2009 Victorian Bushfires Royal Commission

Submission by the Victorian Association of Forest Industries

May 2009

wood lives on™

VICTORIAN ASSOCIATION OF FOREST INDUSTRIES
Level 6, 50 Market St, Melbourne 3000
www.vafi.org.au

Executive Summary

The Victorian Association of Forest Industries (VAFI) is the peak forestry industry body in Victoria. We make this submission as an organisation with members affected by the recent fires and with an interest in forest and fire management.

Southern Australia is one of the most fire-prone regions in the world. Fire is a vital part of our natural environment. It drives regeneration and the health of species and ecosystems.

However, the Black Saturday bushfires and the severe wildfires of 2006/07 and 2003 demonstrate the perilous risk posed by wildfire to people's lives and property, our communities and our natural environment in Victoria. Active and adaptive fire and forest management across all land tenures is required to mitigate this risk in the future.

We must manage for fire first

In the last six years, mega fires have burnt through nearly 3 million hectares of mostly forested public land affecting the lives and livelihoods of many Victorian communities.

Catastrophic bushfires are the greatest threat to biodiversity, the viability of many threatened species, future water supply from Melbourne's catchments and our future supplies of timber from Victorian forests.

Early estimates indicate that about 30 percent of Melbourne's water supply catchments have been affected. Although the impact has not yet been fully assessed, we do know that fires cause a long term decline in water yield as the forest recovers.

Many of the areas affected by the 2009 bushfires are at the heart our industry. The immediate personal and commercial losses are substantial. It is estimated that over 10 percent of the industry's current sustainable yield from native forests has been burnt along with 20,000 hectares of plantations. The impact on the future wood supply is far-reaching, with VicForests conservatively estimating the value of the standing timber burnt at over $600 million.

The viability of threatened species such as the Leadbeater's possum and the Barred Galaxias (a native fish) have been severely impacted. Many native birds and animals have been killed.

It is more cost effective to reduce the risk of catastrophic wildfire than it is to recover these values. **Forest, biodiversity, water and land management policies must manage to minimise the risk of catastrophic bushfire as a priority.**

The forestry industry plays a significant role in fire management and suppression

The native forest and plantation sectors from Victoria and interstate contributed hundreds of personnel and hundreds of vehicles and pieces of equipment to suppression of the February 2009 bushfires. Industry equipment used included tankers, bulldozers, excavators, floats, skidders and general vehicles along with skilled crews to operate them. Trained and experienced forestry industry personnel have local forest knowledge and are based in fire prone regional locations.

The activities of the industry also provide access to forests through roads, fire tracks and trails, suitable to enable passage for fire fighting and management equipment.

The contribution of the forestry industry to fire management should be recognised within fire management policy.

Commercial forestry is consistent with a risk minimisation approach to fire management in public native forests. In addition to providing access, skilled personnel and equipment necessary to quickly respond to fires on public land, timber harvesting creates a diversity of age classes (and fuel levels) across the forest estate. There are several examples of young regrowth forest acting to lessen the intensity of the recent fires, providing grounds for further research in this area.

Plantations are valuable commercial assets and are actively managed to protect them from fire. Companies provide resources and industry fire brigades to mitigate the risk of fire.

The contraction of the Victorian native forestry industry has had a negative impact on Victoria's fire management capacity, including maintenance of appropriate human resources, equipment and access for fire suppression. The decline in the availability of skilled fire fighters and volunteers is a significant challenge for effective fire management.

The area available for commercial harvesting in public native forests must not be reduced any further. It should be noted that the footprint of the forestry industry (currently approximately 6,500 hectares per year) is a fraction of the approximately 1.4 million hectares of State forest affected by fire in the past six years.

Forestry is a tool for forest management. The activities and skills of the industry are not limited to commercial harvesting of timber but include ecological forest thinning, biomass management to reduce fuel levels, forest regeneration and restoration, roading and infrastructure and first attack fire response.

The skills, resources and existing activities of the forestry industry should be recognised within the context of fire management policy and expanded for the purposes of fire risk management. Management of conservation reserves should adopt elements of commercial forest management as appropriate for fire risk management.

Victoria faces a legacy of high fuel levels and passive forest management

Weather, topography and fuel are key factors affecting fire behaviour. Fuel feeds fire intensity and spread. Reducing fuel though managing our landscape is the most effective fire mitigation tool available to land managers seeking to reduce the catastrophic bushfire.

Prescribed burning is an important tool for ecological benefit and in reducing fuel levels to slow fire spread and reduce intensity, to assist in fire suppression. There are clear examples from the recent Black Saturday bushfires where fuel reduction burns provided areas of reduced fuel which decreased fire intensity and slowed the spread of the fires.

Victoria has a legacy of high fuel levels, reduced access within forested land and diminished forest management resources as a result of a 'preservationist' approach to conservation over past decades. Prior to the Black Saturday bushfires, forest fuel hazard levels on public land were extreme in many parts of the State, including many of the areas affected by the fires.

Historical fire events and resultant reviews and inquiries have provided a clear and recurring case for active forest management and increased fuel management. Although the recent Victorian Government has made fire management a high priority and made additional efforts to address extreme fuel levels, it is not enough. A more active management program is required.

Fire hazard management on private land has not yet been adequately incorporated into fire preparedness and fuel management programs and **improved fuel reduction burning and use of other forest management tools are needed to manage fuel levels on public land.**

A risk management approach to bushfires is required: active and adaptive land management

There are key areas where current fire management practices must be improved to achieve level of preparedness commensurate with the level of risk from severe bushfire. We must move beyond old paradigms of preservation towards a risk-based approach to fire management and land management. The greatest land management tool in the face of change is active adaptive management.

Active management should use silviculture and fire to provide a diversity of forest ages and fuel loadings across the forest landscape to reduce the severity and impacts of uncontrolled wildfire. This will require additional resources to actively manage forest biomass. It will also require new thinking on how we most effectively and efficiently achieve fire management objectives to reduce the risks from severe bushfire.

Adaptive and active forest management if practiced on a landscape scale can manipulate the age of the forest and its fuel loading. The role of forestry in providing active forest management should be taken into account in fire management policies.

However, the role of the forestry industry as a forest management tool could be expanded to achieve fire management outcomes. **A greater integration of forest industry services and fire management could be achieved across the landscape. Forestry skills and resources could be utilised as part of managing our forest estate for fire.** This is currently being pursued in the United States in conjunction with prescribed burning.

It is important that prescribed burns are of sufficient size. Large-scale mosaic burns across the landscape are required. Accountability for fire management and preparedness is important. **Burning targets and performance should be determined according to fuel hazard risk levels in each fire management zone.**

There are also ways that arrangements for private land can be greatly improved to reduce the risk from bushfires. **Additional resources are required to ensure that private land is formally supported in the prescribed burning program** as signalled in the Victorian Government's bushfire strategy. There is also a need to **review native vegetation regulations for consistency with the need to remove fire hazards on private land** and to **apply the fire services levy through rate notices rather than insurance premiums to improve the equity and broaden the collection mechanism.**

Building requirements in bushfire prone areas should continue to be based on sound technical research

Reducing the risk from fire for residences in fire prone areas is a balance between vegetation management and appropriate construction.

The Australian Standard for Construction of buildings in bushfire-prone areas (AS 3935) is appropriate and is based on current technical knowledge. It is important that any recommendations consider implementation of the standard.

Conclusions

- **Catastrophic bushfires are the greatest threat to biodiversity, the viability of many threatened species, future water supply from Melbourne's catchments and our future supplies of timber from Victorian forests**
- **Forest, biodiversity, water and land management policies must manage to minimise the risk of catastrophic bushfire as a priority**
- **Commercial forestry is consistent with a risk minimisation approach to fire management in public native forests**
- **The contraction of the Victorian native forestry industry has had a negative impact on Victoria's fire management capacity, including maintenance of appropriate human resources, equipment and access for fire suppression**
- **Prescribed burning is an important tool for ecological benefit and in reducing fuel levels to slow fire spread and reduce intensity, to assist in fire suppression**
- **Victoria has a legacy of high fuel levels, reduced access within forested land and diminished forest management resources as a result of a 'preservationist' approach to conservation over past decades**
- **Historical fire events and resultant reviews and inquiries have provided a clear and recurring case for active forest management and increased fuel management**
- **Fire hazard management on private land has not yet been adequately incorporated into fire preparedness and fuel management programs**
- **Improved fuel reduction burning and use of other forest management tools are needed to manage fuel levels on public land**
- **Adaptive and active forest management if practiced on a landscape scale can manipulate the age of the forest and its fuel loading**
- **Active management should use silviculture and fire to provide a diversity of forest ages and fuel loadings across the forest landscape to reduce the severity and impacts of uncontrolled wildfire**
- **Reducing the risk from fire for residences in fire prone areas is a balance between vegetation management and appropriate construction**

Recommendations

- **The contribution of the forestry industry to fire management should be recognised within fire management policy**
- **The area available for commercial harvesting in public native forests must not be reduced any further**
- **The skills, resources and existing activities of the forestry industry should be recognised within the context of fire management policy and expanded for the purposes of fire risk management**
- **Management of conservation reserves should adopt elements of commercial forest management as appropriate for fire risk management**
- **The role of forestry in providing active forest management should be taken into account in fire management policies**
- **A greater integration of forest industry services and fire management could be achieved across the landscape. Forestry skills and resources could be utilised as part of managing our forest estate for fire**
- **It is important that prescribed burns are of sufficient size. Large-scale mosaic burns across the landscape are required**
- **Burning targets and performance should be determined according to fuel hazard risk levels in each fire management zone**
- **Additional resources are required to ensure that private land is formally supported in the prescribed burning program**
- **Review native vegetation regulations for consistency with the need to remove fire hazards on private land**
- **Apply the fire services levy through rate notices rather than insurance premiums to improve the equity and broaden the collection mechanism**
- **Application of commercial forestry fire management principles to reserve management**
- **The Australian Standard for Construction of buildings in bushfire-prone areas is based on current technical knowledge**

Contents

Executive Summary 2
Contents 7
Introduction 8
The devastating impact of the bushfires 10
Impact on the community 10
Impact on the forestry industry 11
Personal loss 11
Commercial losses 12
Costs of fire suppression 13
Far-reaching impacts 14
The cumulative impact of recent mega fires 15
Impact on ecological values 17
Forest health 18
Soil 19
Wildlife 19
Threatened species 21
Catchments and streams 22
Managing for fire first 25
The role of forestry industry in fire management and suppression 27
Resources provided by the forestry industry 27
Skill, experience and local knowledge 27
Comprehensive and adequate fire access infrastructure 28
Fire-fighting equipment and trained operators 28
Fire management by the forestry industry 29
Plantations and fire management 29
Fire management in multiple use forests 30
Loss of capacity due to contraction of native forestry 32
Recognising and developing the role of the forestry industry 34
Fire and land management in Victoria 35
The nature of recent mega-fires 35
Role of fuel management 36
Fire and forest management in Victoria 39
Fuel management in Victoria 39
A legacy of high fuel levels 40
Failure of the preservationist approach 42
What have we learnt? 45
A risk management approach to bushfires: active and adaptive land management 49
Active forest management: Recognising forestry as a forest management tool 49
Prescribed burning on public land 52
Fire management on private land 52
Building in fire prone areas 54
The fireproofing of housing and other buildings, including the materials used in construction . 54

Introduction

Southern Australia is one of the most fire-prone regions in the world. Fire is a vital part of our natural environment. It drives regeneration and the health of species and ecosystems.

However, the recent devastating fires demonstrate the perilous risk posed by wildfire to people's lives and property, our communities and our natural environment in Victoria.

The Victorian Association of Forest Industries makes this submission as an organisation with members affected by the recent fires and with an interest in forest and fire management.

The Victorian Association of Forest Industries

The Victorian Association of Forest Industries (VAFI) is the peak forestry industry body in Victoria. It was established in 1945 and represents its members' interests to governments, communities and markets. Our members include forest producers, processors and associated bodies.

The hardwood timber resource used by our members is largely derived from public forests managed sustainably by the Department of Sustainability and Environment (DSE). Parts of these forests are vested to VicForests, a state owned enterprise which is responsible for the harvest and commercial sale of timber from State forests in Victoria. Under these arrangements forest values are protected, active management of State forest occurs and sustainable timber products are made available for consumption by Victorian, Australian and global communities.

The VAFI is committed to promoting an economically robust, socially responsible and environmentally sustainable forestry industry. We support and encourage best practice in industry and in forest and land management.

As detailed in this submission, VAFI's members have been impacted by the recent bushfires through loss of life, homes, sawmills, plantations and loss of public native forest designated for timber production.

The VAFI has worked closely with other industry bodies and experts in the preparation of this submission. In particular, the National Association of Forest Industries (NAFI) and Wood Products Victoria (WPV) have provided input into this submission. The NAFI submission provides a national context to many of the issues discussed in this document.

Our industry

The forestry industry in Victoria is a significant local employer and manufacturing industry. Victorian sourced timber generated approximately $3 billion in economic value in 2007-08 and much more in flow on economic activity. Victoria's sales and services income from wood and paper product manufacturing industry is $6.5 billion. [1]

[1] Victorian Department of Primary Industries ((2009) Timber Industry Strategy Public Consultation Draft, Victorian Government, April; quoted from ABARE (2008) Australian Forest and Wood Product Statistics, March and June quarters 2008, Canberra

It is estimated that in 2006, there were 1,875 enterprises with operations in the forest-growing and wood product industry in Victoria, employing 32,154 people. [2] The industry supports an important manufacturing sector and makes a significant socio-economic contribution in regional Victoria.

This production is generated from a relatively small land base. Victoria has the following areas available for timber production:

- 422,112 hectares plantation;
- 600,000 hectares public native forest (approximately 9 percent of all public native forest in Victoria); and
- 350,000 hectares private native forest.[3]

The Victorian forestry industry operates according to strict regulatory controls for responsible forest management. Timber production on public land managed by VicForests is certified to the Australian Forestry Standard.[4]Approximately 86 percent of the total plantation area in Victoria is certified under the Australian Forestry Standard, the Forest Stewardship Council, or both.[5]

This submission

This submission aims to detail the impacts of the recent fires on the community, the environment and our industry. It focuses on the contribution of land and fuel management to fire management and provides a clear and compelling case for an integrated, active and adaptive approach to fire management across the landscape (Terms of Reference 2, 6, 7 and 11).

The submission explains the role of timber harvesting operations as a traditional land use for our public native forests and private land. The submission also discusses how timber harvesting is part of active and adaptive management which provides diverse forest landscapes, serviced road networks and viable knowledgeable local communities and how these can assist fire authorities in the prevention, preparedness and recovery from wildfires in Victoria.

In particular, it explains how forestry can be better utilised as a key tool for fire management through maintaining access to the forest estate and in achieving fuel management goals.

Finally, the submission also considers the fireproofing of housing and other buildings, including the use of timber and other building materials used in construction (Term of Reference 8).

[2] ForestWorks (2006) *Forest and Wood Products Industry Workforce and Industry Data Collection Survey Report 2006*, National Skills Company for the Forestry and Forest Products, Furnishing and Pulp & Paper Industries Ltd and Forest and Wood Products Australia, Melbourne

[3] Victorian Department of Primary Industries (2009) Timber Industry Strategy Public Consultation Draft, Victorian Government, April; quoted from ABARE (2008) Australian Forest and Wood Product Statistics, March and June quarters 2008, Canberra; Bureau of Rural Sciences (2009) Australia's Plantations: 2009 Inventory Update, Department of Agriculture, Fisheries and Forestry, http://adl.brs.gov.au/mapserv/plant/NPI2009Update.pdf

[4] The Australian Forestry Standard and the Forest Stewardship Council are two independent, internationally recognised schemes for the certification of responsible forest management which are available in Australia.

[5] Victoria has approximately 422,112 hectares of softwood and hardwood plantations. Approximately 361,930 hectares are certified to AFS and/or FSC. www.forestrystandard.org.au and www.fscaustralia.org, accessed 17 April 2009

The devastating impact of the bushfires

The impact of the bushfires of early 2009 has been devastating. It is our worst natural disaster with 173 lives lost along with property, livestock, livelihoods and a serious impact on ecological values and public assets and infrastructure. The impacts on the forestry industry are considerable and far-reaching.

In the last six years, mega fires have burnt through nearly 3 million hectares of mostly forested public land, affecting biodiversity, water quality in our streams, timber resources, tourism enterprises and public and private assets. The cumulative impact of the mega fires of 2003, 2006/07 and 2009 is sobering and provides a clear rationale for review of key elements of our fire and land management strategies.

Impact on the community

The 2009 and other recent bushfires have had a major impact on the lives and livelihoods of many Victorian communities.

Victoria's regional communities suffered the full destructive brunt of the 2009 February bushfires. Not since the 1983 Ash Wednesday Bushfires has a fire disaster swept so ferociously through town centres and residences.

The close proximity of heavily populated communities meant that the recent fires were far more devastating in human terms than any recent fire event. Towns such as Kinglake, Flowerdale and Marysville were virtually razed.

It is currently estimated that over 420,000 hectares of land was burnt in the 2009 February fires.[6] The official police death toll of the 2009 fires stands at 173 confirmed dead.[7] It is estimated that 2,200 houses were destroyed.[8]

Intense wildfires affected large areas of Victoria in 2003 and again in 2006/07. These fires burnt 1.2 million and 1.5 million hectares of primarily public forested land, respectively.[9] They resulted in the loss of two lives and 92 houses.[10]

Rural industries including forestry, agriculture, tourism and the wine industry have been heavily affected by resource and infrastructure losses. The full economic impact of the 2009 fires continues to be examined; however, preliminary research indicates that property and industry related losses will exceed both the 2003 and 2006/07 bushfire losses combined.

---

[6] DSE (2009) 'Summary of Fires in Victoria: January/February 2009' http://www.dse.vic.gov.au/CA256F310024B628/0/9E5B815B204F8C6ACA257590000E5661/$File/StatewideFiresOverview_20090406.pdf

[7] Victoria Police (2009) 'Bushfire Death Toll', http://www.police.vic.gov.au/content.asp?Document_ID=19190

[8] Personal Correspondence, CFA Media, 7th April 2009

[9] Environment and Natural Resources Committee (2008) 'Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria', Parliament of Victoria, Melbourne

[10] Environment and Natural Resources Committee (2008) 'Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria', Parliament of Victoria, Melbourne

Stock loss estimates around the state are currently at more than 11,800; this includes more than 4,500 sheep, 4,000 cattle and 200 horses. It is estimated that more than 10,000 kilometres of fencing has been destroyed along with more than 3,500 farm facilities.[11] This is on top of over 9,100 livestock and over 3,000 kilometres of fences lost in the 2003 fires and 1,741 livestock lost in the 2006/07 fires. [12]

Communities within the bushfire affected regions are heavily dependent on tourism for economic activity. Tourism generates more than $1.6 billion annually within the Victoria's High Country, Gippsland, Yarra Valley and Dandenong Ranges. The impact on tourism, wineries and other business in has yet to be evaluated but it is clear these areas have suffered significant infrastructure loss and a major downturn in bookings.[13] Similarly, the 2006/07 fires had a damaging impact on the local tourism industry with assets and visitor facilities lost. Regional tourism officials estimated it caused a $200 million downturn for the 12 months from December 2006.[14]

These serious and significant losses highlight that our communities live in a fire prone environment but that we must plan and manage to minimise the risks posed by intense wildfires.

Impact on the forestry industry

Many of the areas affected by the 2009 bushfires are at the heart our industry. The immediate personal and commercial losses are substantial. The impact on the future wood supply is far-reaching.

Many in our industry were directly affected during the bushfires either through personal or commercial loss or by contributing to the fire suppression effort.

Personal loss

The personal loss from the bushfires has been devastating. As an industry, we count ourselves relatively fortunate; it could have been much worse. Each life lost is a tragedy.

ITC Limited lost an employee from its Alexandra processing facility and a number of employees lost family and homes in Marysville. At least four workers in the harvest and haulage sector also lost homes.[15]

The emotional impact on people in affected communities and in particular those involved in the emergency response should not be underestimated.

---

[11] DPI (2009) 'DPI Continues to Help Land Holders with Bushfire Recovery', Media Releasehttp://www.dpi.vic.gov.au/DPI/dpincor.nsf/LinkView/9A3C46B9F5D19B45CA2575610017D9699F838E54F27113DFCA257553000A71C9/$file/Media%20Releases%20DPI%20rural%20recovery%20figures.pdf; DPI, personal communication 13/05/09

[12] Environment and Natural Resources Committee (2008) 'Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria', Parliament of Victoria, Melbourne; Office of the Emergency Services Commissioner (2003) 'Report of the Inquiry into the 2002-2003 Victorian Bushfires', Melbourne

[13] Tourism Victoria Media Release (2009) '$10 Million for Tourism Bushfire Recovery', http://www.tourism.vic.gov.au/images/stories/10%20million%20for%20Tourism%20Bushfire%20Recovery.doc

[14] Ministerial Taskforce on Bushfire Recovery (2007) 2007 Report from the Ministerial Taskforce on Bushfire Recovery, http://www.business.vic.gov.au/busvicwr/_assets/main/lib60018/rdv_bushfire_recovery_07.pdf

[15] Victorian Forest Harvest and Cartage Council, personal communication, 20/04/09

Commercial losses

A substantial amount of productive native and planted forest was lost in the recent bushfires. In addition, five sawmills were destroyed. These were family businesses and provided the livelihoods for owners and workers. A summary of commercial losses to the industry based on available information is set out below in Table 1.

Figure 1. The Alex Demby Timbers (McCormack Demby Timbers) Sawmill at Toolangi was destroyed in the fires[16]

Valuable Mountain and Alpine Ash forests were burnt northeast of Melbourne between Marysville, Toolangi and Alexandra and in the Bunyip State Forest in Gippsland. Up to 25,000 hectares of ash species and 25,000 hectares of mixed species forest were burned in State forest areas, which were available for timber production.[17] That is 50,000 hectares out of the total 464,000 hectares (more than 10 percent) of the public native forest area that is available and merchantable for timber production.[18]

A preliminary estimate by VicForests is that around 10 million cubic metres of standing ash timber with a mill door value of approximately $600 million was burnt.[19] While some of this timber can be salvaged, it will have significantly lower residual price than equivalent green timber. The 46,000 tonnes of stored pulpwood which was lost in Marysville had an inventory value of $2 million.[20]

Plantation and private forest was lost totalling 20,000 hectares (ha), including both softwood and eucalypt timber.[21]

[16] VAFI (2009)
[17] VicForests, Customer Briefing, 24/02/09 and personal communications
[18] Although 600,000 hectares of public native forest is available for timber production, only 464,000 hectares is considered by VicForests to be merchantable.
[19] VicForests, Customer Briefing, 24/02/09 and personal communications
[20] VicForests, Customer Briefing, 24/02/09 and personal communications
[21] DPI (2009) 'Impact of 2009 bushfires on Victoria's timber industry', http://www.dpi.vic.gov.au/dpi/nrenfa.nsf/LinkView/04B5222DD7AFBB2FCA25759000810ABAE8F3D1B1F5BB36C4CA2574C900047193/$file/Bushfires%20addendum.pdf

Table 1. Preliminary summary of commercial losses[22]

Organisation	Forest area	Property, Stock & Equipment
VicForests (Victorian Government)	Up to 50,000 ha, including up to 25,000 ha of ash species and up to 25,000 ha of mixed species forest (Available and designated for timber production)	46,000 tonnes of processed pulpwood from Andersons long dump
Individual harvest and haulage contractors		VicForests contractors: 17 items of equipment were destroyed including dozers, skidders, excavators and trucks. HVP: several pieces of contractors' equipment
Hancock Victorian Plantations	16,559 ha of productive plantation including: • 4,044 in the central region • 1,850 in the Northern region • 10,775 in Gippsland (4,650 pine & 6,025 eucalypt) 330 ha of research plots 355 ha of MIS land	
Midway	1,749 ha plantation burnt in the Kilmore East- Kinglake complex fire	2 houses destroyed *including one house used by the Salvation Army for substance abuse rehabilitation 1 vehicle destroyed
Great Southern Limited	31.2 ha of plantation burnt in the Churchill fire	
Forest Stewards Australia	35 ha of private native forest (managed for timber production)	
McCormack Demby Timbers (Alex Demby Sawmill), Toolangi		Sawmill and stored timber destroyed
Gresham - Narbethong Sawmill		Sawmill destroyed
Narbethong (pine) Sawmill		Sawmill partially destroyed
Kinglake Timbers (Anthony McMahon)		Sawmill destroyed
GB Timbers, Central region		Sawmill destroyed

In addition there was damage to roads and bridges used by the industry and forest managers.

The commercial value of forest, property and equipment is a substantial loss to the industry.

Costs of fire suppression

The native forestry and plantation sectors as well as forestry organisations from other jurisdictions contributed significant resources to fire management. The native forestry industry effectively shut

[22] VicForests, Customer Briefing, 24/02/09 and personal communications; Midway Limited, personal communication, 03/04/09; Victorian Forest Harvest and Cartage Council (VFHCC), personal communication, 20/04/09; Hancock Victorian Plantations (HVP), personal communication, 20/04/09; Gary Featherston, personal communication, 23/04/09

down for six weeks (during a peak production period) to fight the fires and due to fire risk and impact.

Over two thirds of VicForests' staff and contractor workforce was directly involved in fire fighting duties.[23]

HVP deployed significant resources to fight the fires including 135 coordinators, commanders, fire fighters, logistics, liaison, planning, administration and support staff; and 74 vehicles, including 16 tankers. [24]

In addition, HVP contractors deployed:

- 85 personnel (primarily fire fighters);
- 8 fire vehicles;
- 44 pieces of equipment, including 28 bulldozers and 33 skilled equipment operators; and
- 10 support personnel.

In addition, overseas or interstate forestry organisations provided 52 fire fighting personnel and 11 fire vehicles.

The native and plantation forest industries provide fire fighting services as part of their operational requirements. The contribution is willing and provides significant support to fire fighting efforts. However, it is important to recognise both the active and willing contribution of industry as well as the costs of lost production and fire suppression which is borne by forestry contractors and businesses.

Far-reaching impacts

The fires burnt extensive areas of State forest that our industry relies on for timber supply. The area of state forest burned in the 2009 bushfires was primarily mature regrowth from the 1939 bushfires, which was designated for harvest over the next 40 years. DSE and VicForests are currently calculating the future sustainable yield and forest management impacts. The VAFI estimates that the future reduction in supply as a consequence of these fires will be greater than 10 percent of current sustainable yield, based on the age class structure of Victoria's public native forests and the current sustainable yield methodology.

Some commercial value will still be gained from fire-affected forests. Our industry is salvaging as much burnt timber as possible within environmental, safety and market constraints. A substantial salvage harvesting program will help to reduce the future reductions in sustainable yield levels. Salvage harvesting targets productive stands of trees (and timber) within areas available for timber production that are killed as a result of the fire. It is anticipated that high quality timber, suitable for the highest value markets, will be able to be salvaged for up to 12 and possibly 18 months after the 2009 fires.[25]

Sawmill recovery is generally lower for salvage timber, which means that there is a direct commercial and financial impact on Victorian timber processing companies as a consequence of assisting the Government and VicForests with the salvage program. It must also be remembered that this is the third large salvage program to be undertaken in the last 6 years.

[23] VicForests, Customer Briefing, 24/02/09 and personal communications
[24] HVP, personal communication, 20/03/09
[25] Experience from the 2007/08 salvage program indicates that drying and degradation of burnt timber is occurring much more quickly than expected due to the impact of the prolonged drought on trees.

VicForests hopes to be able to salvage 465,000 m^3 of burnt sawlog timber (primarily mountain ash) over the next 12 months.[26] However, the impact on wood supply in the medium term is likely to be considerable with prices paid for logs already at record levels. VicForests has also invoked force majeure provisions for some harvest and haul and customer supply contracts, which further exacerbates uncertainty in the industry.

Figure 2. Salvage operations following the Black Saturday fires[27]

There is also a need to complete seeding and regeneration activities where forest younger than 20 years has been killed by fire as ash eucalypts do not produce the seed required for natural regeneration until the stage of maturity.

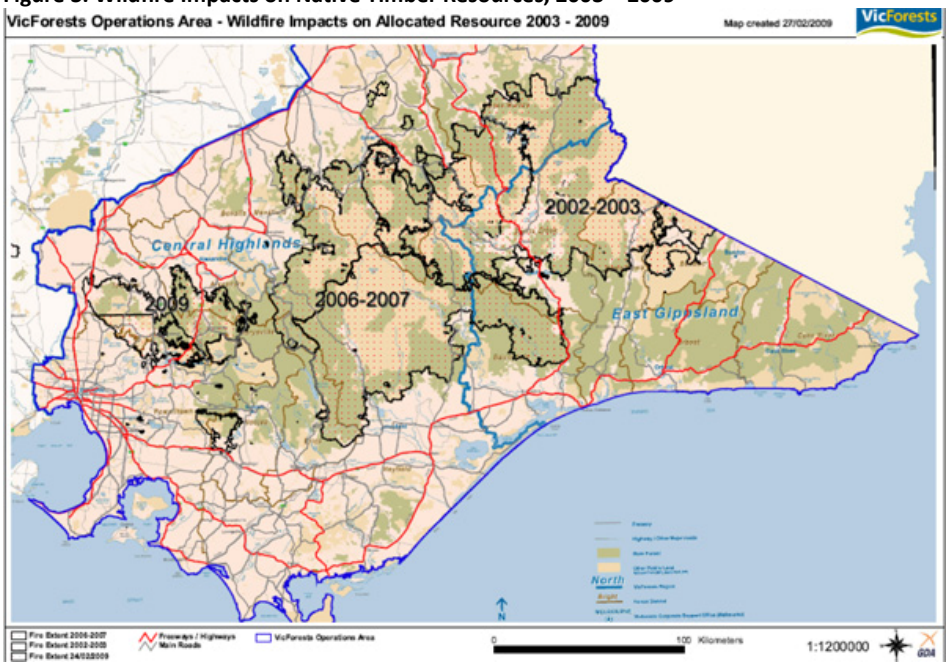
Plantation producers including HVP and Midway have likewise undertaken salvage programs. The salvage of softwood plantations has its own challenges, with the risk of 'blue stain' affecting the ability to market salvaged logs, and reducing the timeframe to salvage burnt pine trees to approximately 12 weeks. [28] Young plantations are generally not able to be salvage harvested. HVP is undertaking salvage harvesting in several thousand hectares of burnt plantation and is investing in replanting burnt areas.

The cumulative impact of recent mega fires

The forestry industry has now suffered three mega-fires in six years. The impact of these fires has eroded the scale and profitability of the industry throughout the supply chain. It has also undermined confidence in the long term wood supply.

[26] VicForests, personal communication, 29/04/09
[27] VAFI (2009)
[28] DPI (2009) 'Impact of 2009 bushfires on Victoria's timber industry', http://www.dpi.vic.gov.au/dpi/nrenfa.nsf/LinkView/04B5222DD7AFBB2FCA25759000810ABAE8F3D1B1F5BB36C4CA2574C900047193/$file/Bushfires%20addendum.pdf

Figure 3. Wildfire Impacts on Native Timber Resources, 2003 – 2009[29]



The losses from the recent bushfires follow significant resource losses from bushfires across Victoria in 2006-07 and 2003. These major bushfires burnt approximately 2.3 million hectares of public land, including around 1.2 million hectares of State forest.[30] Cumulatively, these three fire seasons have burnt approximately 1.4 million hectares of State forest and at least 28,750 hectares of plantation.[31]

It should be noted that the industry also provided significant support for fire suppression efforts for fires in 2006-07 and 2003 (see also section on role of the forestry industry).[32]

The impact of the 2003 fires on the timber industry was significant. Timber resources, time and equipment were lost in the fire response effort. The fire salvage program was very late to receive government approval, limiting the amount of commercial value that could be recovered from fire affected areas. After the 2003 forest fires the reduction in sustainable yield was 60,000m^3.[33]

The 2006/07 bushfires burnt 680,000 hectares of State forest including 55,000 hectares of merchantable forest and a much larger area of forest that had not yet grown to maturity and was important to future harvesting. Following the 2006/07 fires, VicForests estimated the loss in resource from public native forests could be up to 80,000m^3.[34] A salvage program commenced

[29] VicForests, Unpublished data
[30] Victorian Department of Primary Industries (2009) Timber Industry Strategy Public Consultation Draft, Victorian Government, April
[31] DPI (2009) 'Impact of 2009 bushfires on Victoria's timber industry', http://www.dpi.vic.gov.au/dpi/nrenfa.nsf/LinkView/04B5222DD7AFBB2FCA25759000810ABAE8F3D1B1F5BB36C4CA2574C900047193/$file/Bushfires%20addendum.pdf; DPI, personal communications; HVP, personal communications; Timbercorp, personal communications
[32] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria; VAFI (2007) *Our Forests Will Burn Again: Fire and Forest Industries – The Benefits of Active Forest Management for Successful Fire Management*, Submission to the Environment and Natural Resources Committee, Submission No. 174, June
[33] VAFI (2007) A Plan for Forest Fire Recovery and Viable Sustainable Forest Industries in Victoria, Submission to the Victorian Government Bushfire Recovery Roundtable, February
[34] VicForests (2007) VicForests Annual Report 2007, Melbourne, http://www.vicforests.com.au

quickly and with support from the Victorian Ministerial Taskforce on Bushfire Recovery, which recognised the importance of salvage harvesting to rebuilding affected communities and in minimising the impact of the fires on future wood supply.[35] VicForests estimated the total value of the standing timber marked for salvage was approximately $43 million, with a mill door value of approximately $99 million.[36]

The Ministerial Taskforce on Bushfire Recovery also foreshadowed a review of the sustainable yield for timber production to take into account the loss of resource from the bushfires. The Joint Sustainable Harvest Level (JoSHL) project reviewed the assumptions underpinning the sustainable yield. The JoSHL report estimates that, following salvage efforts, the impact of the fires on future timber production was limited to 7,000 m^3, including 4,000 m^3 of Central Highlands ash.[37]

The outcomes of the JoSHL provided for an estimate sustainable yield of up to 500,000m^3 per year for the next 15 years. However, this estimate included areas which are planned to be reserved for protection of threatened species, less economically viable and may be set aside as environmental buffers. It did not include any margin for potential fire impacts and assumed that approximately 37,300 hectares of 1939 ash and 21,900 hectares of mixed origin species are available for harvest and that the 1939 resource will continue to be harvested for the next 45 years.[38]

The 2009 bushfires significantly burnt the 1939 resource. VicForests and DSE are undertaking a salvage program designed to minimise the impact of the fires on future wood supply. However, the impact on the industry, given the age class of forest affected and damage from previous fires is likely to be significant.

The 2009 fires will have significant short, medium and long-term impacts on Victoria's forestry industry. They follow two other severe fires in 2003 and 2006/07 and the cumulative impact of these fires is to considerably alter the age class structure of the native forest area available for timber production. The fires demonstrate the need to protect the commercial forest estate from severe wildfire. Recent history has highlighted the vulnerability of valuable timber resources to wildfire. There is now a need for improved strategies to better protect this resource that underpins Victoria's sustainable forest industries.

Impact on ecological values

Fire is an integral part of the Australian environment and has shaped our ecosystems. Indeed many of our species and ecosystems need fire to regenerate. The precise effects of bushfires on biodiversity are dependent on many factors such as fire intensity, site conditions, fire extent and season.

Intense mega fires such as the three experienced in the past six years have adversely affected forest and soil health, biodiversity, protection of threatened species and our water catchments in a way that does not reflect typical ecological cycles.

[35] Ministerial Taskforce on Bushfire Recovery (2007) 2007 Report from the Ministerial Taskforce on Bushfire Recovery, http://www.business.vic.gov.au/busvicwr/_assets/main/lib60018/rdv_bushfire_recovery_07.pdf
[36] VicForests (2007) VicForests Annual Report 2007, Melbourne, http://www.vicforests.com.au
[37] Victorian Department of Sustainability and Environment and VicForests (2008) Joint Sustainable Harvest Level Statement, Victorian Government, p. 16
[38] Victorian Department of Sustainability and Environment and VicForests (2008) Joint Sustainable Harvest Level Statement, Victorian Government, p. 16

Some effects of the latest fires (such as the impact on catchments) may not be realised until a considerable length of time has elapsed; but may be deduced from the known impacts of earlier severe fires such as those of 2006/07, 2003 and 1939.

Forest health

Large areas of ash eucalypt and mixed species eucalypt forest were burnt in the February 2009 bushfires. Fire affects the growth cycle of plants. Each species has its own survival features which assist with recovery.

Treeferns and some eucalypt species such as Messmate are protected by thick bark. The bark protects the trees' epicormic buds which sprout new growth when activated by loss of foliage, damage or intense heat.[39]

Ash eucalypts such as Mountain Ash and Alpine Ash are fire intolerant; yet fire dependent for their regeneration. Intense fire kills the trees and triggers the release of seeds from their protective "gumnuts". The seeds are able to germinate under optimal conditions of direct sunlight and no competition from weeds. The absence of fire during the lifetime of ash eucalypts would cause the ash forest to die out.[40]

However, it is important to note that while fire is essential for the reproduction of ash forests, immature trees may be killed by fire before they can set seed. Alpine Ash requires thirty years to reach maturity. Thus if forest destroying fire is allowed to occur at intervals of less than thirty years in these forests, the species may face local extinction and can be replaced by other species.[41]

Large areas of Mountain Ash forest have been burnt in the recent fires including much of the Yarra Valley National Park and Kinglake National Park.

[39] Department of Sustainability and Environment, 'The effects of fire on Victorian bushland environments', http://www.dse.vic.gov.au/CA256F310024B628/0/23BAEA9A6DC3C740CA2572250020BF50/$File/Effects_of_fire.pdf

[40] Griffiths, T. (2001) Forests of Ash: An Environmental History, Cambridge University Press, Cambridge, pp. 22-23

[41] Doherty MD and Wright G (2006) Vegetation dynamics in the northern extremities of the Australian Alps after the 2003 fires: the story so far, 10th Biennial Australasian Bushfire Conference, Brisbane.

Figure 4. Forest burnt in the Black Range[42]

Soil

Bushfires can have biological, chemical and physical effects on soils. Fire removes litter cover and burns through the upper soil horizons, destroying the resident insects and other invertebrates. High intensity fires may alter soil chemical structure.

Fire can also change the permeability of the soil and the soil physical structure. Decreased vegetation cover following fires renders the soil more vulnerable to erosion during rainfall episodes. This effect is more pronounced on steeper slopes.[43] These factors make soil very susceptible in the event of heavy rainfall after fires and can cause substantial erosion or mudslides. Erosion and mudslides became a major problem after the 2006/07 fires in Gippsland.

The soil in areas burnt by the recent bushfires remains susceptible to erosion, particularly on steeper slopes. This a particular concern for water quality in catchments and streams and future forest productivity, since soil can take hundreds or even thousands of years to recover.

Wildlife

Bushfires result in reductions in the populations of many native species. They are killed either during bushfires or as a result of starvation or predation following major fires.

Preliminary reports estimate that millions of native animals were killed as a direct result of the 2009 bushfires. Although large, charismatic species such as kangaroos and koalas form the bulk of wildlife rescues and are widely reported in the press, most wildlife mortality is comprised of small reptiles, amphibians, bats, birds and rodents.

[42] VAFI (2009)

[43] Shakesby RA, Wallbrink PJ, Doerr SH, English PM, Chafer CJ, Humphreys GS, Blake WH and Tomkins KM (2007) Distinctiveness of wildfire effects on soil erosion in south-east Australian eucalypt forests assessed in a global context, *Forest Ecology and Management*, 238, 347-364

Animals such as wallabies and kangaroos can outrun bushfires and take shelter in wet gullies[44]. However, large numbers of dead and injured kangaroos were found in February and March. The loss of vegetative cover to fires also renders them more vulnerable to predators later.

The effects of fire on small terrestrial mammals are more severe. Populations are reduced as an immediate result of fire mortality, emigration and predation. Speed of recovery is dependant on patchiness of the burnt area[44]. Populations of Bush Rat can recover in one to three years following a fire that burns approximately 50 percent of the available habitat; but if all habitat is burnt, similar recovery does not occur.[45]

Arboreal mammals such as koalas and possums take refuge from fires by climbing higher into the canopy and retreating into hollows; thus their survival depends on the height of their location versus flame height[46]. Losses in this group as a result of the exceptionally intense 2009 bushfires are likely to be extremely high given the high fire intensity and the extent of crown fire. Possums and gliders require hollow-bearing trees as nest sites; these have also been lost extensively.[44]

Bird mortality in severe wildfires is likely to be very high – rates of 20 to 65 percent mortality have been determined for wildfires in sclerophyll eucalypt forests, not including later losses due to predation and starvation.[47]

The 2009 bushfires will have resulted in severe losses for the region's reptile fauna due to its extent and intensity.

The fate of amphibians is tied to the preservation of catchments. Most of the Corroboree Frog's habitat was lost in the 2003 alpine fires[48]. Wet gullies are less susceptible to severe fires and frogs may be able to take refuge underwater, but there exists a delay between bushfires and their impact on waterways. Erosion following a fire may lead to increased silting and turbidity in streams, affecting the survival of tadpoles. In the event that fires burn creekside vegetation, adult frogs will become exposed to increased predation[49].

Fish suffer the effects of silting and increased turbidity as a result of sedimentation, which may result in direct mortality. Organic nutrients from ash and dead plant matter washed into streams fuel increased bacterial activity which can fatally lower oxygen concentrations.[50] The effects of the 2009 bushfires are also likely to be compounded by habitat reductions due to the prolonged drought that has affected Victoria since 2003.

---

[44] Wilson BA (1994) Fire effects on vertebrate fauna and implications for fire management and conservation, In Fire and Biodiversity, the Effects and Effectiveness of Fire Management, Proceedings of the Conference held at Footscray, Melbourne

[45] Wilson BA (1994) Fire effects on vertebrate fauna and implications for fire management and conservation, In Fire and Biodiversity, the Effects and Effectiveness of Fire Management, Proceedings of the Conference held at Footscray, Melbourne

[46] Gill AM and Catling PC (2002) Fire regimes and biodiversity of forested landscapes of southern Australia, In 'Flammable Australia: The fire regimes and biodiversity of a continent', eds.Bradstock RA, Williams JE and Gill AM, Cambridge University Press

[47] Woinarski JCZ (1997) Fire and Australian birds: a review, In 'Australia's biodiversity – responses to fire', eds. Gill AM, Woinarski JCZ and York A, Department of the environment and Heritage, Australia.

[48] Worboys G (2003) A brief report on the 2003 Alpine bushfires, *Mountain Research and Development*, 23, 294-295

[49] eWaterCRC, Ecological aspects of stream recovery after bushfire, http://www.ewatercrc.com.au/newbushfire/background_aspect.shtml, Accessed 13-04-2009

[50] Nelson T and Milligan A (2003) Effects of bushfire on stream ecology, *Watershed*, published by eWaterCRC, http://www.ewatercrc.com.au/newbushfire/downloads/1000017.pdf, Accessed 13-04-2009

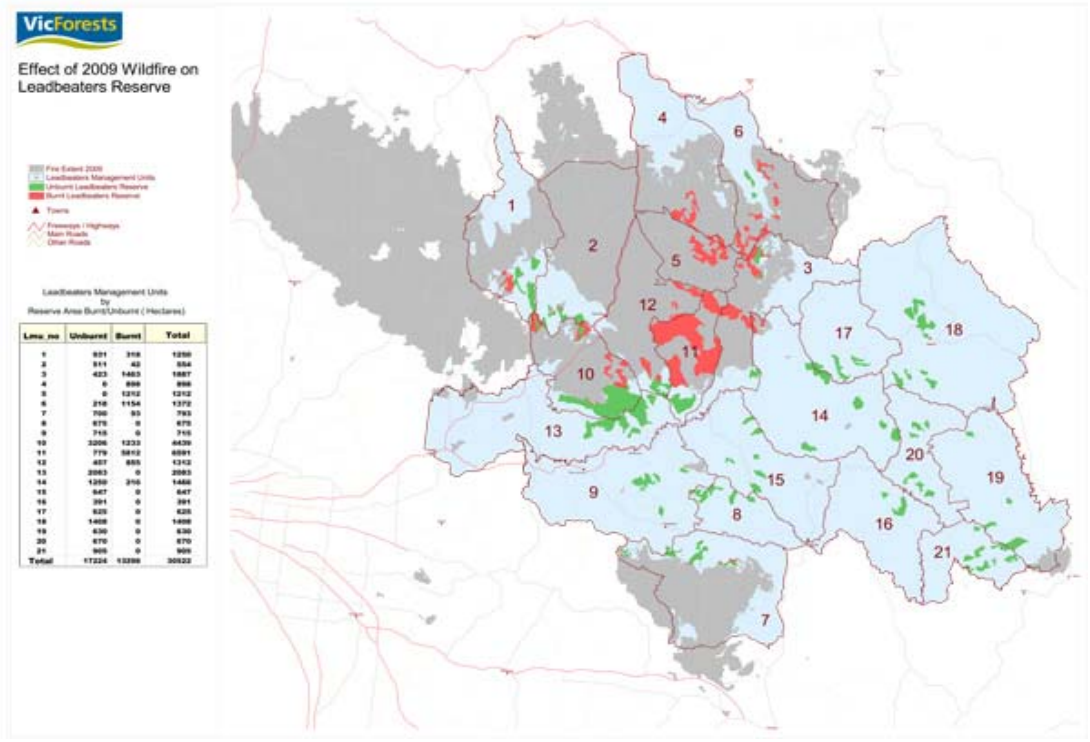
Threatened species

Severe wildfire presents a serious threat to efforts to protect threatened species. The Leadbeater's Possum and the Barred Galaxias are two threatened species adversely affected by the February 2009 bushfires. Fires in 2003 and 2006/07 affected the habitat of the long-footed potoroo and other threatened species. The impact of recent, severe wildfires on these species is discussed below.

Leadbeater's Possum

The Leadbeater's Possum is likely to have sustained severe losses in the 2009 fires. 13,298 hectares out of a total of 30,522 hectares (approximately 45 percent) of the known area designated as Leadbeater's Possum reserve has been burnt in the 2009 bushfires.[51] (See Figure 5 below – the red areas indicate Leadbeater's Possum reserves burnt in the recent fires; green areas are unburnt.)

Figure 5. Effect of 2009 Wildfire on Leadbeater's Possum Reserves[52]



Prior to the fires, the possum was found in three known populations located in the Lake Mountain plateau above Marysville, the central highlands around Toolangi and Marysville, and a third population at Yellingbo. Only the Yellingbo population has remained unaffected. The total wild population prior to the fires was estimated to be less than 3000.[53]

[51] VicForests (2009) unpublished data
[52] VicForests (2009) unpublished data
[53] Gray D (2009) 'After the fires, rangers call out to a marsupial emblem', *The Age*, http://www.theage.com.au/environment/after-the-fires-rangers-call-out-to-a-marsupial-emblem-20090327-9ebb.html?page=fullpage#contentSwap1, Accessed 14-04-2009

The Leadbeater's Possum is reliant on hollows in trees of at least 190 years of age as nesting sites[54]. Many of the hollows found in Mountain Ash forests have been lost to the flames. Nest boxes that were installed before the fires to supplement natural hollows have also been destroyed. New nest boxes and feeding stations have been installed post-fire and careful observations are still being made to determine the extent of the losses incurred[53].

Long-footed Potoroo

Habitat for the endangered Long-footed Potoroo, which was also burnt very extensively in the 2006-2007[55] and 2003[56] fires (some areas were burnt in both fires). Long-footed Potoroo individuals have a limited home range of 5-10 hectares. Efforts to protect the species therefore aim to conserve areas of and connections between suitable habitat.

Fires that destroy large amounts of living plant biomass are likely to impact on the availability of food for the Long-footed Potoroo; and extensive, high-intensity fires may cause local extinctions.[57] Like many native mammals, the Long-footed Potoroo is also more susceptible to predation by cats and foxes after fires[57].

Barred Galaxias

The Barred Galaxias is nationally endangered and found only in the headwaters of the Goulburn River catchment in the central highlands of Victoria. Populations have sustained severe losses as a result of the 2006/07 and 2009 fires. Decline has also been attributed to the presence of trout, which consume young fish and out-compete adults. The species is non-migratory, has low fecundity, and is unable to bypass large stream barriers. The existing 18 populations are isolated from each other by the presence of trout and it is unlikely that fish can naturally recolonise areas after local extinctions have occurred.[58]

Unplanned and highly intense fires such as those that occurred in February 2009, 2006/07 and 2003 have an immediate destructive impact on the mortality of native species and undermine efforts to conserve threatened species; in fact jeopardizing remaining populations.

Catchments and streams

Early estimates are that approximately 30 percent of Melbourne's water supply catchments were affected by the 2009 bushfires. [59]The extent and intensity of the burnt area has not yet been fully assessed and the in many cases it is too early to predict the full impact on water yield, water quality and in-stream health. However, scientific research and experience in other fires provide a good indication of what outcomes may occur.

---

[54] Lindenmeyer D (1996) Wildlife and woodchips: Leadbeater's possum ; a test case for sustainable forestry, UNSW Press

[55] Department of Innovation, Industry and Regional Development, Victoria (2007) 2007 Report from the ministerial taskforce on bushfire recovery

[56] Ryan K (2007) 'Bushfires take toll on fauna', *Herald Sun*, http://www.news.com.au/story/0,23599,21037472-2,00.html, Accessed 26-04-2009

[57] Department of Sustainability and Environment (1994) Flora and fauna guarantee action statement #58 – Long-footed Potoroo

[58] DSE (2003) Flora and fauna guarantee action statement #65: Barred Galaxias *Galaxius olidus* var. *fuscus*

[59] Lane, P. (2009) 'Implications for our catchments and streams', presentation given at University of Melbourne (2009) 'The Science of Bushfire and Recovery', Dean's Lecture Series, 21/04/09, Melbourne

Water yield

Fires in forested catchments areas have both a short and a longer term impact on water yield. In the short term, the loss of foliage and soil cover leads to increased potential for surface water inflows. However, this surface water movement is associated with the risk of flooding, as experienced in Gippsland after the 2006/07 fires.

The longer term impact on water yield is determined by the ecology of the forest. Ash eucalypts are often killed by fire; their young regrowth is dense and uses more water than do mature trees. Essentially there is an increase in water yield in the first few years after fire and then a decline as regrowth establishes and grows. This relationship is described in the 'Kuczera curve', which predicts a decline in water yield of up to 50 percent in the affected areas when dense regrowth is 20-30 years of age, followed by a gradual increase back to the pre-fire water yield as the forest ages.

The water yield impact of mixed species eucalypts after fire is not as large as for ash species.

Mountain ash study to quantify water use by different forest parts[60]

Vegetation thickening and allowing massive fuel loads to accumulate not only poses fire risk, but also significantly reduces potential catchment water yields. Complex stand structures and dense understorey layers within a forest dramatically increase the forests water demand.

Water use modelling in Victoria's mountain ash forests show that heavy understorey can use 20 or 30 percent more water than ash forests with little or not understorey. Melbourne's catchments can have more water and reduced fire risk, but also larger trees, if Governments are willing to invest funding to improve fuel reduction actions, even over a small portion of water catchment forested areas. Although there is a trade-off with less understorey, trees will be better spaced through fuel reduction, concentrating site resources to establish grand and noble forest stands.

The impact on water yield in Melbourne water supply catchments from the February 2009 fires remains unclear. The Kuzcera curve impact on 30 percent of the catchment area would be significant. However, the forests in Melbourne's water catchments are not as mature as those assumed in the model and the full effect will only occur where ash trees have 'crowned'. It depends on the fire extent and intensity (which is still being evaluated), the species mix of the areas burned and rainfall in future. However, a significant decline in water yield due to the fires could cause problems for Melbourne's water supply, which in early May was at 27.7 percent of capacity[61] following an extended period of drought.

It is important to compare the impact of timber harvesting in Melbourne's water supply catchments to the impact of fire. Over the last two decades, about 265 hectares has been harvested each year in catchment areas; 0.17 percent of the 157,000 hectares.[62] Timber harvesting mimics a bushfire disturbance but on a much smaller scale. At the current rate of harvesting, it would take nearly 180 years to cover the area of the catchments affected by the recent bushfires. There are cases where forest thinning and fuel reduction burning are being applied to forested catchments to increase water yield.[63] Such measures have been considered but not yet adopted for Melbourne's water catchments.

[60] Adams M. (2008) 'Fire in Water Catchments', Stretton Group Seminar, Melbourne 19 November 2008
[61] http://www.melbournewater.com.au/content/water/water_storages/water_storages.asp, accessed 05/05/09
[62] DSE (2008) Harvesting in water catchments – managing resources sustainably, http://www.dse.vic.gov.au
[63] Batini, F., Bradshaw, J. And Underwood, R. (2007) 'Managing forested catchments for water, timber and biodiversity', Proceedings of the 2007 IFA and NZIF Conference, Coffs Harbour, June 2007, pp. 60-65

As discussed below, timber harvesting provides critical resources to fight bushfires and reduce the risk of fire to water yield.

Climate change and severe bushfire are the most significant threats to water yield in our catchments. The VAFI has long argued the need to mitigate the threat from severe bushfire to our water catchments, most recently in a review of timber production in Melbourne's catchments published in March 2008.[64]

Water quality

Severe fires can have a serious, negative impact on water quality in the short term. The impact of fire on soils (detailed above) increases the potential for the mobilisation of sediment and nutrients, which can increase stream loadings, particularly with high rainfall.

The rate at which soil erodes from hill sides and stream banks is greater after fire as the vegetative cover that binds and protects soil is destroyed temporarily. This increases the scouring effect of precipitation on exposed soil, resulting in faster over-land and in-stream water flows and greater turbidity. The overall sedimentation and destruction to catchments can be considerable.

The 2006/07 fires had a severe impact on the catchments of most rivers in Gippsland and North East Victoria. Vegetation was almost entirely burned and streamside vegetation lost. Water authorities needed to provide additional treatment for town supplies, which rural users and small communities drawing water directly from river saw water quality deteriorate sharply because of sediment and ash.[65]

Many landholders, including farmers, said it would take many years, possibly a lifetime to rehabilitate the organic matter in their soils. This renders affected rural industries unproductive for many years, but the real impact to catchments could take thousands of years to ameliorate.[66]

Water quality was further affected by localised storms following the fires, which led to landslips, flash flooding and increased silt and debris being washed into waterways.

Water quality impact on Macalister River after 2007 Fires[67]

The Macalister River, in Melbourne's water catchments, and the surrounding hills experienced a catastrophic erosive event after the 2006 fires, causing massive mud slides, stripping hills of topsoil, uprooting trees and loading river flats with gravel, rock and farm infrastructure.

A modest 50mm rainfall event, just two months after the December 2006 fires fell over the scorched farm land, which had been burnt from wildfire escaping the neighbouring crown owned forested land. This rainfall event was enough to cause drastic damage to water resources in the Macalister catchment. The cost to the community to address the water quality and soil degradation issue alone will be in the order of many millions.

The impact on water quality from the February 2009 bushfires will depend on the balance between rainfall and the recovery of soils and vegetation. However, there are likely to be some areas of higher impact where streamsides are burnt and slopes are steep.

[64] Poynter, M. and Featherston, G. (2008) Review of timber production in Melbourne's water catchments, Report prepared for the Victorian Association of Forest Industries, www.vafi.org.au

[65] Ministerial Taskforce on Bushfire Recovery (2007) 2007 Report from the Ministerial Taskforce on Bushfire Recovery, Victorian Government, http://www.business.vic.gov.au/busvicwr/_assets/main/lib60018/rdv_bushfire_recovery_07.pdf

[66] Dunkerley D. Prof. (2008) *'Fire – Flood – Mud – Water'* Stretton Group Seminar, Melbourne, May 28, 2008

[67] Gilder R. (2008) *'Rebuilding a disaster zone'* Article by D. Story, Stock and Land, 12 June 2008

Aquatic habitat and biodiversity

The impacts of erosion, sedimentation, increased nutrient loads and flooding as a result of fires can degrade aquatic habitat and undermine efforts to protect fish species such as the Barred Galaxias.

As noted in the Inquiry Report into the Impact of Public Land Management Practices on Bushfires in Victoria, floods are a natural phenomenon which, like bushfire, can be a benefit or a source of potential devastation for the environment.[68] The combination of flood events and fire damaged catchments, as the Victorian EPA has found, has dire consequences for freshwater ecosystems.[69]

As a result of the 2003 fires in Gippsland, a flood event shortly afterwards on the Buckland River generated a "slug" of sedimentation, causing major fish kills and damage to other aquatic life and habitat.[70] Extreme sedimentation based on ash loading and soil erosion clogs fish gills, alters habitat for spawning, disrupts invertebrate populations, and also stresses and drowns Platypus.[71]

Disturbance caused by fire is a natural and necessary phenomenon. Fire exclusion can have a negative impact on ecosystem health and the viability of many species. However, the significant impact of severe wildfire on terrestrial and aquatic biodiversity, the viability of threatened species, catchment health and water yield demonstrate that fire management must form part of our management approach for these values.

Managing for fire first

We live in a fire prone environment with a risk of more frequent and intense fires associated with climate change and drought. In the past we have focused on excluding fire from our environment through fire suppression and conservation management. However, it is clear that the absence of fire is not environmentally appropriate, nor is it likely to be possible within the context of climate change.

The human, social, economic and environmental costs of severe wildfire are extremely high. Although periodic bushfire is necessary for the health of many ecosystems and species; uncontrolled, severe bushfires have caused significant loss of life, property and infrastructure. They have caused significant economic damage to many rural industries, including the forestry industry, destroying the forests on which our industry depends.

The environmental impact of high intensity fires includes:

- A larger area being burnt;
- Soil damage due to heat and damage to plants, seeds and fungi;
- Death of fauna and trees and other vegetation;
- Loss of hollow-bearing limbs and logs due to heavier fuels burning for longer;
- Degradation of water quality and freshwater ecosystems; and
- Long-term and broadscale impacts on water yield.

[68] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria

[69] Environment Protection Authority Victoria, (2009)*'Bushfire and River Health: Effects of the 2003 bushfires'* www.epa.vic.gov.au/water/rivers/bushfires.asp

[70] Environment Protection Authority Victoria, (2009)*'Bushfire and River Health: Effects of the 2003 bushfires'* www.epa.vic.gov.au/water/rivers/bushfires.asp

[71] Allen F. (2008)*'Counting Platypus after Fire, Flood'*, Weekly Times, 7 May 2008

In particular, high intensity fires undermine programs to protect threatened species, biodiversity, heritage and cultural values as well as our efforts to manage water yield from catchments.

It is clear that catastrophic bushfires are the greatest threat to Melbourne's water supplies, the survival of many threatened species and our future supplies of timber from Victorian forests.

It is more cost-effective to prevent unplanned fires than to pick up the pieces afterward. Decisions around management of forested catchments, threatened species and public native forest must consider the potential environmental impacts of more active management to reduce the risk of severe wildfire versus the potential environmental, economic and social impacts of doing nothing.

Conclusions
• **Catastrophic bushfires are the greatest threat to biodiversity, the viability of many threatened species, future water supply from Melbourne's catchments and our future supplies of timber from Victorian forests** • **Forest, biodiversity, water and land management policies must manage to minimise the risk of catastrophic bushfire as a priority**

The role of forestry industry in fire management and suppression

Victoria's forest industries support a rural employment base that creates significant human resources and infrastructure that are available for bushfire preparedness and control. Resources available for fighting fires, in large part, reflect the capacity of in-location, skilled and trained human resources.

Rural communities based in fire-prone regions benefit from trained and experienced forest industry personnel, skilled in effective contribution to extreme fire events. Forest industries directly support this through provision of procedures and equipment specific to fire management and mitigation, as well as through significant employment.

As mentioned above, the native forest and plantation sectors from Victoria and interstate, contributed hundreds of personnel and hundreds of vehicles and pieces of equipment to the fire suppression for the February 2009 bushfires.

The activities of the industry also provide access to forest through roads, fire tracks and trails, suitable to enable passage for fire fighting and management equipment.

Resources provided by the forestry industry

Skill, experience and local knowledge

In-location forest workers generate lifetimes of experience in fire behaviour and preparedness; an essential and non-replaceable asset for regional communities situated in fire prone areas. Forest workers based in forestry regions, also being fire prone areas, are often the first personnel into action and have an excellent local knowledge base to apply strategic approach to extreme wildfire situations.

These workers, especially from the native forest industry sector, are highly skilled and formally trained in all aspects fire management and action in extreme wildfire events. They are also experienced in using heavy machinery in forest conditions, including track construction, whereas other operators are often inexperienced in those conditions.

Common skill sets in fire management of Australia's forest industry personnel include;

- Fire fighting;
- Strategic planning in fire containment and suppression, incorporating tracks and other infrastructure;
- Fuel reduction implementation, including back-burning, mechanical and other forms of non-combustion fuel reduction;
- Local knowledge and experience; and
- OH&S and Risk Assessment in extreme wildfire situations.

Hundreds of native forest and plantation industry personnel acted as coordinators, fire fighters, equipment operators and logistics and support staff to fight the Black Saturday bushfires.

Fire Management Policy should recognise the value of non-replaceable local knowledge held by in-location forest industry employees, and the networks in which they operate for effective wildfire mitigation.

Comprehensive and adequate fire access infrastructure

The strategic placement of fire access trails and tracks, for use in fire fighting, as well use of other management machinery and human resources is essential for success in bushfire control. Access to fires in forested areas is the key limiting factor for bushfire mitigation and containment.

Multiple use native forests incorporate comprehensive and adequate road and trail infrastructure, exclusively for fire management. Infrastructure standards, such as those applied to multiple use forest managers, should become the benchmark standard across all land tenures, especially public conservation reserves.

The McLeod Report into the Operational Response into the January 2003 Canberra Bushfires recommended clear policy guidelines be developed and implemented to support the identification of a strategic network of fire tracks and trails and their establishment and maintenance.[72] The Inquiry revealed that early intervention into extinguishing the source fires that later joined to form the fire front that devastated Canberra, was possible where strategic fire trail and track infrastructure was in place.

Fire Management Policy must underpin the creation and maintenance of comprehensive and adequate fire trail and track access infrastructure throughout fire prone forested areas in Southern Australia, across all land tenures.

Figure 6. Forestry operations following the Black Saturday fires[73]

Fire-fighting equipment and trained operators

As a condition of operating in the forest, the industry is required to supply its bulldozers and transport machinery and operating personnel to fight fires. This is particularly important in allowing rapid access for fire crews and creating fire breaks, and for first attack fire response.

[72] McLeod R. (2003) Inquiry into the Operational Response to the January 2003 Bushfires in the ACT, ACT Government
[73] VAFI (2009)

The industry provided equipment including tankers, bulldozers, excavators, floats, skidders and vehicles, along with skilled crews to operate them in the effort to control the February 2009 bushfires. The equipment provided by the industry is purpose built for operating in rugged and steep forest terrain, a resource that is readily available at a scale that can't be sourced from elsewhere.

In the 2003 fires, over 100 bulldozers and crews supported the fire fighting effort of which around 80 were from the forestry industry.[74]

These crews provide critically important local knowledge, experience in using heavy equipment in rugged bush terrain, and experience on fire control. They present a valuable resource that is made even more valuable by its ready availability. These resources are only paid for when deployed, providing a cost effective reserve that does not incur maintenance or upgrade costs.

Fire management by the forestry industry

Plantations and fire management

Planted forests are valuable commercial assets. For this reason they are resourced and managed to mitigate fire risk. The management imperative to protect a resource of tangible economic value is crucial in ensuring detection and response networks are in place and able to limit damage to both the primary resource being protected and the wider community that may live within or near to the forest area.

Plantation companies each have a fire brigade which is under the operational control of the CFA. Industry brigades provide resources to manage and protect the plantations from wildfire. They carry specific skills in managing forest fires. They can provide additional resources to the CFA and DSE, including personnel and specialist vehicles.

Midway[75] and HVP[76], companies which lost plantations in the February 2009 bushfires, both maintain industry brigades to protect their assets. They have fire prevention programs and collaborate closely with the CFA and DSE. Midway and HVP deployed fire suppression equipment and highly trained and experienced staff to control the recent fires.

All staff and contractors on firelines are accredited by the CFA and have formal fire training in line with the Public Safety Training Package (PSTP,) the nationally recognised standard of training for the fire industry.[77]

The company deploys crews and contracts equipment to fight fires within its local area, within the control plan for that incident as determined by the responsible fire control agencies (DSE and CFA). This supports HVP's commitment to protect its plantation estate from fire.

Although plantations only occupy a relatively small proportion of rural land, they provide comprehensive and active fire management services to protect their own and neighbouring assets.

[74] VAFI (2003) 'Bogong Fires – January/February 2003', Submission to the Inquiry into the 2002-03 Victorian Bushfires, Submission 227, http://www.dpc.vic.gov.au/Bushfires/227-org-vafi.pdf
[75] Midway, personal communication, 03/04/09
[76] Hancock Victorian Plantations, personal communication, 20/04/09
[77] Hancock Victorian Plantations, personal communication, 20/04/09

Fire management in multiple use forests

Commercial forestry is consistent with a risk minimisation approach to wildfire in multiple use forests. It provides the access, skilled personnel and equipment necessary to quickly respond to fires in State forest as discussed above.

Canberra fires example – extracts from the McLeod Inquiry[78]

On the 8th of January 2003, lightning strikes began many fires in the Brindabella Ranges and Namadgi National Park, west and south-west of the ACT. 10 days later, the fires that were not extinguished soon after ignition became out of control, eventually on the 18th developed into the inferno that killed 4 and burnt 70% of the ACT; one Canberra suburb reporting more than 200 homes destroyed.

Lightning started fires on both conservation reserve and multiple use forest. All fires that began in multiple-use forest areas were extinguished soon after ignition. Success was attributed to quick action and availability of infrastructure and human resources. Adequate machinery and skilled personnel gained access to fires, through strategic and dedicated fire trails and tracks, a key feature of all commercial timber production forests in Australia.

By the time weather conditions became extreme, two fires raged out of control in Namadgi National Park, whilst additionally Tidbinbilla Nature Reserve was ablaze. These fires became the source of the tragedy that was the Canberra fires.

The McLeod Inquiry reveals that early intervention to extinguish the fires in forested conservation reserves was inadequate and in direct contrast to the actions taken in the adjoining multiple-use forest areas. This fire event clearly illustrates the track access and fire management standards set by the multiple use native forest industry, should become the minimum standard across all land tenures.

It also creates a diversity of age classes (and fuel levels) across the forest estate. Timber harvesting removes merchantable timber and provides a fire disturbance, consistent with the natural need of eucalypt forests for fires on a 30 to 400 year cycle for their ongoing survival as forest. [79] Without such disturbance, species such as Mountain Ash could not survive in perpetuity.

It should be noted that the footprint of the forestry industry (currently approximately 6,500 hectares per year) is a fraction of the approximately 1.4 million hectares of State forest affected by fire in the past six years.

Forestry activities in multiple use forests are conducted according to strict regulatory controls to ensure environmental, social and economic values of our forests are maintained. This includes compliance with legislative and regulatory requirements including the Code of Practice for Timber Production, which is audited publicly, annually under the EPA audit framework.

There has been some discussion in the forestry and fire debate about whether stands of young trees and the timber harvesting that generates them make the landscape more or less prone to fire.

The issue is complex. Old growth forests that are turning into rainforest have a dense understorey that shades the fuels and lowers wind speeds. Old growth forests without a dense understorey can have large accumulations of fuel that is exposed to the sun and the wind. The former is less fire

[78] McLeod. R (2003) Inquiry into the Operational Response to the January 2003 Bushfires in the ACT, ACT Government

[79] Attiwill, P.M. (1994) Ecological Disturbance and the Conservative Management of Eucalypt Forests in Australia, Forest Ecology and Management, 63: 301-346

prone and the later is more fire prone. Young forests are often dense and with a dense canopy from the thousands of fast growing crowns. These stands shade the fuels and lower the wind speeds. They are generally less fire prone.

From an ecological point of view these tree species need fire to regenerate but frequent fires will kill them off. They have adapted growth habits that protect them in dense young stands until they are old enough to regenerate after a second fire. As they get older the habit is to form open stands with heavy fuels loads to increase the chance that they will get burnt before they die of old age. This applies to most Victorian forests except where the eucalypts are competing with rainforest species. However rainforest is rare in Victoria because periodic fire is common.

There is visual and anecdotal evidence on the impact of harvesting and young regeneration on reducing the intensity of the February 2009 fires. In fact, clusters of regrowth are often used strategically as a site from which to attack the fires.

In figure 7, the aerial photo reveals that the reduced fuel loads in the regrowth (less than 10 years old) have brought the fire to ground and this has been maintained beyond the regrowth for some distance through older forest before the fire has come back in and climbed into the crown. Interestingly, the effect seems to have helped block fires burning some of Melbourne's water supply catchments.

Figure 7. Aerial photo of fire intensity following the February 2009 bushfires[80]

The images in figures 8 and 9 shows a small section of green canopy 1939 Mountain Ash, which is the only surviving 1939 Mountain Ash on Mt Margaret. It was burnt on the South Westerly Change (Image below is North oriented). The regeneration burnt initially before running out of fuel and trickling around until it again got into the 1939 forest where it built up intensity. The reduction in intensity allowed the forest to survive in an otherwise landscape of dead trees.

[80] DSE (2009) Unpublished data

Figure 8. Fire impact on regrowth forest at Mount Margaret (near infrared aerial image)[81]

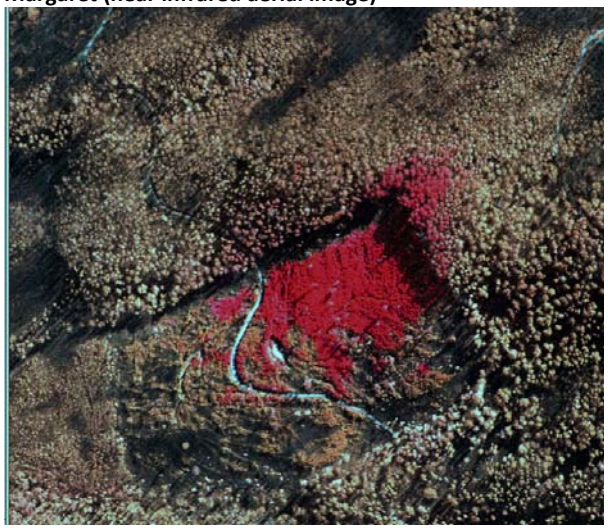


Figure 9. Fire impact on regrowth forest at Mount Margaret (ground photo)[82]

There are numerous examples from the 2009 fires where regrowth has acted as a fire break. The VAFI believes that further work should be undertaken to explore how regrowth forest impacted on the intensity and progress of the 2009 fires.

Loss of capacity due to contraction of native forestry

The capacity of Victoria's forestry industry to provide resources and management activities to support fire prevention and suppression has been diminished by the contraction of the industry.

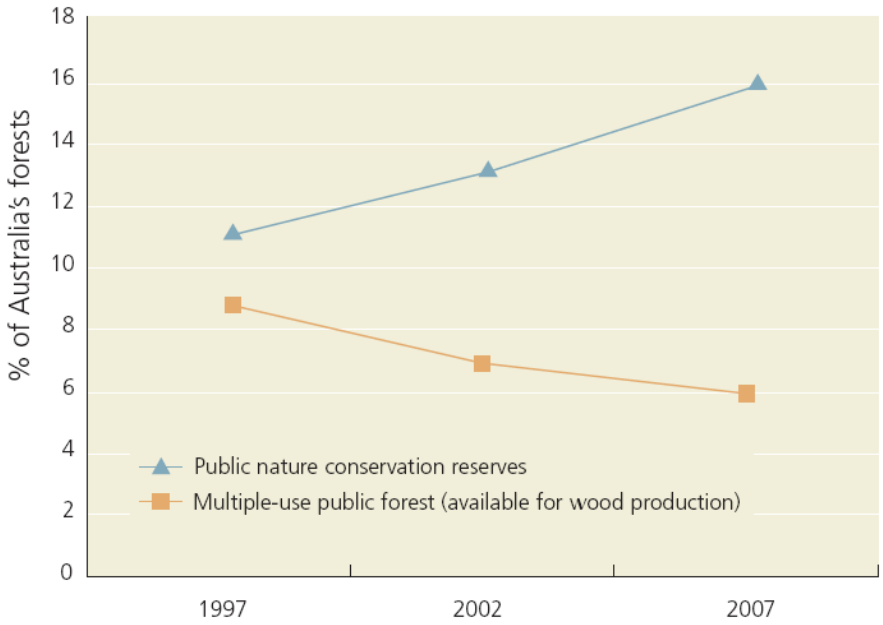
The contraction of the Victorian forestry industry is linked to a series of reserve system increases, which have transferred the tenure of public native forest from State forest (multiple use) to National Park as well as reductions in the sustainable yield. The contraction of the industry as part of an overall philosophy based on preservation of ecological values is discussed in detail in the next section of this submission.

This reduces the number of skilled and experienced forestry workers and professional foresters, with local forest knowledge and equipment available to fight fires. It also reduces the active access infrastructure in public native forest. This impact may be more pronounced in some areas such as the Otways, where timber harvesting has now been phased out and industry equipment is no longer available for fire management.

The contraction of the native forestry industry has occurred across Australia. As a result, local infrastructure and personnel for fire control has declined in recent years, reflecting the conversion of 11 million hectares from public multiple use forest to conservation reserve over the last decade.[83]

[81] VicForests (2009) Unpublished data
[82] Russel, L (2009) Unpublished data
[83] Department of Agriculture, Fisheries and Forestry (2008) Australia's State of the Forests Report, Five-yearly report – 2008, Australian Government

Figure 10: Change in percentage of forest in formal nature conservation reserves on public land and multiple-use public forest available for wood production, 1997 to 2007[84]



The labour sector of the native forest industry has been the backbone of active native forest management practices for multiple public good, which includes bushfire mitigation, preparedness and fire fighting resources. As there has been a decline in multiple-use native resource availability for Australia's forest products industries, so too has there been a decline in associated timber town job prospects and population. This has a flow-on effect in terms of reducing the availability of people to contribute to the CFA, the SES and other community organisations (e.g. sporting clubs).

The Environment and Natural Resources Committee (ENRC) recognised the negative impact of the contraction of native forestry on Victoria's capacity for fire management and suppression in its Inquiry into the 2006/07 fires. The ENRC found:

> That the reduction in the extent of timber harvesting on public land and associated loss of local knowledge and expertise, machinery available for fire prevention and suppression, and a decline in the number and accessibility of vehicle access tracks has had a negative impact on land and fire management, particularly the bushfire suppression capacity of relevant agencies.[85]

Victoria's Bushfire Strategy, released in December 2008, acknowledges a decline in both volunteer and career firefighter recruitment pools. It states that "as well as having fewer people available, valuable local knowledge and skills are also being lost."[86] This presents a significant challenge for effective fire management.

[84] Department of Agriculture, Fisheries and Forestry (2008) Australia's State of the Forests Report, Five-yearly report – 2008, Australian Government, p. 21

[85] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria – Recommendation 5.2

[86] DSE(2008) Living with Fire: Victoria's Bushfire Strategy, Victorian Government, December, http://www.dse.vic.gov.au, p. 17

Recognising and developing the role of the forestry industry

The VAFI believes that fire management policy should provide greater recognition of the role of Victoria's forestry industry in fire preparedness and suppression, as well as practices in forest and fuel load management.

The contraction of the industry has had a negative impact on our State's fire management capacity. Yet there is significant potential to better utilise the skills and resources of the forestry industry and to leverage existing forestry industry activities for improved fire preparedness and suppression.

Forestry is a tool for forest management. The activities and skills of the industry are not limited to commercial harvesting of timber but ecological forest thinning, biomass management to reduce fuel levels, forest regeneration and restoration, roading and infrastructure and first attack fire response. These activities provide relatively untapped resources to reduce the risk from catastrophic bushfire across the landscape through a more integrated approach.

The standards to which the forestry industry operates can also be more widely adopted to improve fire containment infrastructure. For example, access to forests through roads and fire tracks and trails, suitable to enable passage for fire fighting and management equipment should be an imperative minimum standard through Australia's forest estate. The standards set by production native forest managers specific to comprehensive and adequate utilisation of fire access tracks, would be an appropriate benchmark across all land tenures.

A fully integrated approach is required in forest management including significant expansion and development of Australia's native forest industries, and the thriving regional communities they support, to prevent the realities of the most recent Victorian fires from becoming a common experience well into the future.

Conclusions
• **Commercial forestry is consistent with a risk minimisation approach to fire management in public native forests** • **The contraction of the Victorian native forestry industry has had a negative impact on Victoria's fire management capacity, including maintenance of appropriate human resources, equipment and access for fire suppression**

Recommendations
• **The contribution of the forestry industry to fire management should be recognised within fire management policy** • **The area available for commercial harvesting in public native forests must not be reduced any further** • **The skills, resources and existing activities of the forestry industry should be recognised within the context of fire management policy and expanded for the purposes of fire risk management** • **Management of conservation reserves should adopt elements of commercial forest management as appropriate for fire risk management**

Fire and land management in Victoria

Fire management and land management are inextricably linked in Australia. The weather, topography and fuel are key factors affecting fire behaviour. However, fuel is the only factor we can manage to assist fire suppression efforts as well as ensuring adequate fire suppression capacity. In this respect, human resources, equipment, access and strategic firebreak networks are highly important.

The nature of recent mega-fires

In the past six years mega fires have burnt through nearly 3 million hectares of mostly forested public land, affecting biodiversity, water yield and quality in our streams, timber resources, tourism enterprises, and private and public assets.

These mega fires have come during a period of extended drought. Since the middle of the last century, the overall climate change trend in south-eastern Australia has been one of decreased rainfall, increased drought severity and increased fire risk.[87] This trend is predicted to continue.

The weather on 7 February 2009, was rated catastrophic according to the McArthur Forest Fire Danger Index.[88] Prior to the bushfires, the affected areas had experienced three years of drought, a week of extremely hot temperatures and 35 days of no rain. On Black Saturday, high northerly winds followed by a southerly change, 5 percent relative humidity and temperatures in the 40s. Such extreme conditions were present during the 1939 fires and the Ash Wednesday fires.

The weather, topography and fuel are key factors affecting fire behaviour. Fire expert, Dr Kevin Tolhurst has recently suggested that better understanding of convection events on fire development and incorporation of this into fire behaviour modelling is also required.[89]

According to Dr. Tolhurst, weather dominates fire behaviour in extreme fire danger weather. Fuel dominates fire behaviour under high to very dangerous conditions[90] Daily weather cycles, including temperature, humidity, wind speed and direction, atmospheric stability, sea and land breezes and katabatic and anabatic winds[91] have a "profound impact on fire behaviour".[92] Evidence suggests that

[87] Henessy K, Lucas C, Nicholls N, Bathols J, Suppiah R and Ricketts J (2005) Climate change impacts on fire-weather in south-east Australia, Commonwealth Scientific and Industrial Research Organisation Australia, http://www.cmar.csiro.au

[88] Karoly, D. (2009) 'The recent heatwaves and bushfires: Is there a link to climate change?', presentation given at University of Melbourne (2009) 'The Science of Bushfire and Recovery', Dean's Lecture Series, 21/04/09, Melbourne

[89] Tolhurst, K. G. (2009) 'Bushfire behaviour under extreme climate', presentation given at University of Melbourne (2009) 'The Science of Bushfire and Recovery', Dean's Lecture Series, 21/04/09, Melbourne

[90] Tolhurst, K. G. (2009) 'Bushfire behaviour under extreme climate', presentation given at University of Melbourne (2009) 'The Science of Bushfire and Recovery', Dean's Lecture Series, 21/04/09, Melbourne

[91] Katabatic winds occur in mountainous areas on cloudless nights when the land surface loses heat by radiation and the air in contact with the land cools, becomes denser and is forced down slope by gravity. Anabatic winds are the opposite process which occurs during the day.

[92] Tolhurst, K. P. and Cheney, N. P. (1999) Synopsis of the Knowledge Used in Prescribed Burning in Victoria, Department of Natural Resources and Environment, Melbourne, p. 58

understanding the impact of these cycles is crucial to fire suppression. Indeed, Dr. Tolhurst asserts that a few hours of extreme weather determined the footprint of the 2009 fires.[93]

However, the role of fuel is complex and remains extremely important. It affects the intensity and spread of a fire. It was particularly important on the days of the fires following Black Saturday.

The Synopsis of the Knowledge used in Prescribed Burning describes fuel as "the most important factor" influencing fire behaviour. [94] Total fuel is described as the maximum quantity of combustible material that is burnt under the most extreme conditions.

Fuel levels feed fire intensity. The impact of a fire is influenced by the amount of fuel available and in high intensity fires coarse fuels (vertical and horizontal) become available.

The effect of the drought on the moisture content of soil and fuel is also important. "Fuel moisture content affects the ease of ignition, fire spread rate, fire intensity, smoke properties, fuel consumption, spotting and plant mortality or scorch. Fuel moisture is so important that it forms a foundation for many fire danger rating systems..."[95] A guide to fuel moisture content and fire behaviour in eucalypt forests suggests extremely dry surface moisture content creates the potential for extreme fire behaviour with intense short distance spotting and crown fire at moderate wind speeds.[96] Periods of drought correlate strongly with bad fire years in south-eastern Australia.[97]

Regular forest fuel reduction will, however, result in reduced levels of fuel material that produce burning embers and will reduce both the potential for spotting ahead of the main fire front and the impact on structures in the face of the fire. Both of these factors are critical in reducing the fire impact on total area burnt and structures at risk in a given fire event.

Most importantly, reducing the fuel through managing our landscape is the most effective fire mitigation tool available to land managers seeking to reduce the risk of catastrophic bushfire.

Role of fuel management

Land managers cannot control the topography or the weather. However, they can manage forest biomass.

The Victorian Government, through the DSE and Parks Victoria carries out fire prevention activities including prescribed burning to reduce the occurrence and impact of uncontrolled wildfires.

Prescribed burning is one of the tools to manage fuel levels, vegetation and ecosystem health and deliver other land management objectives. On public land in Victoria, prescribed burning is used for the purposes of:

- Fuel management (fuel reduction burning);

[93] Tolhurst, K. G. (2009) 'Bushfire behaviour under extreme climate', presentation given at University of Melbourne (2009) 'The Science of Bushfire and Recovery', Dean's Lecture Series, 21/04/09, Melbourne
[94] Tolhurst, K. P. and Cheney, N. P. (1999) Synopsis of the Knowledge Used in Prescribed Burning in Victoria, Department of Natural Resources and Environment, Melbourne, p. 29
[95] Tolhurst, K. P. and Cheney, N. P. (1999) Synopsis of the Knowledge Used in Prescribed Burning in Victoria, Department of Natural Resources and Environment, Melbourne, p. 38
[96] Tolhurst, K. P. and Cheney, N. P. (1999) Synopsis of the Knowledge Used in Prescribed Burning in Victoria, Department of Natural Resources and Environment, Melbourne, p. 45
[97] Tolhurst, K. P. and Cheney, N. P. (1999) Synopsis of the Knowledge Used in Prescribed Burning in Victoria, Department of Natural Resources and Environment, Melbourne, p. 54

- Flora and fauna management (ecological burning); and
- Commercial forest management (regeneration burning). [98]

"Planned burns are proven to reduce bushfire risk and protect communities and assets such as water, timber, flora, fauna and cultural assets by reducing fuel loads in parks and forests. A number of burns are also important for managing ecosystem health."[99]

The purpose of fuel reduction burning (and fire hazard management generally) is to ensure that fires are:

- "Of less intensity;
- Are less likely to "spot", where embers fly ahead of the fire-front and ignite smaller fires;
- Extend over a smaller geographic area; and
- Are more economically and safely controlled." [100]

Fuel reduction burning manages the amount of fuel by removing some of the materials that can burn such as leaves, twigs, branches and bark. This can reduce the severity of a bushfire.

According to fire experts, "broad area prescribed burning changes a number of fuel characteristics that will result in reduced rate of spread, reduced spotting, reduced flame heights, reduced fire intensity and increased ease of suppression for a period of time following the burn."[101]

Fuel reduction burning is not a panacea for fire prevention. It is only one of a number of tools to manage land and resources to minimise the risk from fire. Land management sits as one strategy in addition to fire containment equipment, road networks, a skilled professional and volunteer workforce, appropriate planning and inter-agency cooperation.

"It is important to understand that planned burning operations, particularly fuel reduction burns, do not stop or eliminate the risk of bushfires. However, Victorian research, and similar information from Australia and overseas, clearly shows that firefighters have a much better chance of controlling bushfires in areas where fuel reduction burns have been carried out."[102]

There are clear examples from the recent Black Saturday bushfires where fuel reduction burns (FRBs) provided areas of reduced fuel which decreased fire intensity and slowed the spread of the fires.

These examples include:

- Mullers Creek FRB: Autumn 2008 – possibly the only unburnt patch of forest in Mt Disappointment, vital as a refuge for wildlife and subsequent recolonisation of burnt ground (see figures 11 - 14 below);
- North Silver Creek FRB: Autumn 2008;
- Mt Robertson East FRB: Autumn 2008 – there is a large unburnt 'pocket' in the lee of the burn that seems to indicate that it stopped the fire completely;

---

[98] DSE, 'Fire as a management tool', http://www.dse.vic.gov.au/DSE/nrenfoe.nsf/LinkView/784ACA76C411E70D4A2568E9000B66A7B79C5FE3BBF26AE74A2567CB000DB458, accessed 27/02/09

[99] DSE 'Burns this Season', accessed 27/04/09, http://www.dse.vic.gov.au

[100] Auditor General Victoria (2003) Fire prevention and preparedness, Auditor General Victoria, May, http://archive.audit.vic.gov.au/reports_par/fire_report.pdf, p. 49

[101] Tolhurst, K. P. and Cheney, N. P. (1999) Synopsis of the Knowledge Used in Prescribed Burning in Victoria, Department of Natural Resources and Environment, Melbourne, p. 35

[102] DSE 'Fire Operations Plans', accessed 27/04/09, http://www.dse.vic.gov.au

- Glenburn FRB: 2004;
- Eagles Nest FRB: Autumn 2007;
- Lukes Creek FRB: Autumn 2007;
- Kalatha Creek FRB: Autumn 2007;
- Bald Hills FRB: 2008;
- Horseyard FRB: 2008;
- H Mine FRB: Autumn 2008; and
- Fryers FRB: Autumn 2008.

Figure 11. Mullers Creek, FlowerDale – Unburnt forest[103]

Figure 12. Mullers Creek, FlowerDale – Across the road[104]

Figure 13. Mullers Creek, FlowerDale – East side[105]

Figure 14. Mullers Creek, FlowerDale, West side[106]

There are some examples where fuel reduction burns had not been large enough to make a significant impact on fire intensity and spread (for example, the Blackmans FRB was not large enough to impact on fire spread) and there may be others where the impact is unclear. However, evidence suggests:

- Larger burns had a better impact on fire spread and intensity than smaller burns; and
- Burns in all types of landscape contributed to slowing the fire or reducing its intensity.

[103] Grant, S. (2009)Unpublished data
[104] Grant, S. (2009)Unpublished data
[105] Grant, S. (2009)Unpublished data
[106] Grant, S. (2009)Unpublished data

Fuel reduction burns are designed to support human fire suppression efforts rather than stop fires themselves. They work to slow the spread of fires and reduce fire intensity, providing opportunities for fire fighters to suppress the fire. According to DSE, "the burning program is as important as fighting bushfires."[107] The above evidence suggests that burning programs need to cover a significant proportion of the landscape.

Fire and forest management in Victoria

Fuel management in Victoria

Fuel management on public land

The DSE has fire management responsibilities for public land including State forests, National and State Parks, wilderness areas and Crown Reserve. This includes both management of wildfires and prescribed burning to meet land management objectives.

The DSE coordinates with Parks Victoria, the Emergency Management Committees of local Shires, Regional and Municipal Fire Prevention Committees and the Country Fire Authority (CFA) in fire suppression and fire protection planning.[108]

Under the Forests Act (1958) the DSE is responsible for all prescribed burning on public land. Burns are conducted with the assistance of other agencies including Parks Victoria, VicForests and the CFA.

Prescribed burns are generally carried out in autumn or spring when the weather is milder and fire behaviour is easier to predict. Planning and execution of prescribed burns also take into account scientific knowledge and research.[109]

Biomass in State forests is also actively managed through commercial timber harvesting and thinning programs, which provides a diversity of forest age classes throughout the estate. These activities are managed by VicForests, according to regulatory controls and with oversight by DSE.

Fuel management on private land

Responsibility for fire hazard management on private land lies with property owners, and this is regulated largely by municipal fire prevention and planning instruments.[110] Private landholders may reduce hazards by lighting fires in the open at particular times of the year to "burn off" grass, stubble, weeds, undergrowth or other vegetation.

Wildfire Management Overlays identify areas of high bushfire risk and set objectives and criteria to guide development in these areas.[111] Native vegetation regulations guide the management of native vegetation on private land and are primarily administered to prevent removal of native flora. Following the 2003 fires, the Auditor General recognised the conflict between retaining bushland in a residential environment and removing all potential hazards.[112]

---

[107] DSE 'Burns this Season', accessed 27/04/09, http://www.dse.vic.gov.au
[108] DSE 'Strategic Coordination', accessed 27 April 2009, http://dse.vic.gov.au
[109] Tolhurst & Cheney Synopsis of the Knowledge Used in Prescribed Burning in Victoria
[110] DSE 'Burning Off On Private Land', accessed 27 April 2009, http://dse.vic.gov.au
[111] DSE(2008) Living with Fire: Victoria's Bushfire Strategy, Victorian Government, December, http://www.dse.vic.gov.au
[112] Auditor General Victoria (2003) Fire prevention and preparedness, Auditor General Victoria, May, http://archive.audit.vic.gov.au/reports_par/fire_report.pdf,

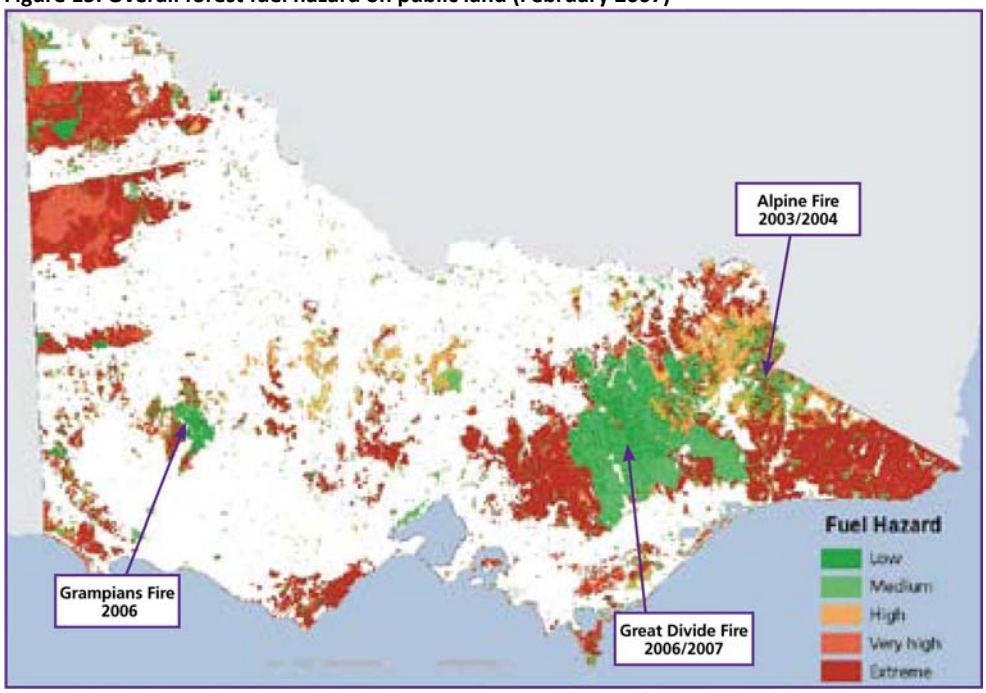
At this stage there is no coordinated program of prescribed burning on private land. However, DSE does support it and informal cooperation between DSE, the CFA and landholders for such activities exist.

A legacy of high fuel levels

A parliamentary inquiry into the 2006/07 bushfires found the legislative, regulatory and reporting structures for the planning and conduct of prescribed burning activities on public land was complex but appropriate. However, the Inquiry found the frequency and extent of prescribed burning has been insufficient.[113]

Despite the severe bushfires in 2003 and 2006/07, forest fuel hazard levels on public land at February 2007 were extreme in many parts of the State, including many areas that burned in the February 2009 bushfires (see Figure 15 below).

Figure 15. Overall forest fuel hazard on public land (February 2007)[114]



Even taking into account the now reduced fuel levels from the areas burnt in recent fires, there remain areas with extreme fuel levels including the Macedon ranges, far East Gippsland and the Otways.

The Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria by the Environment and Natural Resources Committee (ENRC Inquiry)[115] following the 2006/07 fires

[113] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria, Findings 2.1 and 2.2

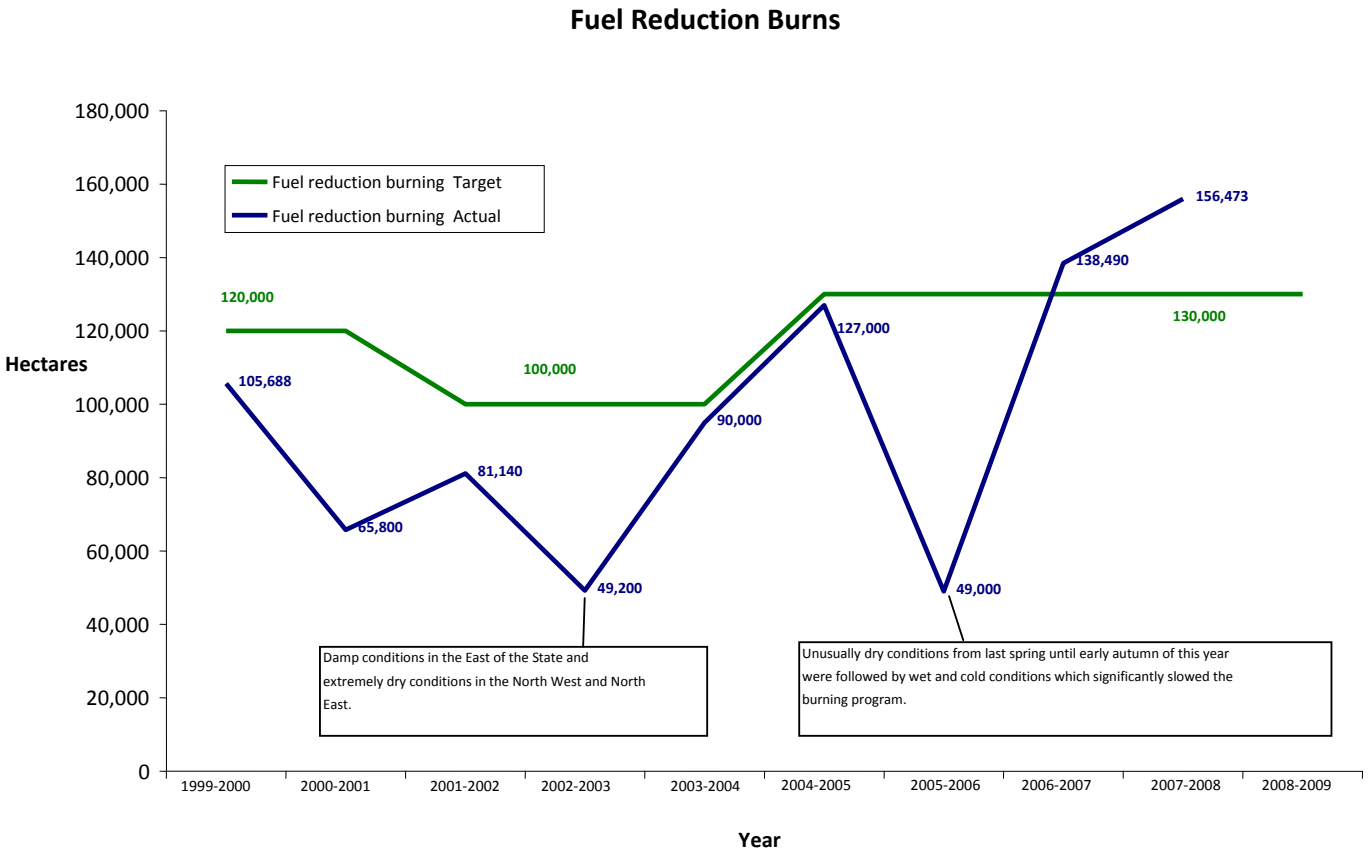
[114] DSE(2008) Living with Fire: Victoria's Bushfire Strategy, Victorian Government, December, http://www.dse.vic.gov.au, p. 8

investigated prescribed burning in Victoria and found it to be insufficient over a number of decades, effectively leaving a legacy of extremely high fuel levels.

The ENRC found that the scale and intensity of the 2002/03 and 2006/07 bushfires were the result of inappropriate fire regimes, and in particular, of an insufficient level of landscape-scale prescribed burning. It contended that the frequency and extent of prescribed burning had been insufficient over a number of decades for ecological purposes. It also found there is a need for an increase in the extent and frequency of prescribed burning in catchment areas to mitigate the risks associated with future bushfires.

The performance of actual fuel reduction burns relative to targets is illustrated below in figure 16 for the last 10 years.

Figure 16. Fuel reduction burn performance against targets[116]



However, it is important to note that the level of prescribed burning has been low beyond the past 10 years. Between 1997/98 to 2001/02, it was approximately 80,000 hectares on average. The average area of land that was subject to hazard reduction burning each year between 1974/75 and 1983/84 was 225,000 hectares. That is, the rate of fuel reduction fell to about 1/3 of the average of 20 years prior.[117]

---

[115] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria

[116] DSE (2009)

[117] VAFI (2003) 'Bogong Fires – January/February 2003', Submission to the Inquiry into the 2002-03 Victorian Bushfires, Submission 227, http://www.dpc.vic.gov.au/Bushfires/227-org-vafi.pdf

The lower level of fuel reduction burning indicates that fuel loads may be higher than 20 years ago. It also suggests that fire fighters are not getting as much experience in controlling fires.

Difficulties in assessing prescribed burn target compliance

The VAFI acknowledges that there a range of factors which mean that measuring the achievement of prescribed burn targets can be complex and potentially difficult to assess.

Prescribed burns are only able to be undertaken safely at certain times of the year and pending the right weather conditions. For example, adverse weather conditions slowed the burning program to well below the target in 2005/06 (see figure 16).

Prescribed burns also require significant planning and can be resource and cost intensive, particularly where they are planned for asset protection close to communities. Risk aversion by communities and ideological opposition to prescribed burning has also complicated the implementation of prescribed burning.

Following the 2003 fires, the Auditor General recognised that although there had been a consistent failure to achieve hazard reduction targets, the significance of the under achievement could not be easily assessed. This was because the DSE reports in terms of hectares burned, and does not report on the level of residual risk resulting from failure to achieve hectare targets.[118]

The Auditor General also found that monitoring and reporting of performance had not been of the same standard as planning for fuel reduction burns.[119]

It was noted by fire experts to the ENRC that reporting of the total burn area does not provide an effective measure of the burn outcome, but that burns should be assessed according to the extent the desired fuel hazard level is achieved in each fire management zone. [120]

This is a logical approach that appears to fit with current DSE policy as articulated the December 2008 Bushfire Strategy.

At the end of the day, it is clear that Governments during the 1990s and early 2000s simply did not manage fuels and biomass across the landscape for fire as actively as they should have. At the same, public land was managed according to a paradigm of preservation rather than active management.

Failure of the preservationist approach

In the past 25 years there has been a significant increase in the areas of forest in National Park and at the same time a significant reduction in the area treated for fuel reduction burns on an annual basis. The reduction in resource availability for the forestry industry and associated contraction in the industry decreases the level of active land management and fire management resources.

[118] Auditor General Victoria (2003) Fire prevention and preparedness, Auditor General Victoria, May, http://archive.audit.vic.gov.au/reports_par/fire_report.pdf, p. 6

[119] Auditor General Victoria (2003) Fire prevention and preparedness, Auditor General Victoria, May, http://archive.audit.vic.gov.au/reports_par/fire_report.pdf, p. 6

[120] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria, p. 77

Conservation through preservation

In the Bracks Government's Policy for the 2006 Victorian Election it proposed a significant National Parks expansion, which totalled approximately 154,110 hectares.[121] [122] Over 100,000 hectares of this area had been State forest and available for timber harvesting.

These National Park increases followed:

- the elimination of timber harvesting in the Otway region and the establishment of the Great Otway National Park;
- the reduction of timber harvesting in Box Ironbark forests to a minimal level and the establishment of new or expanded National and State Parks totalling over 105,00 hectares; and
- the ending of timber harvesting in the Wombat Forest.[123]

In the Election Policy, the Bracks Government claimed that since 1999 it had "created more National Parks than any Government in Victoria's history."[124]

The current Government's Bushfire Strategy, released in December 2008 identifies the Otways and the Wombat Forest as areas with extreme fuel loads.[125] These areas are also the subject of current high priority planned burns.[126]

Expansion of formal conservation areas such as national parks, as a means to assuage political pressure, reflects the desires of a small element in our society that advocates minimal human involvement in our forests. In this view the primary tool for conserving environmental values is increasing reserves.

Outcomes of preservation

As discussed above, our forests, woodlands and heaths require periodic fire to survive and remain healthy and the management of biodiversity, threatened species and water catchments are adversely affected by catastrophic bushfire, such as the three mega fires experienced in the past six years. We must manage for fire first if we are to manage for these values successfully.

A number of preservationist lobby groups have advocated in the past (and present) for reducing levels of active management across the landscape.[127]

---

[121] Australian Labor Party – Victoria (2006) 'Victoria's National Parks and Biodiversity', Policy for the 2006 Victorian Election.

[122] This includes 41,000 hectares specified in the policy for the Goolengook Block, the Great Alpine National Park and forest in East Gippsland as well as 94,710 hectares of expanded Red Gum National Parks and 18,400 hectares for Cobobboonee National Park, which were not specified in hectares in the Policy but which have since been or are in the process of being implemented.

[123] Australian Labor Party – Victoria (2006) 'Victoria's National Parks and Biodiversity', Policy for the 2006 Victorian Election.

[124] Australian Labor Party – Victoria (2006) 'Victoria's National Parks and Biodiversity', Policy for the 2006 Victorian Election.

[125] Department of Sustainability and Environment (2008) Living with Fire: Victoria's Bushfire Strategy, Victorian Government, December, p. 8

[126] DSE 'Burns this Season', accessed 27/04/09, http://www.dse.vic.gov.au

[127] Environment East Gippsland (2007) Submission to the enquiry into the 2006/07 fires, Submission No. 225; http://melbournecatchments.org/mwcn/; Victorian Forest Alliance (2006) Choosing a Future for Victoria's Forests, June

Fire mismanagement – too frequent, too rare, the wrong intensity, at the wrong time of year – has been recognised as a process threatening to Australia's terrestrial biodiversity[128], and in southern Australia, to ecosystem health in general.[129] Active fire management is required for ecosystem health; not fire exclusion.

Forest and woodland thickening is occurring in many parts of Australia where inadequate human intervention is applied to manage fuel loads and ecosystems. The Australian National University is currently researching environmental thinning practices for application to native forest areas in negating vegetation thickening for biological conservation purposes. [130]

Overstocked forests and woodlands, where trees and shrubs crowd the forest structure, are recognised as not reflecting the pre-European landscape, which was shaped by indigenous use of fire. Not only is the vegetation thickening effect a severe fire risk, it also does not meet society's biodiversity expectations in the maintenance of natural environment

It has been argued that 'passive management of nature reserves in Australia has failed to maintain healthy ecosystems'.[131] Jurkis states that "conservation management currently seems to be directed mainly towards designating reserves rather than physically conserving forest ecosystems and maintaining their health. Forest health decline and increasing fire control problems are two facets of a problem arising from passive management philosophies." Active and adaptive forest management across all land tenures is required to reduce fire risk and maintain forest health.

A reduction in resources

A result of expanding reserves and contraction of the forestry industry (as described above) has been that access tracks have deteriorated and there has been a decline in the equipment and personnel available to manage fires in these areas.

In 2003, the VAFI estimated the number of forestry workers in the North East had reduced from approximately 150 in 1985 to less than 40 by 2003.[132]

Aerial suppression is an important tool. However, it is used effectively in coordination with ground crews who can attack the fire directly.

Fires grow in intensity at an exponential rate. Fire fighters have a better chance of controlling the fire if they can get to it quickly, when it is at low intensity. First attack is critical. Getting the fire quickly requires that the workforce:

- Knows the area and local geography;
- Is present and skilled;
- Is properly equipped; and
- Has access to the fire.

[128] National Land and Water Resources Audit (2003) 'Australian Terrestrial Biodiversity Assessment 2002', Land and Water Australia, http://www.nlwra.gov.au/products/pr020457
[129] Environment Australia (2001) 'Landscape health in Australia: A rapid assessment of the relative condition of Australia's bioregions and subregions', Environment Australia and National Land and Water Resources Audit,
[130] McIntosh G. (2007) Ecological thinning: A long-term strategy for forested water catchments and managed reserves. Department of Forest and Ecosystem Science, University of Melbourne
[131] Jurkis, V. (2005) 'Decline of eucalypt forests as a consequence of unnatural fire regimes', Australian Forestry, 68(4), 257-262
[132] VAFI (2003) 'Bogong Fires – January/February 2003', Submission to the Inquiry into the 2002-03 Victorian Bushfires, Submission 227, http://www.dpc.vic.gov.au/Bushfires/227-org-vafi.pdf

This drain of experienced fire fighting personnel and equipment cannot simply be replaced with numbers of casual summer fire fighters and hired machines to achieve the same fire fighting capacity, as the critical bush and fire fighting experience components are missing.

Ground crews are only effective if they can get to the fire. Maintaining a system of access roads which are capable of carrying fire fighting vehicles is imperative. A reduction in forest access due to the closure or lack of maintenance of roads and tracks, many of which were built and funded by the timber industry is a major concern.

A number of residents and stakeholders who provided evidence to the ENRC Inquiry complained that the access network was (and is) insufficient for fire fighting vehicles, not maintained and that there were not enough access tracks. [133] It was noted that tracks and firebreaks which were previously maintained by the forestry industry but were not anymore, no longer had sufficient clearance for firefighing vehicles.

Contraction of the industry leads to fewer roads and trails in the forest. Forest industry revenue raised for roading was over $13 million for both 2000/01 and 2001/02.[134] In 2007/08, VicForests spent $7.3 million on roading. [135] The Victorian Government now has to invest in rebuilding the fire access network. However, in many areas and reserves such as the Otways, the access network is currently not sufficient and has declined in both extent and quality.

The recent mega fires clearly demonstrate that our notions of preserving biodiversity in a fire prone environment are flawed and we need more active and adaptive management regimes that can respond to change. Unfortunately, we have a long history of lessons from severe bushfire, but the lessons have not always been heeded.

What have we learnt?

What have we learnt? It appears not very much. There have been national and Victorian inquiries following every major bushfire in our history. These inquiries have had a common theme; the need for more active fuel management across our forested land.

The Stretton Inquiry following the 1939 bushfires recommended the forest management agency undertake planned burning for protective purposes.[136]

Following the 2002/03 bushfires a number of inquiries and reviews made findings on fuel and forest management.

- The Auditor General recommended that DSE supplement the current area for fuel reduction burning with measures that more accurately reflect the level of risk reduction being sought and achieved.[137]

---

[133] ENRC, p. 141

[134] VAFI (2003) 'Bogong Fires – January/February 2003', Submission to the Inquiry into the 2002-03 Victorian Bushfires, Submission 227, http://www.dpc.vic.gov.au/Bushfires/227-org-vafi.pdf

[135] VicForests (2008) Annual Report 2008, VicForests, http://www.vicforests.com.au

[136] Report of the Royal Commission to Inquire into the Causes of and Measures Taken to Prevent the Bush Fires of January 1939, and to Protect Life and Property and the Measures to be Taken to Prevent Bush Fires in Victoria and to Protect Life and Property in the Event of Future Bush Fires (Stretton Report) (1939), http://www.abc.net.au/blackfriday/royalcommission/index_recommendations.htm

[137] Auditor General Victoria (2003) Fire prevention and preparedness, Auditor General Victoria, May, http://archive.audit.vic.gov.au/reports_par/fire_report.pdf, p. 6

- The Federal 'Nairn' Inquiry recommended that the Council of Australian Governments seek agreement from States and Territories on the optimisation and implementation of prescribed burning targets and programs to a degree that is recognised as adequate for the protection of life, property and the environment.[138]

Following the 2006/07 bushfires the ENRC recommended:

- "That in order to enhance the protection of community and ecological assets, the Department of Sustainability and Environment increase its annual prescribed burning target from 130,000 hectares to 385,000 hectares. This should be treated as a rolling target, with any shortfalls to be made up in subsequent years"; and
- Increased transparency in the monitoring of and reporting on prescribed burn activities.[139]

In its findings, the ENRC calls for an increase in landscape scale prescribed burning to protect communities and the environment. It is notable that it finds no evidence of an adverse impact by forestry operations on the level of prescribed burning; only that a contraction in the forestry industry had a negative impact on fire management.[140]

The forestry industry has long called for more active management of Victoria's forests.

Following the 2006/07 bushfires, the VAFI and the NAFI provided input and recommendations to the ENRC Inquiry. [141] These recommendations clearly focused on the need to practice adaptive and active management on a landscape scale to manipulate forest age and its fuel loading. They also detailed the role of the forestry industry in fire preparedness and suppression and warned about the consequences for fire management of reducing native forest resource availability.

Following the 2003 fires, the VAFI argued that "the risk of future conflagration being more severe is likely unless fuel reduction/ecological burning is increased, more access roads are constructed and maintained and people skilled in both bush craft and fire fighting experience are on hand to cope with the emergency situations." [142]

In its 2003 Submission to the Inquiry into the 2002-03 fires by the Emergency Services Commissioner (Esplin Inquiry), the VAFI argued that:

- The deficit in prescribed burning must be addressed and an expanded program of the appropriate use of fire for ecological benefit and the protection of private and public assets be instituted; and

[138] House of Representatives Select Committee into the recent Australian bushfires (2003) A Nation Charred: report on the inquiry into bushfires, Canberra

[139] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria

[140] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria

[141] VAFI (2007) *Our Forests Will Burn Again: Fire and Forest Industries – The Benefits of Active Forest Management for Successful Fire Management*, Submission to the Environment and Natural Resources Committee, Submission No. 174, June; NAFI (2007) Inquiry into the Impact of Public Land Practices on Bushfires in Victoria, Submission to the Environment and Natural Resources Committee, Submission No. 245, September

[142] VAFI (2003) 'Bogong Fires – January/February 2003', Submission to the Inquiry into the 2002-03 Victorian Bushfires, Submission 227, http://www.dpc.vic.gov.au/Bushfires/227-org-vafi.pdf

- The role of the native forestry industry should be encouraged to provide support for forest management, infrastructure and emergency response.[143]

The VAFI has continually and repeatedly warned that further contraction of the industry will exacerbate reductions in access, funding for forest management activities and skilled fire fighters.

As detailed above for planned burning, land management to reduce the risk of fire in Victoria has not fully met the advice of these government and expert inquiries or the calls of our industry, at least until recently.

Recognising fire management as a priority

The 2008-2011 Corporate Plan of DSE lists 'Responding to the increasing fire threat' as one of four strategic priorities with the focus on:

- Increasing and improving planned burning programs;
- Engaging communities more effectively in managing fire; and
- Consolidating and strengthening the delivery of fire services.[144]

The Victorian Government's response to the ENRC Inquiry supported or supported in principle all recommendations. It did not commit to the 385,000 annual hectare target for prescribed burning which was recommended by the ENRC but it has committed to increasing the effectiveness of the prescribed burning program, within the planning constraints discussed above. [145]

In December 2008, the Government released its new Bushfire Strategy, which committed to managing the land with fire. The Strategy recognises "the current scale of planned burning is insufficient to deliver desirable protection and ecosystem service needs."[146]

It aims to "provide the right mix of fire (at appropriate frequencies, seasons, intensities and scales) across both public and private land to sustain resilient ecosystems, communities, industries and reduce the incidence of large scale severe fire events."[147] In particular, the Strategy identified opportunities to use bushfires, which are burning under appropriate conditions, to achieve land and fire management outcomes. This approach has recently been used for a bushfire near Cann River in East Gippsland.

Although the most recent Victorian Government under Premier Brumby has put more resources into redressing the under-burning of fuels in recent years, a significant build up remains. This is a challenge for land managers.

The commitments in the Government's Bushfire Strategy are encouraging. However, a more active, risk management approach is required. This includes improving management of fire on private land, the coordination of fire management across the landscape and addressing the deficit in active forest

[143] VAFI (2003) 'Bogong Fires – January/February 2003', Submission to the Inquiry into the 2002-03 Victorian Bushfires, Submission 227, http://www.dpc.vic.gov.au/Bushfires/227-org-vafi.pdf
[144] DSE (2008) Corporate Plan 2008-2011, http://www.dse.vic.gov.au
[145] Government of Victoria (2008) Victorian Government's response to the Environment and Natural Resources Committee's Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria
[146] DSE(2008) Living with Fire: Victoria's Bushfire Strategy, Victorian Government, December, http://www.dse.vic.gov.au, p. 10
[147] DSE(2008) Living with Fire: Victoria's Bushfire Strategy, Victorian Government, December, http://www.dse.vic.gov.au, p. 10

and biomass management, including access, personnel and activities to improve forest health and fuel levels.

Conclusions
• **Prescribed burning is an important tool for ecological benefit and in reducing fuel levels to slow fire spread and reduce intensity, to assist in fire suppression** • **Victoria has a legacy of high fuel levels, reduced access within forested land and diminished forest management resources as a result of a 'preservationist' approach to conservation over past decades** • **Historical fire events and resultant reviews and inquiries have provided a clear and recurring case for active forest management and increased fuel management** • **Fire hazard management on private land has not yet been adequately incorporated into fire preparedness and fuel management programs** • **Improved fuel reduction burning and use of other forest management tools are needed to manage fuel levels on public land**

A risk management approach to bushfires: active and adaptive land management

We have experienced three catastrophic bushfires in six years. Our climate modelling tells us that fire risk is increasing in South Eastern Australia. We have in the past been effective at excluding fire from our landscape through suppression activities but now it is clear that the absence of fire from the landscape and the build up of fuel is not environmentally appropriate and has increased the risk of fire to our community.

We must move beyond old paradigms of preservation towards a risk-based approach to fire management and land management. The greatest land management tool in the face of change is active adaptive management.

The current fire management practices are integrated, adaptive and applied across public land irrespective of tenure. This is a sound framework.

However, there are key areas where current fire management practices must be improved to achieve level of preparedness commensurate with the level of risk from severe bushfire. This will require additional resources to actively manage forest biomass. It will also require new thinking on how we most effectively and efficiently achieve fire management objectives to reduce the risks from severe bushfire.

Active forest management: Recognising forestry as a forest management tool

Adaptive and active forest management is practiced on a landscape scale can manipulate the age of the forest and its fuel loading. The resultant landscape is diverse and well adapted to survive the next mega fire. It can also reduce the severity and likelihood of large fires by having a quality road network throughout the forest estate.

Existing forestry activities play a large role in supporting active forest and fire management. There is significant opportunity to utilise the skills and resources of the industry to undertake further activities designed to promote forest health and management of forest biomass to support fire management. It is also clear that supporting the viability of the forestry industry supports fire management capacity.

Active and responsible forest management

The role of forestry in providing active forest management should be taken into account in fire management policies. Forestry activities create a diversity of age classes across the landscape, introducing disturbance to mimic a bushfire under controlled conditions.

As the recent fires demonstrated, excluding fire from our catchments is unnatural; indeed it would have dire ecological impacts. Active management of the catchments can reduce fires when they occur and provide water and wood in the interim. Forestry activities in the catchments are limited to a maximum of 340 hectares per year out of the total 157,000 hectares of catchment area. However, the access, skilled personnel and active management provided by the industry is consistent with a risk management approach for fire management in the catchments. The Victorian Government has

also recently investigated a thinning program, which could provide increased access and improve water yield.

Landscape scale and adaptive management planning for fire and timber harvesting should be integrated so that controlled fires have less impact on young stands, changes in forest values can be accommodated and strategic fire corridors can be established. Forest management regimes could also be included in bushfire modelling.

State forests are managed for the conservation of all forest values and multiple uses. This is achieved using a zoning system that identifies the richest areas for biodiversity and protecting them in Special Management Zones. These zones are flexible and can be moved if the values they are designed to protect move. This is the theory of adaptive management that is required by land management agencies. Following bushfire events and as part of fire management policies, forest management zones should be reviewed to ensure that zoning is current and appropriate.

Forest health and biomass management

Active management should use silviculture and fire to provide a diversity of forest ages and fuel loadings across the forest landscape to reduce the severity and impacts of uncontrolled wildfire and to protect neighbouring communities. The skills and the resources of the forestry industry could be utilised to manage forest health, biomass and fuel, improving the industry's contribution to fire management.

Commercial forestry undertakes harvesting for logs. It also involves roading, treatments for regeneration and forest health, forest thinning to improve growth and controlled burning. These skills and resources could be utilised more broadly as part of managing our forest estate for fire.

A greater integration of forest industry services and fire management could be achieved across the landscape. This may require zoning changes to allow ecological or fire management services to be carried out.

Such services could include:

- Clearfelling and seed tree silviculture that can provide young forest in strategic and controlled locations;
- Selective harvesting of dry forests to provide greater access and water yields and scattered regeneration to replace the older trees;
- Thinning of dense regrowth stands to provide larger trees more rapidly, reduce water usage by the trees and increase access into the stands; and
- Mechanical removal of fuel hazards, including vertical fuels.

These types of services could also involve creating or maintaining access roads as well as generating logs for commercial purposes to assist funding of forest fire management. They also could maintain the industry where commercially-driven activities are not occurring, providing employment and socio-economic benefits to local economies and maintaining local fire fighting resources.

This suite of tools when coupled with an active and well planned program of fuel management by burning across the forest landscape and strategically to protect assets will provide an active management regime that will protect Victorians from catastrophic fires and minimise the impacts when they do occur.

Indeed, the ENRC Inquiry recommended:
That the Department of Sustainability and Environment and its partner agencies conduct or commission research, and a possible trial study, to determine the potential of thinning and other silvicultural practices – whether alone or in combination with prescribed burning – as a means of reducing fuel loads and as a bushfire management strategy in Victoria's forests.[148]

Other jurisdictions are currently leading the way on working with industry on biomass management to reduce the risk of wildfire.

The American Government recently devoted $500 million to wildfire management[149], of which:

- $250 million is for hazardous fuel reduction, forest health protection, rehabilitation and hazard mitigation activities on Federal lands; and
- $250 million is for State and private forestry activities including hazardous fuels reduction, forest health and ecosystem improvement
- Up to $50 million of the total funding is allocated for wood-to-energy grants to promote increased utilisation of biomass from Federal, State and private lands.

This stimulus package is being used to fund projects to reduce hazardous fuels through timber harvesting and thinning.[150] For example, one project near Lake Tahoe plans to use handheld and mechanical forestry treatments to reduce hazardous fuel loading.[151]

The use of the stimulus money for thinning reflects an increasing emphasis on preventing wildfires in the US, by removing smaller trees and brush from overgrown forests. This work is also creating jobs and maintaining skilled workers in forests.

This approach is consistent with the "Healthy Forests Initiative" in the US, which called for active forest management, including through thinning and prescribed burns to reduce fuel hazards.

Maintaining forestry industry resources for fire management

The existing commercial role of the forestry industry and opportunities to utilise the skills and resources of the industry for specific ecological and fire management objectives will provide ongoing support for fire management in the form of skilled human resources, equipment and the number and accessibility of access tracks.

Forestry industry management has the sufficient motivation and tools to protect forest environments (economic value, detection networks, access networks, suppression capabilities with equipment and trained personnel) to minimise both the size and impact of any given fire event.

It is important that the forestry industry be maintained at a viable level so that it can continue to be called upon in times of emergency. Indeed, there is scope for closer relationships between fire agencies and the forestry industry in fire suppression. It may also be valuable to revisit decisions to

[148] Environment and Natural Resources Committee (ENRC) (2008) Inquiry into the Impact of Public Land Management Practices on Bushfires in Victoria, Parliamentary Paper No. 116 Session 2006-2008, Parliament of Victoria
[149] American Recovery and Reinvestment Act of 2009, H.R. 1 -56, http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h1enr.pdf
[150] Fattig, P. (2009) 'Wildfire prevention gets stimulus funds – Josephine County among those getting $2 million', Mail Tribune, 11/03/09, http://www.mailtribune.com/apps/pbcs.dll/article?AID=/20090311/NEWS/903110324, accessed 30/03/09
[151] 'Wildfire reduction project soon at Tahoe', The Mercury News, 27/03/09, http://www.mercurynews.com/breakingnews/ci_12011047?nclick_check=1, accessed 30/03/09

exclude the industry from some forest areas including the Otways and the Midlands Forest Management areas to assess the impact on fire management and potential solutions.

Prescribed burning on public land

The benefits of prescribed burning across the landscape are well understood and documented. The regime of integrated planning for fire across all tenures should be continued with greater support for landscape scale ecological burning, increased burning at times of optimal weather conditions and recognition and acceptance of the risks associated with controlled fires.

It is important that prescribed burns are of sufficient size. Large-scale mosaic burns across the the landscape are required. Dr. Kevin Tolhurst states 'landscape scale fires do not respect the relatively small strategic breaks established around public land margins. To retard their run, we need to manage fires across the whole of the landscape.'[152]

Strategic breaks are generally not of sufficient size to be effective. Larger burns will have a more considerable impact than small burns and strategic breaks which may be overrun by spotting in high intensity fires, as demonstrated in the February 2009 bushfires.

There appears to be still some reluctance to introduce prescribed burning in some areas, including reserves. The VAFI acknowledges the additional stakeholder consultation and educational activities undertaken by the DSE over the past year. There is an ongoing need to educate stakeholders, local communities and the public about the appropriate use of fire for ecological benefit and the protection of private and public assets.

Burning targets and performance should be determined according to fuel hazard risk levels in each fire management zone. Targets should be robust and sufficient resources should be allocated to ensure that they can be met. The VAFI believes that evidence from our fire history, recent reviews examining prescribed burning and experience in other jurisdictions provides a case for increasing the amount of prescribed burning to address the extreme fuel levels that remain in parts of our State such as the Otways and East Gippsland.

The VAFI supports the recent practice of exceeding targets when conditions are ideal. The cost of prescribed burning is far less than the cost of catastrophic bushfire. Decisions about prescribed burning and the creation of firebreaks and access tracks should also consider the environmental costs of inaction.

Fire management on private land

Private land is not yet adequately addressed in Victoria's strategy to manage the landscape for and with fire. Victoria's Bushfire Strategy signals intent to support prescribed burning on private land, however, a coordinated program has not yet been developed. There is clear scope to provide additional resources to ensure that private land is included in the prescribed burning program and to improve the coordination between the fire preparation of private land owners and broader municipal and district plans.

Similarly, there exists a need to review native vegetation regulations for consistency with the need to remove fire hazards on private land. The regulations should be amended accordingly. This is consistent with the need to manage for fire first on public land.

[152] Tolhurst, K. (2007) Lessons we cannot fail to learn from landscape-scale fires. Australian Forest Grower. Autumn 2007 Vol 30 No. 1, 23-25

The fire services levy forms a significant proportion of both property insurance premiums and contributions to fire protection organisations (CFA in particular). The recent fires have highlighted high levels of under insurance in the community. This indicates that funding of fire protection organisations through property insurance premiums is unfair and possibly makes under insurance even more of a problem as it contributes so much to the expense of the insurance. A fairer collection mechanism for the fire protection levy may be through a broader base such as rate notices. This system operates in South Australia and results in a considerably fairer sharing of contributions to fire protection organisations.

Conclusions
• **Adaptive and active forest management if practiced on a landscape scale can manipulate the age of the forest and its fuel loading** • **Active management should use silviculture and fire to provide a diversity of forest ages and fuel loadings across the forest landscape to reduce the severity and impacts of uncontrolled wildfire**

Recommendations
• **The role of forestry in providing active forest management should be taken into account in fire management policies** • **A greater integration of forest industry services and fire management could be achieved across the landscape. Forestry skills and resources could be utilised as part of managing our forest estate for fire** • **It is important that prescribed burns are of sufficient size. Large-scale mosaic burns across the landscape are required** • **Burning targets and performance should be determined according to fuel hazard risk levels in each fire management zone** • **Additional resources are required to ensure that private land is formally supported in the prescribed burning program** • **Review native vegetation regulations for consistency with the need to remove fire hazards on private land** • **Apply the fire services levy through rate notices rather than insurance premiums to improve the equity and broaden the collection mechanism** • **Application of commercial forestry fire management principles to reserve management**

Building in fire prone areas

Reducing the risk from fire for residences in fire prone areas is a balance between vegetation management and appropriate construction.

There has been discussion in the media about the management of vegetation on residential properties as well as along roadsides. It would therefore be valuable for the Commission to consider the impact of local planning requirements (including the impact of Wildfire Management Overlays) and what changes might be required to provide improvement for the life safety of residents.

The fireproofing of housing and other buildings, including the materials used in construction

"Although there is no 'one size fits all' strategy to bushfire risk reduction, there is a range of building maintenance and design measures that can be taken to reduce the likelihood of damage suffered through ember showers, radiant heat and direct flame."[153] This comment is made time and time again following the impacts of a devastating bushfire.

How bushfires enter houses is central to fire-safe design. The vulnerability of a house during a bushfire depends mainly on the ability of the fire to get into the house. There is little scientific evidence that the fire front destroys houses as it passes. CSIRO research emphasises that the majority of houses survive the passage of the fire front, only to burn down during the next few hours as wind-borne debris lodges in, or close by, the building and ignites flammable material.

Almost any building can be destroyed if it has direct contact with flames and extremely high radiant temperatures for long enough. In Australian bushfire conditions, however, (which are often very windy), these extremes occur usually only during the brief interval when the firewall passes through.

Many houses can withstand these extreme conditions for a few minutes, and may be left charred but intact. Only the outer few millimetres of the external cladding or timber building elements are usually damaged. Showers of burning debris, on the other hand, may attack a building for some time before the arrival of the fire front, as well as during the fire attack and for hours afterwards. Research has shown that houses burn from the inside out[154]. Stopping embers from getting in is the key. Clearly then, apart from sensible initial siting, appropriate landscaping and vegetation management, bushfire protection is first and foremost a matter of preventing burning debris from causing ignition in, on or around the house.

In relation to house construction, the significant destruction to property as a result of the recent bushfires has led to ill informed comments being made in relation to building materials. Media reports stating "*In the most extreme fire risk areas, measures required for new homes will include: A concrete slab, Exterior walls must be constructed of non-combustible material such as brick veneer or concrete...*"[155] have led to confusion and concern in the marketplace being expressed by designers and victims of the bushfires wishing to rebuild their lightweight weatherboard homes.

---

[153] *A Nation Charred*: Inquiry into the Australian bushfires October 2003. House of Representatives Select Committee on the Recent Australian Bushfires

[154] Bushfire Investigations – Warrimo, Valley Heights and Yellow Rock, Lower Blue Mountains, NSW, 2001-02.

[155] Media Release: From the Premier of Victoria, *Premier Releases Bushfire Building Standard*, 6 March 2009

In relation to weatherboard construction, AS3959-2009 *Construction of buildings in bushfire-prone areas* provides solutions in respect to the defined bushfire attack levels (BALs) which the Victorian timber industry supports. AS3959 allows the use of bushfire-resisting timbers to be used externally in the less intensive BALs whereas in the extreme level (e.g. flame zone), a fire resisting construction system can be used in order to comply whilst still utilising an exterior timber cladding.

The Australian Standard for Construction of buildings in bushfire-prone areas is appropriate and is based on current technical knowledge. It is important that any recommendations consider implementation of the standard.

Conclusions
• **Reducing the risk from fire for residences in fire prone areas is a balance between vegetation management and appropriate construction**

Recommendations
• **The Australian Standard for Construction of buildings in bushfire-prone areas is based on current technical knowledge**