% of the area burned by the 2002-3 and 2006-7 fires respectively and fire history in Victoria reveals no link whatsoever between the area devoted to national park and the frequency and extent of fire.
- Logging does not reduce fires: dense regrowth post-logging increases fuel loads.
- Grazing does not reduce fires: if anything, grazing reduces more succulent, fire-resistant vegetation and promotes woody, flammable shrubs.

- Endlessly increasing the road and track network will not reduce fires. Victoria has an extensive track network already but improved maintenance and signage may assist.
- If major firebreaks are constructed throughout our forests there will be fragmentation of habitat reducing the ability of our flora and fauna to respond to climate change. Such breaks need to be planned carefully.
- Urban-rural subdivisions in bushland are undesirable on environmental grounds and are an increased fire risk. This type of subdivision should be specifically discouraged in planning controls.

In the following submission we address all of the terms of reference of this inquiry to a greater or lesser extent. We focus on biodiversity and the conservation reserve system and fire prevention that considers these assets. We also counter claims that logging and grazing reduce fires.

(1) The extent, timing, resourcing and effectiveness of prescribed burning on both crown and freehold land;

Prescribed burning is routinely carried out in Victorian parks and forests and is an important tool in the protection of assets. However we believe its effectiveness may be overestimated by some. It is certainly not a panacea that will work in all circumstances – especially in the severe fire conditions that were experienced in the 2006-7 fire season and during the 2003 alpine fires.

When is prescribed burning effective?

Examples of fuel reduced areas that have benefited fire fighting are usually less than 3 years old. Cases where fuel reduced areas have not assisted tend to be ignored by those promoting more fuel reduction. Some instances where pre-existing fuel reduced areas were less than effective in recent fires include:

1. Extensive areas to the south of Mt Buffalo National Park which were regularly fuel reduced, including burns since 2000, were severely burnt in the alpine 2003 fires and were burnt yet again in 2007,albeit less severely

2. Areas to the west of Harrietville through to near Mt Hotham and Falls Creek which were burnt in the 2003 fires, and reburnt in 2007.

3. A hillside just to the east of Swindlers Valley at Mt Hotham burnt twice on two successive days in the 2003 fires (see photo next page). On the second day three fire fighters who were using the already burnt area as a 'safe' area nearly lost their lives because of the ferocity of the fire on the second burn through the area.

4. In the Kosciuszko National Park, some areas that had been prescription burnt only 8 months previously were severely burnt in 2003 and experienced crown fires.

5. An area in the Cobberas (near the source of the Murray) was heavily burnt in a control burn in 2002. The 2003 fires originally burnt around this relatively large area but over the following week it progressively burnt from fires on the edge and spot fires. Because of the very remote location of this previous burn, it was of no apparent help in controlling the wild fire. The end result is that sensitive alpine and sub-alpine vegetation in a wilderness zone in a National Park were burnt twice within about a year with likely severe ecological damage - but no real benefit in terms of protecting any assets.

Discussions we have had with the fire management branch of the Department of Environment and Sustainability (DSE) about recent fires (Mike Leonard) suggest that the usefulness of fuel reduced areas depended very much on weather conditions. In the cooler mornings such areas were generally of assistance, but on many afternoons, with stronger winds and single-figure humidity levels, almost nothing would stop the fires - hence the results seen in some of the examples above. Indeed in 2003, fires burnt scattered trees and windbreaks that were within large areas of cleared, heavily grazed farmland (see photo next page). Farm buildings, fences and other assets were also lost in Benambra and Wulgulmerang in heavily cleared areas.

Area at Mt Hotham burnt twice in 2003 on two successive days (note once burnt area in back ground)

South of Benambra where the 2003 fire burnt isolated trees and windbreaks within cleared and grazed areas.

The need for prescribed burning to be strategic

Fuel reduced areas, unless very recently burned and under relatively mild conditions, also need the presence of active fire fighters to be effective. Otherwise the fire may well slow down, but it will still pass through and continue. In general, for fuel reduced areas to be useful, they must be near to the assets to be protected or in other strategically useful positions. Fuel reduced areas in remote areas, like the fifth example above have little chance of being useful and the burning of vast areas in the hope of combating fires wherever they may occur is both physically and economically impractical, and potentially highly environmentally damaging.

Even when a control burn is perfectly implemented, is recent and is strategically well placed, only partial reliance can be placed on it. Even wildfires, which normally remove more of the fuels than a control burn, cannot necessarily be relied upon for protection from subsequent fires in severe fire conditions. The above example on the Mt Hotham slopes illustrates this as do the multiple Big Desert fires of the last 20 years. Major wildfires have regularly swept the Big Desert and some areas burnt in the December 2002 fire had been burnt four times in the last twenty years. The fire crossed the Murrayville-Yanac Road "firebreak" and several recent fuel reduction burns.

Strategic fuel-reduced areas need to be combined with fire fighting capacity to be useful. Good resourcing of fire fighting capability is essential including improved "first strike" capability (see below). In addition, especially in severe fire weather, fire preparation of individual properties is essential and ultimately probably the most important factor. Fire protection methods such as good house design combined with a high level of fire precautions around the buildings (removal of flammable materials, clearing of leaves from eaves etc.) and fire readiness of the occupants (correct clothing, fire-fighting tools, ability to stay and defend the property etc.) has done much to reduce the life and property losses in recent fires compared with those in past years.

How quickly do fuels return?

Ground fuels are recognized as returning rapidly, often within 3-4 years. In the Wombat Forest fire study area surface litter re-accumulated quickly after prescribed burning due to reduced rates of litter decomposition and returned to 90% of the long-unburnt state within 4 years (Tolhurst and Kelly 2003). Similarly, in Chiltern, measurements showed that ground fuels returned to 95% of their steady state within 3 years while shrub fuels took longer and peaked at 9-10 years (Chatto 1996). The impact of fire on soil invertebrates, especially where an area is repeatedly burnt, will result in the rate of break down of leaf litter being reduced. Hence the build up of fuel can be more rapid than in unburnt areas and can potentially build up to higher levels than in undisturbed areas.

Ground fuels do not build up indefinitely (as implied by some berating the perceived lack of prescribed burning) but usually reach a plateau where decomposition balances deposition. This level and time to reach it varies considerably between forest types. At Chiltern it was found that the final steady state of ground fuel represented only a 'moderate' fuel hazard level. Far more needs to be done to determine the geographic spread of fuel loads, including the response of the shrub component (see below) in order to better understand the need and effectiveness of prescribed burning.

Fuel structure may be more important than total fuel load with shrubs and bark playing an important role (McCarthy and Tolhurst 1988, Chatto 1996). A longer-term effect (up to 10 years) of fuel reduction burning is claimed to be achieved by the reduction in bark on trees – the main source of flying, burning embers (McCarthy and Tolhurst 2001). The spread of fire through bark is undoubtedly a major factor in many fires in Victoria depending on the type of eucalypt involved. However the effectiveness of fuel reduction burning in reducing this is debatable. A wildfire will often spread higher up the trees than is possible for a prescribed burn, igniting and potentially throwing off burning bark untouched by milder fires. To be reasonably effective at reducing this hazard, the prescribed fire must be fairly severe, with high scorch levels. Indeed at Chiltern, it was found that bark hazard showed no relationship with time following prescribed burns (Chatto 1996). Conducting hotter burns safely will be extremely difficult and will exacerbate the problem of restricted opportunities for burning under the desired perfect conditions, especially in drier years. It is also quite possible that the stimulation of shrub growth by fire will counter the effect of reduced bark in at least some forests. The expectations of the duration of effectiveness of fuel reduction burning, and of their ability to prevent spotting should be more realistic and should be based on what is experienced in the field.

There are some environments where prescribed burning may actually increase rather that reduce fuel loads. The alpine and sub-alpine area is one of these. The effect of fire on some of the vegetation communities here is similar to the effects of grazing (see discussion below), except that it can be more dramatic. The removal of the grass cover encourages the germination of shrub seedlings and regular fire can favour those species that can take advantage of the bare ground that remains for years after fire. Some of these shrubs such as *Bossia foliosa* and *Ozothamnus hookeri* can increase rapidly after fire and will burn fiercely in any subsequent fire (Good 1980). Thus as with grazing, a grassy sward may be replaced by more fire-prone shrubs and fire danger is increased, not reduced. A recent study of the alpine vegetation and fuel hazards following the Caledonia fire in 1998 (Gregory, McCarthy, Tolhurst and Chatto 2003) concluded that there was no imperative to apply prescribed burning to Victorian alpine and subalpine vegetation for fire protection reasons and no need for it for ecological reasons as there are no fire dependant alpine species. Most importantly it was concluded that it was important <u>not</u> to apply prescribed fires in the high country as marked soil erosion could occur.

In some other habitats, fuel reduction burning similarly increases fire risk where it encourages rapidly growing, flammable shrubs. This is the case in many of the drier forests such as box-ironbark and many of the foothill forests such as some of those near Melbourne. Some of these are in need of fire for ecological reasons but are best burnt every few decades to maintain their diversity. Fuels will be reduced in the short-term, then increased due to a flush of peas and wattles within 3-4 years (see photos), followed by a steady decline to again reach a relatively low steady state after about 10-12 years (see photos over page). Thus lower fuel levels can result from either recent burning or a long time since fire. Burning habitats at a frequency that removes the shrubs and decreases the diversity is not justified unless the area is particularly strategic.

Therefore the impact on fuel loads by fires is complex, with differing effects on ground fuels, shrubs and bark, all of which vary between forest types. The real test of how long fuel reduction is effective for is best seen by how they perform in the field in different forest types when interacting with wildfires, rather than by just by looking at theoretical fuel loads.

Shortly after fire in Kinglake National Park near Steels Creek in 1983

One year after fire in Kinglake National Park near Steels Creek

Three years after fire in Kinglake National Park near Steels Creek

Four years after fire in Kinglake National Park near Steels Creek

Twenty-four years after fire in Kinglake National Park near Steels Creek

Nearby area in Kinglake National Park near Steels Creek burnt about forty-three years ago

Restrictions on undertaking burns

The severity of the drought impacted the fuel reduction program of DSE which plans and oversees fire protection in all public land, including parks and reserves. The weather patterns and the dryness of the fuels meant that the number of days when it was considered safe to conduct these burns was considerably reduced. Caution on the behalf of the Department with respect to these burns is understandable in the light of the risk and liability these can pose. It must be remembered that much of the public that is so ready to point a finger of blame at the department (and at 'greenies') after these recent bushfires are also extremely ready to complain and sue the Department should any of the control burns escape. For instance, compensation was claimed for damage from an escaped controlled burn from the Cobaw Forest north-west of Melbourne in 2003 and there were also demands for compensation as a result of back-burning conducted during the 2003 February fires in East Gippsland. DSE is often damned if it burns and damned if it doesn't.

Although the amount of fuel reduction burning in the years prior to 2003 and 2007 was below that which might have been achieved in wetter and cooler years, it must also be remembered that the severe conditions meant that such fuel reduced areas were of less use than they might have been under milder conditions. For more remote areas or for areas where severe fire approached on hot windy afternoons, it is unclear as to the extent that the presence of such areas would have been of assistance.

Providing sufficient resources for DSE to conduct needed burns when weather conditions are suitable is important and is far preferable to relaxing controls on how these are conducted with possible detrimental effects. Indeed we believe far more needs to be done to understand the impacts on flora and fauna when deciding how, when and where to conduct these burns

Is current burning less than in the past?

Many voices have been raised to claim the severity of the recent fires is dues to lack of sufficient fuel reduction burning. These same voices often refer to pre-European fire regimes, claiming that fire under Aboriginal regimes was far more frequent and on a much larger scale.

We acknowledge that Aboriginal people burnt parts of the environment some of the time, but only the most selective reading of history would support the thesis that all Victoria was like a park after being burnt from end to end. Reference to sightings of smoke and open areas are commonly made, but explorers' accounts are also littered with descriptions of "impenetrable scrub", "thick bush" and "endless forest". Open areas encountered were as likely to be caused by maturity of forests from lack of disturbance, not the opposite. Firestick practices seem to have been prevalent in grasslands, heathlands and open forest, but nowhere near as much in the great forests of the Divide, Otways and South Gippsland where big 3-500 year old Mountain Ash were common. Even parts of the Mallee remained long unburnt.

There is no evidence that Aboriginals burned large areas of snow-plain or sub-alpine grassy Woodland. Indeed, dendrochronological studies of fire scars on Snow Gum have been used to gather data on fire frequency in the alpine and sub-alpine areas. This research has shown that there was a substantial increase in fire frequency in the high country after 1860 (Banks 1989; Richards et al. 2001). It appears that major high country fires were rare, occurring once or twice a century (Wahren et al. 1999). Aboriginal burning in the high country appears to be in no way synonymous with large-scale, indiscriminate burning post-settlement championed by vested interests such as graziers. The Royal Commission by Stretton into the disastrous Black Friday fires in 1939 soundly criticised a range of interest groups including graziers for this practice which resulted in an increase of shrubs.

Forest with sparse understorey and grassy ground cover can result both from very frequent burning (which eliminates many species from the undergrowth, especially species that are slower to mature) and from infrequent burning (which allow shorter lived species to largely die out, but leaving a 'seed bank' in the soil – and is illustrated in the photos). Probably both conditions existed before settlement in various areas and habitats. Interestingly the Stretton report subscribed to the latter pre-settlement condition blaming the increase in scrub within forest on disturbance including clearing and burning by settlers and graziers.

We will never know just how much burning was carried out pre-settlement, but fires are probably more common in some areas now, not less common.

Improving the science

The Department needs to conduct more statistical studies of the effectiveness of prescribed burning in various forest types. Up to the mid-90's, internal fire research reports contained largely anecdotal evidence. They selected a few examples of prescribed burning that helped control fires but ignored an unknown number that did not. No overall analysis of all interaction of wildfire with prescribed burning was undertaken. More recently, Fire Management Research Report no. 51 "Effectiveness of broadscale fuel reduction in assisting with wildfire control in parks and forests in Victoria" (McCarthy and Tolhurst 2001) looked at a larger sample of fires and used some statistical analysis. However it also presents tables in which only mean values are given and drew conclusions on the effectiveness of fuel reduction without clear substantiation. Results appear somewhat inconclusive and, from some of the figures given, it seems that zones 4 and 5 (low or no burning) had fuel levels that were little different from, or sometimes less than, zones 1 and 2 (higher levels of burning). This may be as a result of the stimulation of shrub growth by the fuel reduction burns countering reduction of other fuels.

The recent larger fires give an excellent opportunity for examination of what happened in practice when the fires crossed recent prescribed burn and past wildfire areas. We trust DSE Fire Management Branch will be doing this for the whole of these fires and not just selected parts. We hope to undertake an analysis ourselves using information now available on the web, perhaps using environmental student projects. If completed in time, we would like to present this to the inquiry in due course.

Another problem with the fire management research to date is that it has taken place in too few areas. As far as we are aware, the only place that research has been taking place on multiple

burning regimes is in the Wombat Forest. There has been some single post-fire sampling in East Gippsland and Chiltern (and possible elsewhere that have not been reported on). But overall far more needs to be done on the fuel load response post fire in a range of habitat types and conditions. The same comment is especially true for research into flora and fauna response to fire (see further below)

(2) the manner in which prescribed burning is conducted, including how applicable codes of practice are employed;

We are generally supportive of the Code of Practice for Fire Management but it is difficult to ascertain the extent to which this is adhered to in practice when conducting burns. The audits provided on the web conducted in 1999, 2001 and 2002 examined only a handful of prescribed burns and are not sufficient to give an overall picture.

Of particular concern to us is that there appears to be very little or no survey of flora and fauna before these burns or follow-up monitoring afterwards. While not practical for every fire, adequate information on the effect of fire on key species and communities is essential for sound fire management. If we have this knowledge we can better cater for both fire safety and biodiversity protection at the same time. However such information is sadly lacking in many areas and it is imperative that far more resources are provided to allow this essential research.

(3) the impact of prescribed burning and recent wildfires on Victoria's biodiversity, wildlife and other natural assets including water quality and quantity;

Undoubtedly, the recent wildfires had severe effects on some aspects of the environment including increased susceptibility to soil erosion and impacts on fire sensitive flora and fauna species and communities. The widespread nature of the fires mean that even some more common species may have been reduced at least temporarily.

However, there are also many flora and fauna species and communities that are well adapted to fire, especially in dry forest areas, including some that benefit from fire. Some of these species may even have been lacking recent fire. Nonetheless there are additional pressures today, including global warming, habitat fragmentation and modification from uses such as ski resorts and logging, which may compound the impact of the fires. The issue of biodiversity and fire is discussed further below.

Fire and biodiversity

Victoria is a highly diverse State and our biodiversity is our most valuable and irreplaceable natural resource.

At the broadest scale, there are 16 natural regions in the State, varying from the dune sheets of the Lowan Mallee in the north-west to the mountains of the Eastern Highlands (Conn 1993). These regions are clothed by different native plant alliances providing habitats as varied as rainforest, mallee scrub and grasslands. These habitats both reflect the 'natural' burning regime and shape the regime. They have evolved in unison for many tens of thousands of years.

Some habitats frequently burn and are more flammable, such as grasslands and heathlands. Some habitats infrequently burn (if at all), such as rainforests and tall wet forests. Other habitats burn at frequencies in-between, such as dry forests and dry woodlands.

Reducing the scale further, major habitats are made up of "sub-habitats" of varied topographical, geological, hydrological and biological factors, which leaves them far from uniform. In Victoria they can be divided into 28 Broad Vegetation Types and over 400 Ecological Vegetation Classes with varying fire regimes.

The biodiversity in Victoria reflects this diversity of regions, habitats, sub-habitats and burning regimes. Any attempt to impose a single burning regime across this diversity will simplify statewide ecosystem structure, function and composition and reduce overall biodiversity. The key to preventing this simplification of the natural environment is to employ flexible, diverse burning

regimes that mimic, as much as possible, the natural conditions under which particular species and habitats have evolved. It is also important to burn "patchily" leaving burnt areas surrounded by unburnt areas from which species can utilise and re-colonise burnt patches.

Effects of prescribed burning and wildfires if too frequent or broadscale

Some effects of fuel reduction burns (and of wildfires) are:

- reduced litter biomass for one-three years post-fire (Figure 7: York 1994)
- reduced nutrient cycling (DEST 1996) including a decline in carbon and nitrogen and a loss of organic matter with frequent low-intensity fires (Hopmans 2003)
- increased temperature fluctuations and exposure to light on the ground storey
- loss of food and shelter on the ground storey for periods of one to many years.
- Increased soil erosion.

This last effect is most dramatic if heavy rains follow before the establishment of new ground cover and the risk is increased if repeated burning keeps ground and litter cover low. These effects can be expected to increase in magnitude and kind with broadscale burning, be it wildfire or prescribed burning. Repeated burning can compound these effects and also impacts on flora and fauna, some examples of which follow:

Flora

Plant species that have not matured sufficiently to produce enough seed or, if a resprouting species to regain their vigour, can be eliminated by a second fire that occurs too soon. As a result:-

- "Frequently repeated fires are likely to alter significantly the species diversity and structure of plant communities studied here" ([Dry Sclerophyll Forest] Tolhurst et al. 1992)
- "Frequent rotational burning appeared detrimental in the long-term to nutrient cycling and flora and fauna, especially longer lived and slower reproducing species" ([Dry Sclerophyll Forest] DEST 1996)
- “the recovery of the understorey after a single fire differed from that observed after successive fires … It is likely that high-frequency low-intensity fires will adversely affect the biodiversity of the forest ([Dry Sclerophyll Forest] Tolhurst 2003)
- Plants in alpine and sub-alpine areas generally lack the large carbohydrate stores that enable plants in fire prone areas to resprout readily. Species such as snow daisies may take many years to recover physiologically after fire (van Rees and Walsh 1985; Kirkpatrick and Dickenson 1985). Some species such as the Mountain Plum Pine, an important food plant for the Mountain Pygmy Possum, can be eliminated by a single fire (Mansergh et al. 1989).

Mammals

Some small mammals depend on fire for their preferred habitat such as the New Holland Mouse *Pseudomys novaehollandea* and the Heath Rat *Pseudomys shortridgii*. These are relatively rare and restricted species in heathland – a habitat that normally requires reasonably regular fire. There are other widespread species like the Agile Antechinus and Bush Rat that can persist with or without fire.

However there are also species such as the Long-footed Potoroo and Mountain Pygmy Possum which are greatly disadvantaged by fire as this removes their protective cover and food supplies.

The sensitivity of some mammals to changed burning regimes is illustrated by a population viability analysis undertaken for the endangered Southern Brown Bandicoot of South Australia. This indicated greatly increased likelihood of extinction if fire frequencies significantly deviated from once every 15 years in either direction, and particularly when these burns were broadscale in nature (Possingham and Gepp 1993)

Birds

Birds similarly demonstrate a wide range of responses to fire. A suite of species in the mallee, such as the Malleefowl, Red-lored Whistler and Black-eared Miner require long unburnt habitat, in the order of 60 years or more without fire, to survive, whereas the Ground Parrot (Eastern) seems to require fire frequencies of 4-15 years in coastal heathland,. The Rufous Bristlebird

(Otways) requires fire frequencies of 6 years plus to provide just the vegetation structure and composition they need (Garnett and Crowley 2000).

Across the board, 80 (31%) of Australia's threatened bird species and subspecies have 'inappropriate fire regime' or 'wildfire' listed as a threat to their survival in *The Action Plan for Australian Birds 2000* ((Garnett and Crowley 2000) signifying the major importance of fire in the conservation of our avifauna. (Affected species are listed in Appendix 1 of *The Action Plan*).

Invertebrates
Apart from being the largest component of our faunal biodiversity, invertebrates as an essential part of every ecosystem

- "There is clear evidence of community changes (to ants) in response to some fire regimes; with frequent fuel reduction, rarer species with more specialised requirements tended to be replaced by species with broader environmental tolerances" (DEST 1996)
- "In Mountain Ash Forest, fire intensity was found to affect the rate of recovery of soil invertebrates" (loc.cit.)
- Frequent fire caused a significant decrease in abundance of several invertebrate taxa in Dry Sclerophyll Forest in eastern Australia (York as cited in DEST 1996 - see Figure 10).

Conclusion
The paradoxical nature of the effects of fire was summed up by ecologist Barbara Wilson when she wrote: "Uncontrolled wildfires and unplanned fires may eliminate critical habitat and populations (of endangered wildlife). On the other hand, the absence of a particular successional aged habitat (created by fire) may result in population declines and threats to species" (Wilson as cited in DEST 1996). As emphasised at the commencement of this section, diversity of regimes and habitat in Victoria is the key and any attempt at a "one-size-fits-all" policy will have the overall effect of simplification of the State's environment and a significant reduction in its biodiversity.

Like overuse of prescribed burning, having large areas uniformly burnt out by wildfire is likely to be detrimental. More resources to control fires in the early stages are therefore very important and is discussed towards the end of this submission. In addition, some of the fire fighting techniques that deliberately burn out unburnt areas can conflict with the survival of species within the region affected, and should not be over used.

(4) the reporting process applicable to prescribed burning programs;

As noted above, the audits provided on the web conducted in 1999, 2001 and 2002 examined only a handful of prescribed burns and are not sufficient to give an overall picture. Of particular concern is the infrequent reporting of monitoring of the effects of fire.

Some monitoring has followed the 2003 fires in the high country and the Big Desert. However for prescribed burning, the only monitoring that has been published has been in an experimental fire area in Wombat forest. Unfortunately the results of this cannot be extrapolated holus bolus to different habitats with different species. We understand there may have been some limited monitoring undertaken elsewhere, such as in the Grampians and Little Desert, but the results have not apparently been published. It is vital that this be improved with more frequent monitoring in a range of habitats with publicly accessible reporting of results.

(5) the legislative and regulatory arrangements for prescribed burns and bushfire management;

We are generally supportive of DSE's fire management process which draws up Regional Fire Protection Plans encompassing all public land, including state forests, parks and reserves. These are compiled after extensive community input and review. They are not drawn up in isolation by bureaucrats. Their purpose is to protect people and property and at the same time, as far as practical, mimic natural burning regimes so as to maximise biodiversity.

These regional plans identify strategic areas to be fuel reduced near assets such as townships and pine plantations (deemed 'priority 1'), areas to serve as strategic breaks in more remote areas

('priority 2) and areas to be burned as part of a more broad-scale regime to complement the 'priority 1 and 2' areas ('priority 3'). Other areas, such as some heathlands, that require special fire management regimes to maintain fire dependant species are also identified ('priority 4) along with areas that are fire sensitive and should not be burnt ('priority 5').

'Priority 1 and 2' areas may have to be burnt at frequencies that compromise some species within them. However we accept this compromise providing the areas are not excessive. We are somewhat sceptical however, as to whether 'priority 2' areas are very effective, especially those in more remote areas (see our comments above). 'Priority 3' areas are to be burnt within the ecological tolerances of the major vegetation types and this principle is even more strictly applied in 'priority 4' areas.

We may not agree with every detail of every fire plan but we support the principles. The main problem may be the level of resources available. For instance we would like to see enough resources to ensure the implementation of burning regimes for 'priority 4' areas.

There is an intention under the recent review of the Code of Practice for Fire Management to expand these plans to also encompass private land and to include Fire Ecology Strategies as an integral part of each regional plan. We strongly support this integration of all land and of fire protection and fire ecology together.

Sometimes we need more fire, sometimes we need less, and sometimes the current regime seems about right. Victoria has good, integrated fire plans and implementation, and most that are involved are doing their best to deal with a highly complex phenomenon. Remarkably few houses and major assets were destroyed in Victoria in both the 2002-3 and 2006-7 fires, considering the extent and duration of the fires. Only one life was lost in each. This indicates a degree of effectiveness of fire fighting and fire protection methods and regulations in Victoria relating to asset protection including fire protection measures that are taken before the fire approaches.

We are however concerned because this sound planning process has recently been circumvented with the hasty construction of major fire breaks without any public consultation, analysis of environmental impacts, or proper understanding of costs and benefits (see comments below}. For instance DSE and PV have planned and commenced implementation of an "Otway Fire Protection Enhancement Project" without any public process or prior environmental assessment. This includes the creation of a "strategic fuel break network" and the creation of a "strategic wildfire moderation zone", neither of which exist in the Otway Regional Fire Protection Plan or the Code of Practice for Fire Management. Indeed areas that are shown as zone 5 (exclusion of burning) in the Otway Regional Fire Protection Plan are now included in this years 'strategic burns'.

This lack of public consultation and environmental assessment is in breach of the Code of Practice for Fire Management and of the federal Environmental Protection and Biodiversity Conservation (EPBC) Act

(6) the effectiveness of maintaining permanent, strategically placed fire breaks and containment lines throughout public land areas;

In January the government announced that 600km of permanent fire breaks would be established around water catchments in Victoria's central highland region. Some 350 km of these have now been cleared during and since the fires (see photos). In the Otway region a further 150km is proposed or has recently been cleared along roads (as part of the above "Otway Fire Protection Enhancement Project"), in addition to slashed firebreaks around several Otways townships. Huge fire breaks were also cleared in and around the Big Desert in 2003 extending for over 200 kilometres (see photos over page).

Fire breaks, while they do little or nothing to stop a fierce fire because of spotting, can be useful if they are immediately adjacent to an asset being protected by firefighters or if they can be used in the back-burning process. But if they are to go in at all, their positioning should be carefully planned, both for effectiveness and conservation reasons. We are concerned about a number of issues here, including weed and feral animal invasion and fragmentation of flora and fauna populations by increased barriers to species migration. Such fragmentation of forest habitat will affect the ability of some species to adapt to climate change or to other major impacts including fire.

Fire break cleared near northern edge of Wyperfeld National Park in 2003

Fire break cleared in middle of Wyperfeld National Park, just north of Wirregren Plain in 2003

We are also concerned that there has been little science being put forward to justify the claimed effectiveness of the breaks in the situation in which they are being placed. For instance whether it is practical to back burn the type of forest in which they are cleared and how big a break is necessary compared with what breaks already exist along roads. We are also concerned that many that have been already been cleared are far wider, and with more trees removed, than was stated to us by Parks Victoria/DSE to be prescribed for the breaks (20 or 40m).

The clearing around the Otways coast has potential to impact on many areas in the Great Otway National Park including some of international importance for orchid conservation. In the Central Highlands there is potential for serious impacts on both the environment and on tourism if fire breaks are not placed appropriately. Unfortunately, a VNPA visit in late February to the area between Cumberland Junction and Woods Point along the northern and eastern edge of the Yarra Ranges National Park revealed an ugly stretch of recent clearing – even though it was several weeks after fire had been in the region. Most of this was in the National Park rather than the adjacent state forest and large numbers of logs were being debarked and removed. Enormous piles of logging slash and bark were left on site - with the fire season far from ended. Two months later in early April, clearing was still occurring in the Matlock-Aberfeldy area, long after the fires had been controlled and in breach of the EPBC Act and the Code of Practice for Fire Management.

Fire break being clearing in Central Highlands National Park Feb 26th 2007

Fire break clearing between Aberfeldy and Matlock April 10th 2007

The remaining 250 km of breaks proposed in the central highlands region have many sites vital for threatened species, particularly Leadbeaters Possum. They are also through tall wet forest and rainforest with myrtle beech and ferny understoreys which would not appear to be amenable to back-burning. They transect import and highly attractive tourist routes such as the “Big Culvert” area. The area cleared, and planned to be cleared, also contains important vegetation such as temperate rainforest. This rainforest contains Myrtle Beech which is highly susceptible to the disease myrtle wilt being brought in by disturbance and machinery. The firebreaks in the mallee would have impacted on a range of flora and fauna including endangered species such as Malleefowl.

Since our visits to the central highlands, Parks Victoria has told us that there will be a temporary halt to the work and we trust this is the case. Biological consultants have at last been asked to look at the existing and proposed fire breaks and make recommendations and to prepare a proposal for approval under the federal Environment Protection and Biodiversity Conservation Act. We welcome this move which should have happened far earlier, once the fire emergency had passed. It will allow at least some public comment when this is advertised on the EPBC website and when amended Fire Management and Fire Operations Plans put out for public comment. These legally required steps should have been initiated earlier and should also have occurred for the mallee clearing.

We also seriously question the logic of clearing these breaks to protect our water supply when logging (which has an equal or possibly more intense effect on reducing streamflow and causing turbid run-off) is still occurring within the Thompson and Armstrong catchments. Indeed we drove past active logging coupes in February when visiting the on-going fire break clearing. A virtual visit via Google Earth reveals many logging coupes in the Thompson catchment adding up to a not insignificant area. As the Google Earth photos are not necessarily recent, the amount of logging could well be more than is shown.

With the long-predicted climate crisis upon us, it is very important that our land managers (Parks Victoria and DSE) have a clear strategy to deal with the threats that climate change presents to natural systems. The need for such a strategy is because it has been estimated that temperature sensitive species will need to migrate some 6km per decade towards the poles at the present rate of climate change (Parmesan and Yohe, 2003). The setting up of barriers and habitat fragmentation by factors such as increased firebreaks is a serious issue. We hope an effective strategy will be set up where any additional fire protection needed because of climate change will be properly planned with adequate consultation with the community and with all appropriate experts including those responsible for flora and fauna protection.

(7) the provision and maintenance of large water points on crown land to assist with bushfire aerial taskforce operations;

This would seem to be sensible. It is preferable to knocking down mature riparian trees and bulldosing holes in rivers during the heat of the fires as was reported in Parliament by Mr Koch (14 March 2007 Council). However we urge that sensitive areas such as wilderness areas be avoided if possible and maximum use is made of existing water bodies. We ask for sound planning and assessment to ensure these are not placed in sensitive areas with resulting high impact.

(8) the impact of traditional land uses such as timber harvesting, grazing, four-wheel-driving, hunting, camping, mining and prospecting on the scale and intensity of bushfires and the ability of relevant agencies to respond;

Grazing

The recent fires have lead to the predictable repeat of the claim of the Victorian Mountain Cattlemen's Association that '*grazing reduces blazing*'. Much was made of the fact that sections of the Bogong High Plains were unburnt. As the cattle frequent the grasslands and because these grasslands did not always burn, it was being claimed the two are cause and effect. But there were also many parts of the Bogong High Plain and of other areas in the alps that were grazed and yet burnt.

Shortly after the 2003 fire, a group of scientists set about testing the "grazing reduces blazing" theory. The authors of the study (Williams el al 2006) are all scientists with solid reputations: Dick Williams (CSIRO Sustainable Ecosystems), Carl-Henrik Wahren (Centre for Applied Alpine Ecology at La Trobe University), Ross Bradstock (Biodiversity Conservation Science, NSW Dept. of Environment and Conservation), and Warren Mueller (CSIRO Mathematical and Information Sciences).

Measurements were taken in over 400 locations through 100 square kilometres of the Bogong High Plains, in both grazed and ungrazed areas. They surveyed fire occurrence and intensity in alpine heathland (shrubby places) and in open heath (shrubs in grassland), and fire occurrence in grasslands. It wasn't possible to reliably measure fire intensity in grassland after the fire had passed.

The results were interesting.

Heathlands, at 87% burnt, were by far the most flammable, open heaths less at 59%, while only 13% of the grassland areas were burnt. Importantly, there was no significant difference between these results for grazed and ungrazed areas.

The severity of the fire in grazed and ungrazed areas was determined by measuring the size of twigs left on shrubs (small twigs remaining means a less severe burn) From this it was clear that there was no significant difference between grazed and ungrazed areas of heathland, even in open heathland where cattle had grazed grasses in between and around the shrubs.

Essentially, in alpine areas, fire is mainly spread by flammable shrubs, which cattle don't eat.

Overall mapping of the areas where fire passed also does not show any retardant effect of grazing. The 2003 fire blazed through almost every alpine grazing licence area in its path. A total of 240,000ha under grazing licences within the Alpine National Park was burnt amounting to approximately 93% of the area of all National Park grazing licences within the fire area. The notable exception was the Pretty Valley area of the Bogong High Plains - the largest grassy plains area in the Victorian Alps. The only comparable place in Australia is in Kosciuszko National Park, but even larger areas of grassland remained unburnt there, even though they had not been grazed for decades.

Mapping of the fire extent and intensity for the 1988 Caledonia fire in the southern section of the park shows that every bit of grazing licence area within the path of the fire went up in flames. That fire stopped at the Avon Wilderness – but mainly because it rained.

At the time of the 1939 fires, sheep as well as cattle were grazed on the high plains. Sheep graze much closer to the ground than cattle and yet all this grazing, and the graziers' fires to promote 'green pick', did not stop the fires from burning through the same alpine and sub-alpine areas as have been recently reburned in 2003.

Creation of bare ground by cattle trampling promotes the establishment of shrubs over grasses (Williams 1985; Williams and Aston 1987). As shrubs in open heath, such as Grevillea, age and begin to open out, they are eventually replaced by snow grasses and succulent herbs if undisturbed by grazing, fire or other impact. However disturbance of this grass sward allows a subsequent generation of shrubs to establish as seedlings. Cattle suppress these seedlings to a large extent by grazing, but over time there is a slow but steady increase in shrub cover. This is a common process and has been well-documented over the Bogong High Plains both by comparison with grazing exclusion plots, some monitored for over 50 years, and by examining historical photos (van Rees 1984; Williams 1985).

In closed heathland, cattle have very little impact on shrub cover, as the shrub species present in this plant community are not palatable, and the dominant shrubs regenerate vegetatively (eg. from stem buds or root stock) following disturbance.

Alpine grazing therefore does not reduce blazing by "controlling" the shrubs. Nor do they remove the bark and litter in the surrounding woodlands and forests that spot fires into the alpine and sub-alpine areas. Instead *grazing* steadily *increases blazing* over the long-term by encouraging the establishment of shrubs within the grasslands.

Logging

The Caledonia fire intensity map (DNRE 1998a) when overlain on a logging history map for the Carey State Forest which was substantially burnt in the Caledonia fire (DNRE 1998b) shows no inverse correlation between canopy scorch or burn intensity and logging coupes. This suggests that logging and time since logging may be almost irrelevant when fires erupt at times of extreme fire danger.

The 2003 and 2006-7 fires have encompassed an extremely wide range of forest including unlogged and heavily logged areas. There is no evidence that logging retarded fires in any way whatsoever. Indeed some of the more severe and/or rapidly spreading fires occurred in 2003 to the east of Mt Beauty, south of Corryong and to the north-east and east of Benambra all of which which had recent logging coupes. Logging has been found to create a drier forest type for at least some forest types in the short to medium term with changes from damp ferny understoreys to more flammable shrubs (Mueck & Peacock 1992).

The dense regrowth that occurs after clearfelling will also add to fuel loads. Where these regrowth forest are thinned, extreme difficulty has been experienced in conducting fuel reduction burning within them because of the high levels of debris that results from the thinning operations (Buckley et al 1989). Thus it is unlikely that logging, especially intensive logging practices, will reduce fire risk - the reverse is more likely.

National parks and national park management and fire risk

A common source of fire and its spread is often said to be 'national parks'. But statistics do not support this assertion.

Rees (1984) investigated fire and land tenure for the period 1974-84 in Victoria and found that forest fires were four times more likely to occur in state forest compared with national park, and that state forest fires burnt eight times the area of national parks fires. Only five percent of forest fires started in national park.

Similar studies in other states have reached the same conclusions. In South Australia, analysis of fires over the 10 year period 1974-84 found that only 14% of fires started in National Parks and Wildlife Reserves whilst 85% of fires started on other land and burnt into NPWS parks and reserves (Brandle 1992). In NSW it was reported that of the 942 fires which occurred in National Parks in 1990-94, only 64 of these left park boundaries but 341 came from neighbouring lands into National Parks (National Parks and Wild Life Service “Fire Facts” sheet 1994). Thus in all cases, the surrounding state forests and private land appear to be more of a risk to National Parks than the other way round.

It is essential to take a historical perspective and average statistics for a true picture to emerge. Because 38% the area burnt in the 2002-3 fires was in national park and conservation reserve, opponents of national parks used this figure to attack parks and their management. But in the more recent fires national parks only represented about 25% of the total area burnt. The 2002-3 and 2006-7 fires were started by lightning, with about half started outside of parks. The presence of dry mountain ridges is the main factor here. But overall, most fires (62-68%) are started by man (Rees 1984, DSE website – fire and other emergencies – bushfire statistics) and cannot be related to national park management.

(9) the provision and maintenance of serviceable access tracks and signage to assist with recreational and emergency requirements;

It has been often claimed during and after major fires that the existing road and track network is inadequate and that it needs to be extended and upgraded to improve and aid fire detection and suppression. As roads and road maintenance have severe detrimental effects on conservation values, in particular through facilitating the spread of weeds and vermin, expansion of the track network is not to be taken lightly. A study of weeds in the Kosciuszko National Parks (Johnston et al. 2001) has found that the majority of weeds are introduced in this way.

The VNPA contends that the current road and track network in Victoria is extensive and more than adequate to meet the needs of firefighting. This is best demonstrated by examining those areas with the least extensive networks statewide to see if even these areas are "well tracked" or not and if they were particularly prone to burning in the current fires.

The most thorough examination of the State to date for 'naturalness' was the 1990 Land Conservation Council report *Wilderness - Special Investigation.* Wilderness areas mapped in this report were synonymous with highly 'natural' areas. These areas were determined by examining four indicators, three of which related to the absence of roads and tracks: remoteness of access, aesthetic naturalness and remoteness from settlement. The majority of the fires in 2003 and 2006-7 correspond with areas of low-medium wilderness quality where naturalness values have been significantly reduced primarily by the presence of tracks and roads. The main exception to this is the Avon Wilderness area but even this is not entirely without tracks. As Helman et al. (1976) has put it: "Roads remain the biggest single problem facing the delineation of wilderness in Australia".

Mosley (1971) highlighted the problem when he said that he could find only six small areas in the Victorian Alps further than five kilometres from a vehicular track. Similarly, even the wilderness

areas identified by the LCC (1990) were so covered by tracks that most descriptions of them (eg for the Catherine block and Yarrarabula block [south of Bright] were: "no areas of the block are greater than 3km from a road or track", or at best, "no areas of the block are greater than 5km from a road or track" for the Bogong block. And it must be remembered *these are amongst the state's remotest, least-tracked areas.*

Examination of the 2003 and 2006-7 fire areas indicates that lack of access was not a major factor in fire spread. Areas without tracks are mostly too steep and rugged to accommodate them. In the case of the 2003 fires, the location of the 14 lightning strikes that DSE was not able to quickly extinguish and which became the source of the 2003 fire had track networks comparable with the 70+ locations where lightning fires were quickly put out. Access was not the limiting factor.

Fire histories elsewhere in the State indicate that access is not the critical factor. It would be hard to find a more extensive road and track network than exists in the Dandenongs and yet the area has suffered many fires, most recently in 1997 when three people were killed and 41 houses burnt. Similarly, most of the 1983 Ash Wednesday fires occurred in heavily tracked areas to the east of Melbourne, eg. Beaconsfield, or to the south-west, eg. Anglesea.

The only points we would agree with is that tracks, if they are to be kept, must be adequately maintained to allow safe access and to reduce soil erosion and that good signage is important, especially in an emergency.

(10) the impact of climate change on bushfires and public land management practices;

Our climate, vegetation and topography ensures that fire is not a rare occurrence as can be seen from the list of major fires in Victoria since records began:

1851, 1899, 1905, 1906, 1912, 1914, 1926, 1932, 1939, 1942, 1943, 1944, 1952, 1965, 1968, 1969, 1972, 1977, 1980-81, 1983, 1985, 1997, 1998, 2002-3, 2006, 2006-7

The DSE website gives details on each of these (see Fire and other emergencies - significant fire years –major bushfires in Victoria). Some of these fires were of a similar magnitude to the recent fires and runs of major fires have also occurred in the past. There have been major fires approximately every 7 years since records began in the 1840s and the average is 620 fires a year burning an average of 110,000 ha (Parks Victoria 2003).

Unquestionably, the major cause for the 2003 and 2006-7 fires was drought associated with "El Nino" and was probably exacerbated or even caused by global warming. "El Nino" (warming of the equatorial Pacific Ocean) occurs approximately every three-seven years (Karoly et al. 2003).

Such climatic events have been regular occurrences in Australia, but even within this context, the current drought has been exceptionally severe. With 2002 and 2006 being both extremely dry and hot, and Victoria having already suffered six and nine dry seasons in a row respectively, it was not surprising that the vegetation of the State was dry and severely stressed. The undergrowth, ground cover and leaf litter was exceptionally dry, even in vegetation types which normally remain damp, such as wetter forest types and alpine areas. This meant much more fuel was available enabling hotter and harder to control fires which entered areas that tend to remain unburnt by fires in milder years.

Climate change is likely to result in more rather than less fires including in areas where they are currently rare. Adequate resourcing and preparation will therefore be essential. However it is important to recognize environmental values and assets as much as man-made assets when planning protection and when fighting fires. Thus actions such the building of permanent fire breaks must be properly planned and implemented and not done hastily as a knee-jerk reaction. We also emphasise the importance of well resourced fire fighting capacity including 'first strike' capability as a key requirement in a higher fire risk world (see further comments below).

(11) whether additional measures are required to provide a mechanism for the skills, knowledge and interests of local communities, and appropriate scientific expertise, to be better represented in the management of bushfire risk on public land;

The inclusion of biological expertise at all stages of fire protection, from initial planning of fire prevention measures through to fire fighting incident teams is essential. We are concerned that fire protection measures tend to be concentrated on "built asset protection", and can ignore natural assets. Threatened species like the Mallee Fowl or Mountain Pygmy Possum, and areas of rainforests or Pine-Buloke woodland, for example, recover very badly from fire and should be as energetically protected as are built assets.

The burning of mallee in Mallee Emu-Wren habitat last year, the recent failure to tackle a spot fire near Falls Creek before it burnt vital Mountain Pygmy Possum habitat at Mt McKay, and the construction of massive fire breaks in parts of the Big Desert in 2003, shows there is considerable room for improvement. The recent fire breaks constructed without proper planning in the Central Highlands and the Otway is another example where biological consultants have been called in largely after the event, rather than at an early stage. We must be more proactive in protecting our natural resources.

(12) the involvement of local communities in the management of fire;

Similarly, in undertaking local fire management planning, any local biological expertise such as Field Naturalist groups should be utilized for their local knowledge that may well be more extensive than Departmental data bases. This local knowledge will also be important during fire fighting.

(13) any other matter that impacts on the scale and intensity of bushfires in Victoria.

Provision of adequate resources for fire fighting
A major cause of the extent of the fires in 2003 and 2006-7 was the simultaneous starting of multiple fires by lighting, stretching the capability of fire fighting resources at the start of the fires when control is so crucial. It is well known that fires in their initial stages are far easier to control than ones that have developed in size with expanding fire fronts. In 2003, over 80 fires were started by lightning strikes in eastern Victoria on January 7-8th, (at the same time as over 40 fires in NSW). On December 2nd 2006, 56 fires started from lightning in central Gippsland/north-eastern Victoria. These unfortunate events over-stretched the fire-fighting resources forcing DSE to prioritize its fire fighting efforts towards those fires closer to townships and other important assets rather than being able to follow its normal policy of tackling all fires with an aim as controlling them as quickly as possible. To its great credit the number of uncontrolled fires in each case was greatly reduced within a few days but it was the few remaining fires that subsequently went on to combine into the massive fires that lead to this and other inquiries.

The department has previously documented that when first attack fails, these few fires account for the majority of the area burnt and a significant part of the overall suppression costs, with larger and more protracted fire campaigns (McCarthy and Tolhurst 1998) and there is some current opinion in DSE (expressed at a recent seminar at Melbourne University) that more resources and training in first attack capacity might have prevented the extent of recent fires. Thus spending on first attack capability, even if not needed in every season, is money well spent. It will save money overall as well as preventing much social cost and environmental damage where fire enters fire sensitive areas or burns too large an area.

Perhaps this inquiry might be able to determine what additional resources and other improvements might help this first strike capacity. For instance there has apparently been some controversy as to how easily and on what budgets aerial fire cranes can be called in at the very first stage.

Appropriate firefighting methods

Overall we are highly supportive of the fire fighting efforts of the Department, the CFA and others in what were very difficult and dangerous conditions over an extraordinarily long period. Their achievements in terms of protection of property and life are commendable. However there are several aspects relating to the environment that could be improved or should have been avoided.

As noted above, better consideration of biological assets is required during fire fighting, including during back burning. For instance backburning on Mt Buffalo during the recent fires resulted in the reburning of alpine bogs damaged in the 2003 fires at the same time as the (failed) attempt to protect Cresta Lodge. Here protection of the lodge took precedence over natural assets even though it was a national park. We believe there needs to be better mechanisms to convey awareness of the location of such important sites to firefighters to ensure their protection as far as possible from both wildfires and backburns and also from bulldozer lines. The survival of flora and fauna should also be a consideration when deciding to burn out remaining pockets of vegetation, especially if these are not close to the fire edge and may not represent a major fire risk if left. The protection of biological assets, especially those that are very localized and could become extinct should rate at least as highly as the protection of built assets.

Back burning is a powerful and important tool but is one that can also do much damage if misused. At a very recent seminar by Kevin Tolhurst, entitled "Back burning: do we make the wildfire situation worse" given at Melbourne University on May 23rd, it was outlined that it was very important to both properly "black out" back burns (a failure in the case of the Mt Buffalo/Cresta lodge backburn) and to only undertake them in moderate weather. There is also the problem of individuals undertaking backburns that protect their little patch while expanding the fire to the danger of everyone else.

While some successful back burns were conducted during the recent fires, there were also some serious failures including one where the continuing of a backburn into unfavorable weather resulted in an escape that burnt another 90,000 hectares. The audience, who included some DSE personal, volunteered that there had also been a considerable amount of escapes during the 2003 fires. Indeed in 2003 we heard various complaints about areas that were back burnt including Mount Pinibar, Mt Tingaringy and around the Deddick area including claims that some became large and intense as a result of being left unattended.

The Code of Practice for Fire Management gives little guidance for the conducting of back burns and does not include mention of suitable weather conditions, the necessity of blacking them out or of how backburns are approved. We consider this situation should be improved, including by input from Mr Tolhurst as a matter of urgency. Perhaps some of these details are in Departmental guidelines but these are not available to the public.

Complementary Bushfire Mitigation and Prevention Approaches

Since the Ash Wednesday fires of 1983, and the subsequent analysis by CSIRO of reasons for the loss of houses, there has been much more emphasis in Victoria on house design, for regulations to enforce this for new houses in fire prone areas, and on educating the public on how to best protect their house before and during fires. The latter consists of matters such as appropriate plantings close to houses, installation of roof sprinklers, clearing up flammable material around houses, clearing of gutters, reducing other possible areas that might catch burning embers etc. The public are now encouraged to stay with their houses if they feel capable and are given advice on the appropriate clothing and equipment and actions to take including drawing up their own 'fire plan'. The relatively low loss of houses with these severe fires perhaps illustrates the success of this program.

It is important that emphasis continue to be placed on this aspect rather than conceding to demands that would have serious impacts on biodiversity.

Improvement of Planning Controls

The call for new or increased breaks also illustrates the problem of allowing subdivisions in fire prone areas without making allowance for sufficient buffers from natural areas. It is no more sensible to call for extensive firebreaks after a subdivision is allowed, than to belatedly discover a need for roads or sewerage.

As mentioned above, building design guidelines exist for houses being built in fire-prone areas. In Victoria this is implemented via a 'wildfire overlay', applied via the planning legislation and which covers significant areas of native vegetation. We have great concern, however, that this overlay merely applies the building guidelines and demands large buffers to be cleared that could seriously impact on the biodiversity if the subdivision has small lots. It does not discourage new development such as rural residential subdivision in these areas. The fire emergency that occurred (twice) at Cobungra in 2003 is an example of what can happen in bushland 'lifestyle' subdivisions.

Compounding this, the Ministerial guidelines for rural residential subdivision (Ministers Direction No. 6) which previously prohibited rural residential subdivision which resulted in vegetation clearing, were weakened last year to allow these subdivisions in bushland areas. Thus more of these subdivisions inviting conflict are possible.

It is one thing to ensure that a house being rebuilt in these areas has sound fire-resistant features, but it is another to allow increased development that demands widespread clearing in order to make it safe. There is therefore currently great potential for conflict. The overlay should be changed to specifically discourage or preferably prohibit development such as residential subdivision in these areas - with extensive vegetation clearing resulting in areas that are basically unsuitable for new development for fire and environmental reasons. This type of development is unacceptable in an era of climate change.

Conclusion

The serious fire situations that we have seen in the last 4 years could be prevented from reoccurring, in spite of climate change if:

- Well placed strategic fuel reduction burning is undertaken along with well- researched ecologically based burning where needed to benefit flora and fauna.
- Increased resources and training are provided to improve "first strike capacity" to the point that it can deal with the extent of lightning strikes seen in recent years.
- The control and conducting of backburning is improved so that it normally aids fire suppression and does not result in an expansion of the fire.
- Improved building design and the taking of fire prevention methods by individual landowners to protect their own lives and property – as strongly advocated by the CFA.
- Improved planning controls that prevent residential and other unsuitable development in fire prone areas.

We have serious doubts about the efficacy of the proposed (and already created) major fire breaks and especially about their environmental impact and we are also concerned that prescribed burning not become broadscale.

References

Banks (1989): A history of fire in the Australian Alps: in The Scientific significance of the Australian Alps, Ed. R. Good, Australian Alps National Parks Liaison Committee.

Brandle (1992): "Select Committee on Bushfires" in Xanthopus No. 139, Newsletter of the Nature Conservation Society of South Australia, February 1992

Buckley, Andrews, Corkish and Nicholas (1989): Fire hazard and prescribed burning of thinning slash in eucalypt regrowth forest: Fire Management Research Report no 29, Fire Management Branch, Department of Conservation and Environment.

Chatto (1996) "Fuel hazard levels in relation to site characteristics and fire history – Chiltern Regional Park case study": Fire Management Research Report no 43, Department of Natural Resources and Environment, CFTT – Creswick Research Station

Conn (1993) Natural regions and vegetation of Victoria, in Flora of Victoria, Eds. Foreman et al., Vol. 1, pp. 79-158, Inkata, Melbourne.

Calder (1997) The Hand of Man: People and Fire, The Environment Papers, Vol. 1, No. 4.

Department of Environment Sport and Territories (1996) Fire and Biodiversity - the effects and effectiveness of fire management, Proceedings of the conference held October 1994, Melbourne; Biodiversity Series no. 8, National Capital Printing, Canberra.

DNRE (1998a): Caledonia River Fire 1997/8 Fire severity class mapping, Forest resource inventory spatial data group.

DNRE (1998b): Caledonia River Fire 1997/8 Forest classes and logging history, Forest resource inventory spatial data group.

DSE (2007) Major fires in Victoria, Fire History, DSE website.

Garnett and Crowley (2000) The Action Plan for Australian Birds 2000, Env. Australia, Canberra.

Good (1980): The effects of prescribed burning in the sub-alpine area of Kosciuszko National Park: Master of Science Thesis, University of New South Wales.

Gregory, McCarthy, Tolhurst and Chatto (2003) "Determination of sustainable fire regimes in the Victorian Alps using plant vital attributes" Fire Management Research Report no. 54 Forest Science Centre, Orbost and Creswick

Helman et al. (1976) Wilderness in Australia: Eastern NSW and South-Eastern Queensland, Dept. of Geography, UNE, Armidale.

Hopmans (2003) "Effects of repeated low intensity fire on carbon, nitrogen and phosphorus in the soils of a mixed eucalypt foothill forest in south-eastern Australia" Fire Management Research Report no. 60. Forest Science Centre, Orbost and Creswick

Johnston F.M. and Johnston S.W. (2001): Relationship between road induced disturbance, soil properties and weed occurrence in Kosciuszko National Park: in Australian Institute for Alpine Studies Newsletter July 2001

Land Conservation Council (1990) Wilderness - Special Investigation, LCC, Melbourne.

Karoly et al. (2003) Global warming contributes to Australia's worst drought, WWF, Sydney

Kirkpatrick and Dickenson (1985): The impact of fire on Tasmanian alpine vegetation and soils: Aust J Bot 32, 613-629

McCarthy and Tolhurst (1998) "Effectiveness of firefighting first attack operations by the Department of Natural Resources and Environmment from 1991-92 – 1994-5" Fire Management Research Report no. 45 Forest Science Centre, Orbost and Creswick

McCarthy and Tolhurst (2001) "Effectiveness of broadscale fuel reduction in assisting with wildfire control in parks and forests in Victoria" Fire Management Research Report no. 51 Forest Science Centre, Orbost and Creswick

Mansergh, Kelly and Scotts (1989): Management strategy and guidelines for the conservation of the Mountain Pygmy Possum: Arthur Rylah Institute for Environmental Research, Department of Conservation, Forest and Lands, Technical Report Series No 66

Mosley (1971) National parks in alpine regions, Victoria's Resources, 13 (2): 24-31.

Mueck & Peacock (1992) "Impacts of intensive timber harvesting on the forests of East Gippsland, Victoria". Conservation & Natural Resources, VSP Technical Report No. 15.

Nicholls (1985) Towards the prediction of major Australian droughts, Aust. Met. Mag. 33: 161-166.

Parks Victoria (2003) Community information emails, January 19-March 12, 2003.

Parmesan and Yohe (2003) "A globally coherent fingerprint of climate change impacts across natural systems" Nature 421: 37-42.

Possingham and Gepp (1993) The application of population viability analysis to assess management options for the southern brown bandicoot in the SE of South Australia, Proceedings of the International Simulation Society Conference, Perth, pp. 633-638.

Pyne (1991) Burning Bush - a fire history of Australia, Henry Holt, New York.

Rees (1984) Forest Fire Statistics, 1974-84, CF&L Fire Protection Branch Report 22.

Richards, Cary and Bradstock (2001): The sensitivity of snowgum to fire scarring in relation to Aboriginal landscape burning: in Australasian Bushfire Conference, Christchurch pp 285-292

Stretton (1939): Report of the Royal Commission on the 1939 fires presented to both houses of Parliament

Tolhurst et al. (1992) Ecological Effects of Fuel Reduction Burning in a Dry Sclerophyll Forest, DCE, Melbourne.

Tolhurst (2003) "Effects of repeated low intensity fire on the understorey of a mixed eucalypt foothill forest in south-eastern Australia" Fire Management Research Report no. 58 Forest Science Centre, Orbost and Creswick

Tolhurst and Kelly (2003) "Effects of repeated low intensity fire on fuel dynamics in a mixed eucalypt foothill forest in south-eastern Australia" Fire Management Research Report no. 59.

Traill and Porter (2001) Nature Conservation Review 2001, VNPA, Melbourne.

van Rees, H. (1984) Behaviour and diet of free-ranging cattle on the Bogong High Plains. Department of Conservation, Forests and Lands, Victoria; Environmental Studies Publication No. 409.

van Rees and Walsh (1985): Monitoring of the burnt vegetation on the Buffalo Plateau: Department of Conservation, Forest and Lands Progress Report No. 1

Wahren, Papst and Williams (1999): Post-fire regeneration in Victorian alpine and sub-alpine vegetation: in Australian Bushfire Conference, School of Environmental and Information Sciences, Charles Sturt University, Albury.

Williams, R.J. (1985) Shrub-grass dynamics on the Bogong High Plains. Ph.D. Thesis, Botany School, University of Melbourne.

Williams, R.J. and Ashton, D.H. (1987) The composition, structure and distribution of heathland and grassland communities in the subalpine tract of the Bogong High Plains, Victoria. Aust. J. Ecol. 12: 57-71.

Williams, Wahren, Bradstock and Muller (2006) "Does alpine grazing reduce blazing? A landscape test of a widely held hypothesis" Australian Ecology 31, 925-936

Wilson, B. (1996) Fire effects on vertebrates - fire management and conservation, pp. 131-147, In DEST (1996) Fire and Biodiversity, DEST, Canberra.

York (1994) The long-term effects of fire on forest ant communities: management implications for the conservation of biodiversity, Memoirs of Queensland Museum, Vol. 36, pp. 231-239.