The Institute of Foresters of Australia

ABN 48 083 197 586

27 July 2009

The Secretary
Senate Select Committee on Agriculture and Related Industries
PO Box 6100
Parliament House
Canberra ACT 2600

Dear Secretary,

The Institute of Foresters of Australia hereby lodges its submission to the Select Committee concerning its Inquiry into Bushfires in Australia.

Yours faithfully,

Dr Peter Volker FIFA RPF
President
27 July 2009

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Select Committee on Agricultural and Related Industries

The Institute of Foresters of Australia Forest Policy Statement 3.1 on the role of fire in Australia's forests and woodlands states:

"Fire is critical to the maintenance of biodiversity and ecological processes and contributes to the distinctive nature of Australian forests and woodlands. At the same time, uncontrolled fires pose a serious threat to human life, property, community assets and forest values including water, wood and biodiversity. …… In most Australian forests, complete fire exclusion is neither feasible nor ecologically desirable. Forest managers must therefore seek to understand the role of fire and to manage it in ways that complement broad objectives for land management."

Furthermore, IFA Forest Policy Statement 3.2 clearly outlines the IFA position in relation to fire management where it, *"…..advocates the need to actively manage fire in Australian forests and woodlands in a comprehensive, integrated manner that considers risks, ecological and forest management requirements as well as the protection of life, property and other assets."*

The Institute of Foresters of Australia has previously contributed to a wide range of Federal and State Parliamentary Inquires including the 2004 COAG Inquiry and the current Victorian Royal Commission into Bushfires.

Institute members are concerned with the lack of implementation of recommendations arising out of the various Inquiries/Commissions and the Institute wishes to register its strong opinion that any further inquires into Australian bushfire management are futile until recommended actions arising out of previous inquiries are resolved.

The IFA calls on the Federal Government to set up a peak body to co-ordinate implementation of the key issues that have arisen out of at least 18 major inquiries dating back to 1939.

The time for talk has passed. The IFA strongly recommends that action is needed to prepare Australia for likely increases in fire frequency and intensity as a result of climatic changes and increased exposure of urban fringe communities to life and property threatening fires.

Kanowski et al. (2005) clearly outline the issues that need to be addressed which include:

- Education – learning to live with bushfire;
- Approaching bushfire mitigation and management in a risk-management framework;.
- Improving governance and coordination;
- Supporting and sustaining the roles of volunteers.

The Institute is firmly of the opinion that fire management and preparedness needs to be a strong focus of communities and governments. There should be reporting mechanisms, which demonstrate the level of preparedness against key performance indicators. Funding to States and local governments should be linked to meeting these key performance indicators.

The Institute refers the Inquiry to the following websites, which address most of the issues of the Select Committee's Terms of Reference:

1. *Council of Australian Governments National Inquiry into Bushfire Mitigation and Management.* (Ellis et al 2004): http://www.coagbushfireenquiry.gov.au/

2. *Report of the Inquiry into the 2002–2003 Victorian Bushfires*. (Esplin et al 2003): http://www.dpc.vic.gov.au/CA256D8000265E1A/page/Listing-Inquiry+into+the+2002-2003+Victorian+Bushfires-Report+of+the+Inquiry+into+the+2002-2003+Victorian+Bushfires+(Released+14+October+2003)!OpenDocument&1=~&2=~&3=~

3. *A Nation Charred: Inquiry into the Recent Australian Bushfires*. House of Representatives Select Committee on the Recent Australian Bushfires. (G. Nairn, Chair 2003): http://www.aph.gov.au/House/committee/bushfires/

4. A brief description of major historic bushfires in Australia and further references: http://www.ga.gov.au/hazards/bushfire/historic.jsp

5. A number of government inquiries into Victorian bushfires have been carried out since the Black Friday fires of 1939. The reports can be accessed via link: http://www.dse.vic.gov.au/DSE/nrenfoe.nsf/LinkView/DFE0EEF7DAF961ACCA2574950010118E44688EB30B57BF124A2567CB000DB2EF

The Institute also refers the Inquiry to the following papers:

P.J. Kanowski, R.J. Whelan and S. Ellis (2005) Inquiries following the 2002–2003 Australian bushfires: common themes and future directions for Australian bushfire mitigation and management. *Australian Forestry* 2005 Vol. 68 No. 2 pp. 76–86. (copy attached)

Haynes, K., Tibbits, A., Coates, L., Ganawetta, G., Handmer, H., McAnenyy, J. (2008) 100 years of Australian civilian bushfire fatalities: exploring the trends in relation to the 'stay and go policy'. Report for the Bushfire CRC. November 2008.
http://www.bushfirecrc.com/research/downloads/Fatality-Report_final_new.pdf

IFA is willing to make "in person" representation to the Select Committee to further outline its position and address key issues of concern.

Dr Peter Volker FIFA RPF
President
27 July 2009

The role of fire in Australian forests and woodlands

Forest Policy Statement No. 3.1

The Issue

Fire is critical to the maintenance of biodiversity and ecological processes and contributes to the distinctive nature of Australian forests and woodlands. At the same time, uncontrolled fires pose a serious threat to human life, property, community assets and forest values including water, wood and biodiversity. Large-scale high intensity fires, often referred to as firestorms, have periodically inflicted major losses on the community since European settlers arrived in Australia. Inappropriate fire regimes may also threaten ecological values. In most Australian forests, complete fire exclusion is neither feasible nor ecologically desirable. Forest managers must therefore seek to understand the role of fire and to manage it in ways that complement broad objectives for land management.

Background

Fire is one of the most important factors in the ecology of Australian forests and woodlands. Charcoal deposits in lake sediments and pollen evidence indicates that forest fires have occurred periodically since Tertiary times, more than 16 million years before present. Aboriginal people have inhabited much of the continent for more than 40 000 years and over this period have used fire as a management tool for cooking, hunting, maintaining access and for spiritual reasons. The landscapes that European colonists and their descendents have come to recognise as being distinctively Australian have been fashioned by fire over many generations of aboriginal burning. Lightning causes a substantial number of bushfires, and is likely to have been an important source of ignition in pre-historic times. Bushfires are a characteristic feature of forests and woodlands throughout Australia. At one extreme, extensive areas of grassy forest and woodland in northern Australia burn annually or every few years. In contrast, tall moist forests in southern Australia may experience high intensity fires at irregular intervals of decades or even centuries. Between these extremes combinations of frequency, intensity, season, scale and patchiness of burning characterise various fire regimes.

Fire regimes are influenced by environmental factors including climate and weather, topography, soils, and the characteristics of the vegetation itself. In many forest landscapes, fire regimes have changed dramatically in the last two centuries as a result of agriculture and urban development, changes in land management practices, legislative restriction of the lighting of fires, and organised fire control.

Occasional extreme events such as prolonged droughts and severe fire weather conditions can greatly increase the scale and intensity of fires beyond what is experienced in an average season. The effects of extreme bushfire events on human society and the environment can be profound.

Fire plays an important role in a number of ecological processes within forests and woodlands. Heat, smoke and ash provide triggers for germination of many plant species, and a number of eucalypts regenerate best on ash seedbeds produced by burning. Fire regimes affect nutrient cycling processes in forests, and fire is instrumental in mobilising some elements into inorganic forms that are available for uptake by plants. Fires also result in loss of nutrients from forests and woodlands in the form of particulates in ash and smoke, and volatilisation. Stand development processes including recruitment, mortality, senescence, hollow formation and litter accumulation can be substantially influenced by fire, with resulting effects on structure, density and composition of understorey and overstorey layers.

For this reason there is often a direct relationship between fire regimes and structural features of the vegetation that determine habitat condition and population densities of many fauna species. In some environments, fire regimes play an important role in determining the ecotone between different vegetation types including rainforest, eucalypt forest, shrubland and grassland.

Excluding fire from naturally fire prone forests and woodlands can result in conditions quite different from those that have historically given rise to these ecosystems. Altered fire regimes may be linked to changes in ecosystem health and vitality, regeneration patterns, weed invasion and occurrence of pests and diseases. Fire exclusion is also very likely to increase the risk of large-scale high intensity bushfires. While such fires are an important trigger for regeneration in some forest and woodlands, they can also have adverse effects including loss of heterogeneity in vegetation structure, temporary increases in stream sedimentation, and persistent reductions in stream flow from forested catchments.

Fires in forests and woodlands can produce very large quantities of smoke and release significant amounts of greenhouse gases. Heavy concentrations of bushfire smoke can inconvenience the community and cause significant economic loss if the use of airports and major roads is restricted. At a national scale, fire regimes have considerable scope to influence greenhouse gas emissions and carbon balances and need to be managed accordingly. It is likely that these global issues will increase in prominence in the years to come.

Policy

The Institute of Foresters of Australia (IFA) advocates the need for a better appreciation of the important and complex role that fire plays in the evolution and maintenance of Australian ecosystems, including the collection and analysis of comprehensive scientific information and the effective distribution of information to policy makers, land managers and the community.

The IFA recognises that:

- fire is an agent of ecological change which has an important and on-going role in maintaining biodiversity and ecological processes in Australian forests and woodlands;
- the ecological effects of fire vary according to the season, frequency, intensity, scale and patchiness of burning in a landscape;
- forest fires can have effects that are significant at local, regional and global scales

The IFA considers that:

- State, Territory and the Australian governments have a responsibility to provide adequate resources for and coordinate research into the behaviour, environmental effects and social impacts of bushfires;
- A decision to deliberately exclude fire from naturally fire-prone forests and woodlands as an extreme fire regime that can have adverse consequences for ecosystem condition in the longer term;
- communities, agencies and governments should foster cooperative arrangements in relation to understanding and managing the impacts and use of fire in Australian ecosystems;

Further information

Bradstock, R., Williams, J. and Gill, M. (2002). Flammable Australia - fire regimes and biodiversity of a continent. Cambridge University Press. 462 pp.

Gill, A.M. (1975) Fire and the Australian flora: a review. *Australian Forestry* 38, 4-25

Gill, A.M., Groves, R.H. and Noble, I.R. (1981) Fire and the Australian Biota. Australian Academy of Science. 582pp

Luke, R. H. and McArthur, A. G. (1978). Bushfires in Australia. Australian Government Publishing Service, Canberra. 359 pp.

Pyne, S. J. (1991). Burning bush - a fire history of Australia. Henry Holt & Co., New York. 520 pp.

http://www.bushfirecrc.com

(Policy approved 16 November 2005)

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Managing fire in Australian forests and woodlands

Forest Policy Statement No. 3.2

The Issue

In most Australian forests and woodlands weather conditions occur every year during which, given sufficient fuel, bushfires can be virtually impossible to contain. Uncontrolled fires pose a serious threat to human life, property, community assets and forest values and these potential impacts need to be minimised by effective management. Fire also plays an important role in the maintenance of biodiversity and ecological processes and is an essential tool for silviculture and forest management. Forest managers are required to integrate a broad range of fire-related issues and to implement management programs that address objectives related to natural resource management and community protection.

Background

Management of fire in forests and woodlands is principally governed by legislation passed by State and Territory governments. This may include general legislation relating to fires in rural areas, as well as specific provisions in the legislation that governs the management of public native forests, conservation reserves and plantations. The Commonwealth Environmental Protection and Biodiversity Conservation Act imposes requirements in relation to fire management activities. Common law provisions also impose a duty of care on forest owners and managers with regard to fire.

Planning for fire management requires systematic assessment and analysis of the threat of bushfires to forest and community values. Hazards and risks associated with bushfires are addressed through strategies for the prevention of, preparedness for, suppression of and recovery from fire. Fire prevention activities include public education and awareness programs, minimising the risk of fire outbreaks from forest operations and recreation activities, enforcement of fire regulations, and thorough investigation of the cause of fire outbreaks.

Preparedness involves the management of fuels, detection of fires, provision of firefighters, equipment and communications systems, access and infrastructure and development of response plans to be activated in the event of unplanned fires. Collaboration between forest managers and other agencies responsible for fire management in rural areas is important in ensuring that resources are used efficiently and that the response to fire emergencies is effective and well coordinated.

Forest management agencies have a requirement to maintain an effective workforce available for fire management tasks, and to allocate sufficient resources to this task in order to meet their duty of care to the community, volunteer firefighters, and their own employees. Safety of personnel must be a paramount consideration in all operations associated with fire suppression or the planned use of fire.

Forest fire suppression is a difficult and dangerous task that requires well trained and experienced firefighters together with appropriate equipment and effective management systems, such as the AIIMS Incident Control System. The ability to conduct backburing during wildfire suppression operations requires specialist skills and considerable experience, which is most effectively gained by involvement in prescribed burning programs.

Prescribed burning is the planned application of fire under specified environmental conditions to meet particular management objectives. Prescribed burning is an important tool for forest

management and is used for a range of purposes including forest regeneration, site preparation, fuel reduction and habitat management.

Scientific studies have demonstrated that the speed and intensity at which a forest fire burns is related to the amount and arrangement of fuel comprised of leaves, twigs, bark and understorey shrubs. In many eucalypt forests, the amount of fuel increases with the time since last fire, and may continue to accumulate for several decades. Prescribed fire can be used to reduce the amount of accumulated fuel, thereby reducing the intensity and difficulty of suppression of unplanned fires, and minimising likelihood of severe damage to forest values. Prescribed burning can also have an important role in providing heterogeneity of fire regimes at a landscape scale.

Fire management programs should be based on the best available information about fire behaviour, the role of fire regimes in the environment, and the influence of fire on communities and society. This requires a commitment to ongoing research in a range of disciplines, and a commitment to technology transfer to ensure that new information is made available to decision makers and practitioners. Scientifically-based decision support systems are an important tool for integrating a wide range of information and can assist managers to make consistent and transparent decisions about complex issues. Decision support systems are currently being used for smoke management and to plan the use of prescribed fire for biodiversity conservation.

There is a need for forest managers to engage the community during the development and implementation of fire management programs, particularly where publicly-owned forests and woodlands are involved and forest adjoins urban and settled areas. Fire-related issues likely to be of interest to the community include asset and environmental protection, risk management, and the relationship between bushfire smoke and human health. Effective communication and consultation with the community leads to greater support for fire management programs, and ensures that knowledge available within the community is made available to forest managers.

Policy

The Institute of Foresters of Australia (IFA) advocates the need to actively manage fire in Australian forests and woodlands in a comprehensive, integrated manner that considers risks, ecological and forest management requirements as well as the protection of life, property and other assets.

The IFA recognises that:

- Fire plays an important role in the maintenance of Australian ecosystems but uncontrolled fires pose a serious threat to life, property and forest values;
- Prescribed fire is an effective tool for managing fuel accumulation, maintaining ecosystem processes and achieving silvicultural outcomes in forests and woodlands;
- Comprehensive fire behaviour knowledge is critical to the effective management of fires in forests and woodlands.

The IFA considers that:

- Management plans for forest and woodland landscapes should recognise the important ecological role of fire and provide strategies to ensure that fire regimes are compatible with broad land management objectives and ecological characteristics;
- Forest managers have a responsibility to minimise adverse impacts on society caused by uncontrolled forest fires, and should allocate adequate resources to manage fire risk in an effective and safe manner;
- There is a need to manage the accumulation of flammable litter and understorey fuels in strategic areas of forest in order to limit the intensity and difficulty of suppression of fires;

- Effective communication and consultation between forest managers and other stakeholders is critical to successful planning and implementation of fire management activities;
- Effective communication and awareness of the general public that fire is an important part of the landscape is essential;
- Forest fire suppression requires active involvement of well trained and experienced forest land managers who have considerable experience in prescribed burning.

The IFA supports:

- The use of the AIIMS Incident Control System and inter-agency agreements to facilitate co-ordinated management of wildfires, including resource sharing, standardisation of training and equipment, and mutual aid during fire emergency situations;
- The development and use of scientifically-based decision support systems to inform forest fire managers during strategic planning, resource allocation and operational decisions;
- The development of performance indicators to provide meaningful information about the effectiveness of fire management in terms of environmental, social and economic outcomes.

Further information

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Burrows, N. D. (2004) Implementing fire mosaics to prevent large wildfires and enhance ecosystem health. Proceedings of the 11th Annual AFAC conference. Perth. pp 19-25.

Cary, G., Lindenmayer, D. and Dovers, S. (2003) Australia Burning: Fire Ecology, Policy and Management Issues. CSIRO Publishing. 268 pp.

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Luke, R. H. and McArthur, A. G. (1978). Bushfires in Australia. Australian Government Publishing Service, Canberra. 359 pp.

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Inquiries following the 2002–2003 Australian bushfires: common themes and future directions for Australian bushfire mitigation and management

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Summary

Major bushfires in south-eastern Australia in the 2002–2003 bushfire season caused the loss of ten lives, substantial damage both to rural and urban property and to infrastructure and primary production systems, and had significant environmental impacts. The scale and impacts of the fires prompted the governments of the Australian Capital Territory and Victoria to establish inquiries into the bushfires in their jurisdictions, and the federal House of Representatives and Council of Australian Governments to establish inquiries with wider terms of reference. This paper reviews the outcomes of these inquiries in the context of the most wide-ranging, that of the Council of Australian Governments (COAG), which the authors conducted.

The inquiries which followed the 2002–2003 bushfire season explored many of the common themes which had emerged from the preceding 13 inquiries into significant bushfire events in Australia since 1939. These include the importance of risk reduction, particularly through fuel reduction; of community education; of the role of volunteer firefighters; of local knowledge and of access for firefighting; and of the adequacy of resources for bushfire mitigation and management.

While emphases varied, there was broad agreement amongst the four 2002–2003 inquiry processes about key actions necessary to improve bushfire mitigation and management: more pervasive and effective community education; decision-making within a risk management framework; improving governance and coordination; and supporting and sustaining the role of volunteer firefighters. All inquiries focused, to varying degrees, on the limits of knowledge and information, and how that might be addressed; on the importance of improved development planning and building design; on the role of landscape-scale fuel reduction burning in reducing risk; and on improving bushfire response and recovery processes. The inquiries agreed there was both scope and need for more effective fuel reduction burning to protect natural as well as other assets. However, as the Victorian Inquiry noted, this is 'not necessarily about burning substantially more land, but rather, burning smarter'.

The COAG Inquiry developed an indicative set of national bushfire principles, which it suggested should form the basis for future Australian bushfire policy, and COAG has since undertaken to develop a final set of principles based on these.

Keywords: fire; reviews; fire prevention; fire control; fire effects; policy; organization; community education

Introduction: the 2002–2003 bushfire season in context

Severe drought conditions and above-average temperatures prevailed across much of Australia prior to and during the 2002–2003 bushfire season[1], creating high-risk conditions for bushfires. In southern Australia, the season was characterised by both 'campaign fires' — bushfires extending over a prolonged period — and extreme events on particular days during these campaign fires. In the 2002–2003 fire season, ten people lost their lives; city suburbs, rural towns, farms, plantation forests and infrastructure were damaged; property losses exceeded $400 million; and there were significant environmental impacts.

Nationally, over 54 000 000 ha were affected by bushfires in this fire season. As in others, the greatest area burnt was in Australia's rangelands and northern savannas, where extensive bushfires particularly affected Indigenous communities, pastoralists, and environmental assets. The area burnt in the northern Australian savannas in 2002–2003 was less than that burnt in the two preceding seasons, but central Australia experienced the greatest area burnt in 25 y as a consequence of high fuel loads following good rains in previous years.

Aspects of the 2002–2003 fire season in south-eastern Australia were reminiscent of those in other years and regions in which there were major fire events that generated inquiries — including 1939 in Victoria, 1961 in south-western Western Australia, 1967 in Tasmania, 1983 in Victoria and South Australia, and 1994 and 2001 in New South Wales (NSW). This pattern is a reminder

[1]Defined as the period from the start of the 2002 dry season in northern Australia to the end of the 2002–2003 summer in southern Australia; about 1 July 2002 – 31 March 2003. See Ellis *et al.* (2004), Chapter 2, for background, details and sources.

that, while the 2002–2003 season was indeed severe, it was not unprecedented, nor even unusual, in the fire-prone Australian continent. In the period 1967–1999, the most recent for which comparable data are available, bushfires claimed about 250 lives and cost the Australian economy about $2.5 billion; the latter represents about 10% of the cost of all natural disasters over that period (Bureau of Transport Economics 2001). Notwithstanding the severity of the 2002–2003 bushfires, there was — overall — less loss of life and property than in previous, historically significant, bushfire events (Ellis *et al.* 2004, Chapter 2 and Appendix D).

The COAG *National Inquiry on Bushfire Mitigation and Management* (Ellis *et al.* 2004), for which we were the panel, was one of the four inquiries triggered by the 2002–2003 bushfire events. The Inquiry's terms of reference were broad (Ellis *et al.* 2004 Appendix A); their key elements are reproduced in Box 1.

As panellists, we were privileged to learn from the knowledge and experience of a very wide range of people engaged in and concerned about bushfire mitigation and management across Australia. In this paper, we summarise our assessment of how Australian bushfire mitigation and management can be improved, drawing on the work of the COAG Inquiry and that of 13 earlier inquiries which have followed significant bushfire events since 1939 (Table 1). While there have been other inquiries following bushfire events since 1939, these 13 were judged by the COAG Inquiry to have been the most important.

Major bushfire events: common themes and responses

The COAG Inquiry identified a suite of common themes emerging from preceding bushfire inquires; these are summarised in Table 2. It also appears that Australian governments, institutions and the community respond to major bushfire events in a fairly consistent way (Fig. 1). The immediate responses to a bushfire event are fire suppression, and the initiation of recovery processes. Increasingly, assertions of the cause, accusations about deficiencies in policy and preparation, and allocation of blame circulate widely, even before the event is over. Inquiry and review processes are subsequently established. The 2002–2003 fires in south-eastern Australia exemplify many of these elements, with an active public debate about agency and institutional deficiencies preceding, and continuing in parallel with, three coronial and four other inquiries.

Typically, governments have responded to the recommendations of inquiries through the allocation of some additional funding and amendments to some policies and procedures. The community experiences a period of heightened awareness of bushfire risk, and there is greater compliance with good practice by institutions, land managers and homeowners. For example, fire trails and fire breaks are cleared and maintained, gutters and back yards are cleaned, and a higher level of media coverage is sustained. Commonly, however, the passage of time sees growing complacency and reduced levels of preparedness overtake the

Box 1. Key elements of terms of reference of COAG Bushfire Inquiry

Acknowledging that bushfire management and mitigation [are] constitutionally an area of state and territory responsibility, this inquiry will add value by considering issues and identifying situations where there may be opportunities to enhance national cooperation and achieve best practice. Having established the facts in relation to the major bushfires in the 2002–2003 season, the inquiry will address the following issues:

- the current state of bushfire management in Australia, including:
  - risk factors contributing to bushfires …;
  - bushfire mitigation strategies … [on all tenures];
  - the impacts of bushfires [and of fire mitigation strategies, such as hazard reduction,] on the environment, human life, property and the economy;
  - the adequacy of infrastructure and human resources for fire mitigation purposes;
  - the use of existing fire fighting resources, including … the efficiency of resource use and co-operation between agencies and between jurisdictions; and
  - the identification of best practice national measures, cooperation and standards that can be undertaken by all levels of government, industry and the community, and the economic, social and environmental costs and benefits of such measures.

In undertaking the inquiry, the panel shall:

- take account of and draw on bushfire inquiries, distilling from them the common threads and lessons in relation to opportunities for national cooperative bushfire mitigation and management;
- be mindful of the capacity of existing strategies and arrangements, including urban design and land use planning, at all levels of government, to protect life and property from major bushfires and minimise negative environmental impacts of bushfires, and bushfire mitigation regimes; and
- also take into account national and regional objectives and variation in relation to vegetation types, land management processes, biodiversity, terrain, long-term climate conditions and other environment and heritage issues.

Adapted from Ellis *et al.* (2004), Appendix A

Table 1. Chronological list of inquiries following significant bushfire events in southern Australia, 1939–2003

Year and jurisdiction	Inquiry
1939, Victoria	*Report of the Royal Commission to inquire into the causes of and measures taken to prevent the bush fires of January, 1939.* L.E.B. Stretton.
1961, Western Australia	*Report of the Royal Commission appointed to enquire into and report upon the bush fires of December 1960 and January, February and March 1961, Western Australia*. G.J. Rodger.
1967, Tasmania	*The bush fire disaster of 7th February, 1967: report and summary of evidence.* D.M. Chambers and C.G. Brettingham-Moore.
1977,Victoria	*Report of the Board of Inquiry into the occurrence of bush and grass fires in Victoria.* E. Barber.
1984,Victoria	*Report of the Bushfire Review Committee on bushfire preparedness in Victoria, Australia, following the Ash Wednesday fires 16 February 1983.* S.I. Miller *et. al.*
1984, national	*Bushfires and the Australian environment. Report by the House of Representatives Standing Committee on Environment and Conservation*. P. Milton, Chair.
1994, NSW	*Report of the Select Committee on Bushfires*. Parliament of New South Wales, Legislative Assembly.
1996, NSW	*Recommendations from the New South Wales Inquiry into 1993/94 Fires*. NSW State Coroner's Office. J.W. Hiatt.
2001, NSW	*Recommendations from the Inquiry into the Fire at Mt Ku-Ring-Gai Chase National Park.* NSW State Coroner's Office. J. Stevenson.
2002, Victoria	*Report of the Investigation and Inquests into a Wildfire and the Deaths of Five Firefighters at Linton on 2 December 1998*. State Coroner's Office, Victoria. G. Johnstone.
2002, NSW	*Report on the Inquiry into the 2001/2002 Bushfires*. Joint Select Committee on Bushfires, Parliament of New South Wales, Legislative Assembly. J. Price, Chair.
2003, ACT	*Inquiry into the Operational Response to the January 2003 Bushfires in the ACT*. R.N. McLeod.
2003, Victoria	*Report of the Inquiry into the 2002–2003 Victorian Bushfires*. B. Esplin *et al*.
2003, national	*A Nation Charred: Inquiry into the Recent Australian Bushfires*. House of Representatives Select Committee on the Recent Australian Bushfires. G. Nairn, Chair.
2004, national	*Council of Australian Governments National Inquiry into Bushfire Mitigation and Management.* S. Ellis *et al.*

Sources: Petris (1995); COAG Inquiry (Ellis *et al.* 2004), Appendix C

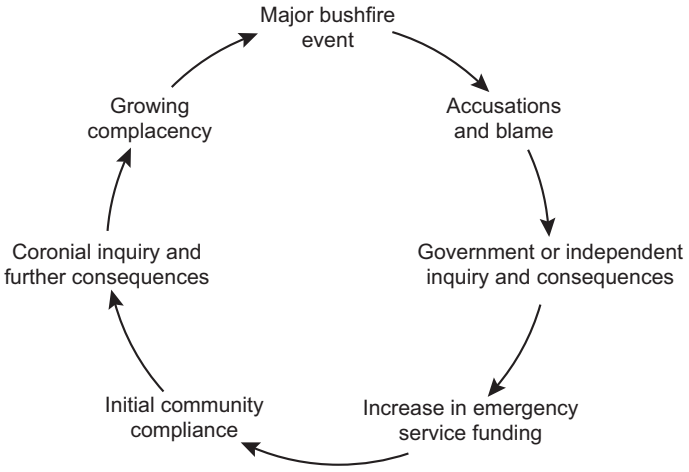

Figure 1. The bushfire event and response cycle. Reproduced from COAG Bushfire Inquiry (Ellis *et al.* 2004), Figure 13.1

heightened levels of awareness and preparedness, ahead of the next major fire event.

Nevertheless, significant and lasting improvements in our preparedness for bushfires have resulted from some inquiries. For example, the 1939 Stretton Royal Commission in Victoria recommended the establishment of a unified state bushfire authority, and the Country Fire Authority (CFA) was subsequently established (after a war-induced hiatus) in 1945. The 1961 Rodger Royal Commission in Western Australia led to fundamental and lasting changes in the approach of West Australian land managers to fuel reduction burning as a landscape-scale risk management strategy. However, it seems that both institutional and human nature present significant challenges to maintaining appropriate levels of awareness, investment, risk management and readiness for major fire events that typically have a return interval of decades. Breaking this cycle of institutional and individual response is perhaps the greatest national challenge in mitigating the impacts of bushfires.

Inquiries established as a consequence of the 2002–2003 fire season

Three coronial inquiries were instituted in the Australian Capital Territory (ACT) and NSW following the January 2003 fires. Only one of these (*Coronial Inquiry into the Circumstances of the Fire(s) in the Brindabella Range in January 2003* — Milovanovich 2003) had reported at the time this paper was written (March 2005). The ACT coronial inquiry had been suspended, due to legal challenges. Four non-coronial inquiries were also established as a consequence of the 2002–2003 fire season in south-eastern Australia, and they are the focus of this review:

- McLeod, R. (2003) *Inquiry into the Operational Response to the January 2003 Bushfires in the ACT*. ACT Government, Canberra.

Table 2. Common themes emerging from Australian bushfire inquiries, 1939–2003

Increased emphasis on risk reduction	A consistent theme has been that greater emphasis, resources and activity should be directed towards what are commonly referred to as 'prevention activities'. This includes activities such as education and awareness, clearing of fuel around buildings, track access and fuel reduction.
The value of volunteers	Reports from as early as 1939 highlight the value of volunteers, what they contribute to the community, and how much they save a jurisdiction.
Education and awareness	Education is a consistent recommendation in reports from 1939. The recommendations refer to both school-based programs and community information and awareness.
Complacency	A level of community complacency appears to have existed before every major fire event.
The adequacy of resourcing	Since 1939, comment has been made consistently about the poor levels of resourcing in both fire agencies and land management agencies.
Protective burning	Concern about the need for protective burning has been a theme since 1939.
Communication	Communication and telecommunications infrastructure support have been a consistent theme since 1961.
The importance of access	The importance of track access and maintenance is a consistent observation in reports from as early as 1939.
Local knowledge	The advantages of local knowledge and engaging people who have local knowledge were identified in most reports and have featured particularly strongly in recent reports.
Local government	Since 1967, the role and responsibilities of local government have featured with increasing prominence.
The insurance industry	The role and contributions of the insurance industry — as the single greatest beneficiary of emergency services — are discussed in reports from 1961 on.

Source: COAG Inquiry (Ellis *et al.* 2004), Appendix C1.2

- Esplin, B., Gill, M. and Enright, N. (2003) *Report of the Inquiry into the 2002–2003 Victorian Bushfires.* Victorian Government, Melbourne.
- House of Representatives Select Committee. (2003) *A Nation Charred: Inquiry into the Recent Australian Bushfires*. Parliament of the Commonwealth of Australia, Canberra.
- Ellis, S., Kanowski, P. and Whelan, R. (2004) *National Inquiry on Bushfire Mitigation and Management*. Council of Australian Governments, Canberra.

The terms of reference of each inquiry reflected its particular constituency and genesis, and the ACT and Victorian inquiries necessarily focused specifically on their jurisdictions. Notwithstanding suggestions to the contrary (e.g. Myers in Cutliffe 2005), we believe the scope of each was sufficiently broad to allow investigation of all relevant matters.

The House of Representatives Inquiry Committee comprised 14 members of the Commonwealth Parliament from across the political spectrum. It was chaired by Gary Nairn MP, Member for Eden-Monaro. Many members of this Committee represented electorates affected by the 2002–2003 bushfires. The ACT Inquiry was chaired by a retired Commonwealth Ombudsman, Ron McLeod, advised by Stuart Ellis, formerly CEO of the South Australian Country Fire Service. The Victorian Inquiry was chaired by the Victorian Emergency Services Commissioner (Bruce Esplin), with two scientists as panellists (Malcolm Gill, CSIRO, and Neil Enright, University of Melbourne). The COAG Inquiry was chaired by Stuart Ellis, also with two scientists as panellists (Peter Kanowski, The Australian National University, and Rob Whelan, University of Wollongong).

All inquiries sought submissions from interested parties. The Victorian and House of Representatives inquiries also held community meetings and public hearings, respectively. Some state governments (ACT, NSW and Victoria) elected not to engage with the House of Representatives Inquiry (Nairn 2003). The ACT, House of Representatives, and Victorian Inquiries commenced soon after the fires, in March or April 2003, and reported around 6 months later. The COAG Inquiry commenced in October 2003 and reported in March 2004, but its report was not released until January 2005 (Prime Minister of Australia 2005).

Each inquiry produced a substantial written report, structured according to the headings listed in Table 3. Each made numerous recommendations — 69 in the ACT report, 152 in the Victorian report, 59 in the House of Representatives report, and 29 in the COAG report. Many of the recommendations reiterate themes identified in previous inquiries (Table 2). While the emphasis of findings and recommendations varies between inquiries, there appears to be general agreement about a set of key actions necessary to improve bushfire management and mitigation, which

Table 3. Chapter headings in the reports of the four non-coronial inquiries into the 2002–2003 Australian bushfires

ACT (McLeod 2003)	Victoria (Esplin *et al.* 2003)	House of Representatives (House of Representatives 2003)	COAG (Ellis *et al.* 2004)
Fuel management	2. The changing Victorian environment	2. Land management factors contributing to the severity of recent bushfire damage	1. Bushfire in Australia
Fire access	6. Weather conditions	3. Fuel reduction and fire management	2. The 2002–2003 fire season
Aerial operations	8 & 9. Fuel management in the High Country and in the Mallee	4. The approach to the 2003 fires — delays and caution	3. Learning how to live with fire
Incident command and control	10. Constraints on prescribed burning in forests	5. Management and coordination of fire suppression	4. The risk-management process
Vehicles and other equipment	11. Measuring the effectiveness of prescribed burning	6. Fire fighting resources and technology	5. Research, information and analysis
The Rural Fire Control Manual	13. Public awareness and preparedness	7. Fire protection	6. Risk modification
Training and development	14. Planning for fire — holistic approach	8. Future directions for the Commonwealth: toward a national bushfire policy	7. Readiness
Occupational health and safety	15. Agency preparedness		8. Response
Relationship between the fire management and land management agencies	17. Initial response to the fires		9. Recovery
Scaling-up	18. Emergency Management arrangements		10. Governance and coordination
Public education	19. Did the Incident Control System work?		11. Knowledge, learning and training
Public information	20. Fire control strategies (including use of local knowledge and information gathering)		12. Rural fire service volunteering
Evacuate or stay?	22. Aircraft operations		13. Reviewing performance
Forestry settlements	23. Communication with the community		14. National principles for bushfire mitigation and management
Emergency Services Authority	24. Social, business & environmental recovery		
The Emergency Management Act	25 & 26. The way forward: planning; unified command and control		
The Bushfire Act and other legislation			
Bushfires and land planning			

we articulate here in the language of the COAG Inquiry:

1. More pervasive and effective education about preparedness for and response to bushfires;
2. Approaching bushfire mitigation and management in a risk-management framework:
   - 2.1. Improving knowledge, learning and training;
   - 2.2. Risk modification, particularly through:
     - Improved development planning and building design to minimise the risk of damage from bushfire;
     - Refining our understanding of the role of hazard reduction in protecting assets, and improving its implementation;
   - 2.3. Improving response to bushfire, particularly by enhancing the effectiveness of initial response;
   - 2.4. Ensuring early and sustained focus on recovery arrangements;
3. Improving governance, coordination and community information;
4. Supporting and sustaining the role of volunteer firefighters.

We discuss each of these issues below, using the terminology 'bushfire mitigation and management' in its broad sense, to encompass the full range of human activities relevant to bushfires and their impacts on life, property and infrastructure, primary production systems, and the environment.

Key issues facing Australian bushfire mitigation and management

Education — learning to live with bushfire

Most rural Australians understand that they must learn to live with bushfire; as the Victorian Inquiry (Esplin *et al.* 2003) noted, 'in the event of large bushfire … the community "cannot rely solely on emergency services to protect lives and property"'. However, establishing and maintaining such an understanding in an increasingly urbanised and mobile Australian population, who might experience bushfire only infrequently, is a significant and continuing challenge.

The Victorian Inquiry also noted that the 2002–2003 fires in that state were distinguished from previous major fire events in that there were fewer deaths and injuries, and less loss of homes and property. All inquiries addressed the specific issue of the fundamental individual decision to 'go early, or stay and defend' (Ellis *et al.* 2004 Sec. 8.3) in responding to a bushfire threat, and noted that informed decisions depended on a well-informed and well-prepared community working in effective partnership with fire and emergency services agencies. The emphasis on community education about bushfire in Victoria, particularly since the 1983 fires, suggests that such programs and partnerships can substantially mitigate the impacts of bushfires on life and property. A similar conclusion can be drawn for NSW for the 2001–2002 fire season.

Bushfire inquiries since the 1939 Stretton Victorian Royal Commission (Stretton 1939, p. 25) have been recommending school education about bushfires, and there are notable contemporary examples of innovative approaches (e.g. the Northern Territory's *Fire in Northern Australia* internet learning resources; Northern Territory Government 2004). The diversity of most Australian communities, and the level of population turnover in many communities — particularly those comprising Australia's ever-expanding rural–urban interfaces — means that both foundation and continuing education are necessary, and all inquiries discussed means by which this might be achieved, drawing from a range of initiatives around the country. However, as the COAG Inquiry noted (Ellis *et al.* 2004 p. xii), 'a nationally consistent bushfire education strategy that reaches and informs all Australians is yet to be implemented'.

Approaching bushfire mitigation and management in a risk-management framework

The COAG Inquiry noted (Ellis *et al.* 2004 Ch. 4) that a structured risk management process, such as that defined by the relevant Australian Standard (AS/NZS 4360:1999 *Risk Management*; Standards Association of Australia 1999), provides the most appropriate basis for strategic decisions about bushfire mitigation and management. Australian emergency management agencies already use a risk management framework termed 'PPRR — Prevention, Preparedness, Response and Recovery'. However, the COAG Inquiry was concerned that the term 'prevention' conveyed unachievable expectations in relation to bushfires, and that it was desirable to make more explicit the fundamental role of research in informing bushfire mitigation and management. The COAG Inquiry therefore proposed adoption of a modified PPRR framework — the '5Rs' (Ellis *et al.* 2004 Sec. 4.3), comprising (i) Research, information and analysis, (ii) Risk modification (rather than risk prevention), (iii) Readiness, (iv) Response, and (v) Recovery. Each element is discussed in detail in the COAG Inquiry report and, to varying degrees, by the other recent inquiries. Here, we focus on a subset of key issues associated with these elements.

Improving knowledge, learning and training

All recent inquiries identified inadequate knowledge — of, for example, 'the effectiveness of prescribed burning [in quantitative terms]' (Esplin *et al.* 2003 Sec. 11.67), or 'the relationship of fire with the environment' (House of Representatives Select Committee 2003 Sec. 8.13) — as a constraint to better bushfire mitigation and management. The COAG Inquiry was able draw on other recent work, such as the planning processes for the Bushfire Cooperative Research Centre, and outcomes of national fora (e.g. Cary *et al.* 2003) — to identify nationally-important research gaps and priorities (Ellis *et al.* 2004 Sec. 5.3.3).

These priorities were: a national program of fire regime mapping, establishment and maintenance of a suite of nationally-consistent databases, establishment of a network of long-term ecological research sites, the integration of information gathering in an adaptive-management process, building design and materials, climate and climate change, fire behaviour and ecological responses, individual and community psychology and social processes relevant to bushfire preparedness and response, and Indigenous knowledge and use of fire.

Both the House of Representatives and COAG Inquiries noted the considerable hopes vested in the recently established Bushfire Cooperative Research Centre to address many of these priorities. The COAG Inquiry noted the limited capacity nationally for bushfire-related research, and recommended (Ellis *et al.* 2004 R5.4) development of a national strategy to build and sustain research capacity.

The COAG Inquiry also identified the need to foster individual and organisational learning, within and between jurisdictions. It therefore recommended (Ellis *et al.* 2004 R11.1–4) better learning and training resources for firefighters, a more coordinated national program of professional development focused on bushfire mitigation and management, and the establishment of an Australian Centre for Bushfire Lessons Learnt, modelled on a corresponding entity in the USA.

Risk modification

Formally defined, risk modification includes *risk avoidance* (such as can be achieved through land planning), *risk limitation* (such as arson reduction programs) and *risk reduction* (such as fuel management, or reducing the vulnerability of assets through building design). One of the greatest challenges to bushfire mitigation and management is the development of broadly-based agreement within the community about the nature and relative importance of assets potentially threatened by fire, and about the appropriate forms and processes of risk modification. For example, significant tensions may exist between development interests and bushfire risk avoidance strategies which focus on limiting new development in high-risk areas. Similarly, the debate between proponents and opponents of broad-scale fuel-reduction burning strategies has as one of its bases the different relative values ascribed to the protection of property and other human assets, on the one hand, and environmental assets such as biodiversity or air quality, on the other. We discuss each of these key areas of debate below.

Development planning and building design. The fundamental importance of addressing bushfire risk in development planning has emerged in all recent inquiries. Different jurisdictions have responded to this imperative in different ways, but there appear to be few examples of truly effective processes that avoid risk by sufficiently stringent zoning or other forms of constraint on

development in high-risk areas. The powers of the NSW Rural Fire Service Commissioner in relation to development applications (reviewed in Ellis *et al.* 2004 Sec. 6.1.1) exemplify the form of arrangements that may be necessary if we are to move from good intent to meaningful outcomes. A related issue, that of the importance of updating and implementing building codes and standards in relation to bushfire risk, was identified by both the ACT and House of Representative inquiries.

Fuel reduction burning for bushfire risk modification. The assets that bushfires may threaten are distributed across the Australian landscape; this is the case whether they are natural assets such as biodiversity, or human-created assets such as property and primary production systems. An important element of risk modification is, therefore, reduction in the levels of risk across the landscape. The objectives of landscape modification include reducing the probability of a bushfire starting, slowing its spread, and limiting its intensity so that it might be controlled — while limiting impacts on ecological processes and their outcomes, such as biodiversity, to acceptable levels. Although other more resource-intensive measures are possible in interface zones, fuel-reduction burning appears to be the only feasible approach to bushfire hazard reduction on a landscape scale.

There are many constraints to achieving fuel reduction on a large scale across the landscape. Some of these are operational, dictated by the resources and opportunities available (these were discussed in some detail for the Victorian case by Esplin *et al.* 2003 Chapter 10; and more generally by the House of Representatives Select Committee 2003 Secs 3.113–3.136), and by the risks to assets. Others are associated with the potential for ecological damage associated with ecologically inappropriate fire regimes (e.g. Bradstock *et al.* 2002; Abbott and Burrows 2003; Andersen *et al.* 2003). Further, in order to be effective in mitigating the impacts of bushfire on assets, fuel-reduction activities need to be strategically located and repeated sufficiently frequently to keep the fuel load from exceeding some threshold level, so that the consequent modification of bushfire behaviour achieves protection of assets.

Much public debate after the 2002–2003 bushfires focused on the extent to which fuel reduction burning had or should have been implemented, and this topic was prominent in all inquiries. Both the House of Representatives and Victorian Inquiries suggested an increased emphasis on fuel reduction burning: the former concluded (Sec. 3.128) that 'increased prescribed burning throughout south east Australia to reduce fuel and achieve acceptable ecological outcomes is achievable', and the latter (Sec. 11.66) that '[various factors] suggest that the trend, at least, should be for more prescribed burning rather than less'. The COAG Inquiry was concerned (Sec. 6.4.4) that the extent of broad-scale fuel reduction burning required to be effective in reducing the risk to assets was unachievable in practice, and so focused its attention on the need for a more strategic approach[3]. This conclusion is consistent with that of the Victorian Inquiry (Esplin *et al.* 2003, p. iv) for public land in that state, which applies similarly in other jurisdictions and tenures:

> [Public] land management practice will benefit by a greater emphasis on prevention/mitigation, and more research into fuel reduction burning. Our conclusion can be summarised as recommending both the development of procedures to maximise the ability to achieve the strategic fuel reduction targets objectively established, and processes to measure and ensure that such programs are effective in mitigating the risk of unplanned fires. Our Interim Report was described as recommending that it was 'not necessarily about burning substantially more land, but rather, burning smarter'. We stand by this assessment.

There are two particular elements of 'burning smarter' which seemed to the COAG Inquiry to limit our capacity to do so. The first is our relatively poor knowledge of the landscape-scale impacts of fire regimes on biodiversity. Such knowledge is important because it is at the landscape scale that fuel reduction burning is applied, but most current information originates instead from small-scale or inferential studies.

The second, not unrelated, constraint is the general lack of systematic evaluation of the effectiveness of landscape-scale fuel-reduction in reducing risk to assets. The current focus of monitoring and evaluation is usually the extent to which the fuel-reduction prescription and activities actually reduced the fuel load to the desired level, or whether the reduction in fuel load actually altered fire behaviour, as predicted, under the weather conditions that prevailed at the time of the fire. However, neither of these is necessarily directly related to the actual risk to assets.

For these reasons, the COAG Inquiry proposed (Ellis *et al.* 2004 Ch. 5 and 6) that land managers should be striving for — and be sufficiently resourced to achieve — implementation of systematic monitoring and evaluation processes that allow (i) accurate measurement and mapping of fuel-reduction activities and fuel loads, (ii) accurate mapping of unplanned fires across a landscape, (iii) detailed analysis of the behaviour of the unplanned fires against the 'fuel-landscape', and (iv) detailed analysis of the pattern of damage to the various assets in the landscape.

Achieving land management regimes that strike the 'right' balance between the protection of human life and property and that of environmental assets will continue to be a substantial challenge for bushfire and land managers across Australia. Finding this context-specific balance will require explicitly adaptive management, informed by ongoing research and monitoring, and supported by effective consultation — as Stephens and Ruth (2005) have also proposed in their review of federal fire policy in the USA. There are several examples of such processes underway around Australia, such as the development of ecological burning guides in NSW (Kenny *et al.* 2003; reproduced as Table 6.1 in Ellis *et al.* 2004), initiatives to reintroduce traditional burning in savanna landscapes in northern Australia (e.g. Whitehead *et al.* 2003), and the evolution of fuel reduction burning regimes in Western Australia's south-western forests (e.g. various authors cited in Abbott and Burrows 2003). The COAG Inquiry noted that land management agencies needed to have sufficient staff and other resources to apply effective adaptive management, to monitor outcomes, and to implement other elements of best practice; a number of submissions to the COAG Inquiry (e.g. CSIRO 2003) noted declining trends in resource commitment, and others (e.g. Institute of Foresters of Australia 2003a) argued that current resources were inadequate.

[3]It is of interest to note that similar conclusions have subsequently been reached in a review of federal fire policy in the USA (Stephens and Ruth 2005).

Improving response to bushfire

All recent inquiries devoted considerable attention to bushfire response, as a consequence of strongly articulated concerns during and following the 2002–2003 fires that initial response had been too slow and insufficiently aggressive, and concerns that strategic and operational planning had not drawn sufficiently on local knowledge (e.g. House of Representatives Select Committee 2003 Chapters 4 and 5). There was also debate about the most appropriate use of aerial firefighting resources, including those provided consequent to the establishment of a National Aerial Firefighting Strategy in September 2002.

All recent inquiries recommended changes to incident management and response systems as a result of experiences in the 2002–2003 fires. These changes were most profound in the ACT (McLeod 2003), but were also significant in Victoria (Esplin *et al.* 2003 Parts D and E). The COAG Inquiry focused on the implementation of a single, national, Incident Control System, drawing appropriately on local knowledge and providing more relevant and timely information to both agencies and communities (Ellis *et al.* 2004 Ch. 8). All inquiries noted both the advantages and the limitations of aerial firefighting, and the Victorian, House of Representatives and COAG inquiries each recommended continuation of a national strategy for provision of aerial firefighting resources (Esplin *et al.* 2003 Sec. 17.51; House of Representatives Select Committee 2003 Sec. 6.120; Ellis *et al.* 2004 R8.6, respectively). The COAG Inquiry also recommended the nationally consistent adoption of bushfire warning systems, the 'go early or stay and defend' policy, and the interoperability of emergency services radio communications (Ellis *et al.* 2004 R8.5, R8.7, F7.2).

Early emphasis on recovery

National principles for disaster recovery are now well established (Matthews 2002), and provide the framework for bushfire recovery, which is understood to have individual, community, business and environmental dimensions. Perhaps the most important lesson from the 2003 fires was that recovery arrangements need to be initiated in tandem with incident response: 'They are not sequential events but should operate in parallel, or preferably in an integrated way' (Esplin *et al.* 2003).

Achieving such integration requires a whole-of-government approach, and there were various ways this was achieved in 2003. For example, in the ACT, 'recovery exercises' prior to the 2003 fires had prepared participants and rehearsed the demands that might be made on recovery centres, and highlighted the need for coordination between a wide range of government agencies and voluntary organisations. In Victoria, Municipal Emergency Coordination Centres acted as focal points for recovery activities. The final report of ACT Bushfire Recovery Taskforce (Hollway 2003) and Chapter 9 of the COAG Inquiry (Ellis *et al.* 2004) provide detail and a synopsis, respectively, of best practice in bushfire recovery.

Improving governance and coordination

The institutional context for bushfire mitigation and management in Australia is now the 'all hazards' approach (Matthews 2002) adopted by Australian governments. This approach provides a coordinated, integrated framework for agency and community preparation for and response to natural disasters. It demands stronger coordination between agencies at all stages, from planning to recovery, and consistent and clear communication with the community.

The consequences for bushfire mitigation and management are significant: increasingly, arrangements associated with bushfires will be integrated with those developed for other hazards, both natural and human-induced. While such integration has many benefits — for example, in terms of whole-of-government response capacity and coordination — it also has the potential to create some tensions — for example, between the traditional emphases of agencies focused on land management and those focused on emergency response. Capitalising fully on the benefits of the all-hazards approach requires that these tensions be addressed.

The COAG Inquiry found that coordination relevant to bushfire mitigation and management within jurisdictions and between the three levels of government — Australian, state/territory, and local — had improved, in part as a consequence of the adoption of an all-hazards approach. The COAG Inquiry also found (Ellis *et al.* 2004 Ch. 10) that best means to represent issues relevant to bushfire mitigation and management in national decision processes remained a vexed question, largely because of the diversity of ministerial councils concerned with aspects of bushfire mitigation and management, and the historically separate spheres of activity of emergency management and land management interests. Ultimately, the COAG Inquiry formed the view (Ellis *et al.* 2004 R10.1) that the best option, based on existing structures and the pre-eminence of the all-hazards approach, was for national responsibility to reside with an augmented Police Ministers' Council and the Australian Emergency Management Committee.

Supporting and sustaining the roles of volunteers

Rural fire volunteering remains the foundation of Australia's emergency service response, particularly for bushfires. Consequently, all recent inquiries explored issues associated with the roles of volunteers in bushfire mitigation and management, and how they might best be supported and sustained. The inquiries (e.g. Ellis *et al.* 2004, Ch. 12) found that a strong ethos of volunteerism persisted, and that some institutional changes — to ensure that volunteers were not out of pocket for expenses, that the important role of the employers of volunteers is recognised, and that the diversity of competencies required of volunteers is recognised — were necessary to sustain this ethos.

Conclusions — sustaining progress in bushfire mitigation and management

The ACT and Victorian inquiries made comment and recommendations related principally to bushfire mitigation and management in those jurisdictions, although many have wider relevance. The COAG Inquiry sought to draw from those and the House of Representatives Inquiry, and from its own work, to chart the best way forward for bushfire mitigation and management in Australia.

In addition to specific recommendations, the COAG Inquiry used two devices to articulate its view of the future for Australian bushfire mitigation and management. The first of these was an indicative set of national principles, reproduced as Box 2, which we suggested (Ellis *et al.* 2004 R14.1) could form the basis of a national policy on bushfire mitigation and management, as advocated by — amongst others — the Institute of Foresters of Australia (2003b) and the House of Representatives Inquiry (House of Representatives Select Committee 2003 Sec. 8.2). These indicative principles embody responses to many of the key points discussed in this paper.

Secondly, the COAG Inquiry articulated a vision for the future of bushfire management and mitigation in Australia (Ellis *et al.* 2004 p. ix), reproduced as Box 3. This vision sought to imagine a future resulting from implementation of the COAG Inquiry recommendations, which themselves build on progress already made within individual states and territories, and nationally. The vision also imagines that we can escape from the inquiry–blame cycle outlined in Figure 1.

Underlying both the principles and the vision are important presumptions about how Australians should respond to the challenges of living in a fire-prone landscape: higher levels of knowledge and understanding about bushfires, and adoption of a learning culture; an acceptance of shared responsibilities across society and its various institutions, and more effective partnerships between different interests; evaluation of decisions about bushfire mitigation and management within a risk management framework; recognition that complex heterogenous landscapes require complex and diverse management and mitigation responses; and sustained willingness to invest sufficient resources, both human and financial, to continue to improve our management and mitigation of bushfires.

The Council of Australian Governments responded to the COAG Bushfire Inquiry Report in January 2005 (COAG 2005), essentially accepting the Report's recommendations in principle, and establishing processes to clarify how they might be implemented. For example, funding for the National Aerial Firefighting Strategy was continued for a next phase of 3 years, and COAG agreed to a consultation period of 12 months about the proposed national bushfire principles, prior to the endorsement of a final set of principles. It is, of course, the ultimate response of both Australian governments and the Australian community to the outcomes of

Box 2: Indicative national bushfire principles

Bushfires are understood, accepted and respected

Like other natural hazards, bushfires cannot be prevented. In many instances, bushfires are an important tool to assist in achieving land management objectives. The impact of unplanned fires needs to be minimised through effective action based on learning and understanding. This also requires strong self-reliance.

Shared responsibility

A philosophy of responsibility shared between communities and fire agencies underlies our approach to bushfire mitigation and management. Well-informed individuals and communities, with suitable levels of preparedness, complement the roles of fire agencies and offer the best way of minimising bushfire risks to lives, property and environmental assets.

Decisions within a risk management framework

No single action will lead to the elimination of bushfire risk. The best approach to minimising risk is to make decisions about bushfire mitigation and management within an integrated risk management framework.

Integration of learning and knowledge

Analysis of fire events is based on operational and scientific evidence and research. This should be informed by extensive and consistent national data, including fire regime mapping. The best results will be achieved by integrating all forms of knowledge, and good information about fire history, with analysis at the local and regional levels.

Manage fire according to the landscape objectives

Australia has a great diversity of climates, environments, land uses and built assets. Fire management objectives and outcomes will vary across landscapes and over time. Clear agreed objectives and an adaptive management approach are required for implementation.

Consistency of purpose and unity of command

There needs to be consistency of purpose during bushfire mitigation and unity of command for all fire response, irrespective of organisational structures.

Protection of lives as the highest consideration

Firefighter and community safety must be at the forefront of bushfire mitigation and management deliberations. Although there should always be a balance between safety, effective response and environmental considerations, it is personal safety that must be the greatest concern.

Monitoring performance

The states, territories and local governments need to regularly review their performance against these principles and other appropriate indicators. Performance review should not be allowed to wait until after a major bushfire event. If the principles are to improve performance and bring about change, they must be monitored on a regular basis.

Reproduced from COAG Bushfire Inquiry (Ellis *et al.* 2004), Box 14.l

Box 3. Bushfire in Australia: a vision for 2020

All Australians understand, accept and respect bushfires and know that they will continue to occur. We have drawn on Indigenous, local and scientific knowledge in learning to live with bushfires. Communities understand that the risk, and the responsibility for bushfire mitigation and management, is shared by individuals, landholders, communities, fire and land management agencies, researchers and governments.

Australians recognise that bushfire can be damaging but that planned fire can also be beneficial, by sustaining ecological processes or by reducing fuels — thus reducing the risk of uncontrollable bushfires. Decisions about bushfire mitigation and management are made within a risk-management framework, known as the 5Rs — Research, information and analysis; Risk modification; Readiness; Response; and Recovery.

Research, information and analysis. All schoolchildren learn about bushfire survival and the role of fire in our environment. Governments, agencies and community groups guide good practice in preparing for bushfire. Coordinated bushfire research redresses gaps in our understanding of bushfires and their effects, is at the international forefront of knowledge, and informs management and policy. A 'Centre for Lessons Learnt' distils and disseminates lessons from major fire events.

Risk modification. There is a cooperative approach to risk reduction. Arson is a rare source of ignition. Fuel reduction and ecological burning are based on fuel management zones that link landscape management to the protection of community, environmental and economic assets. There is greater knowledge, awareness and trust between rural landholders, public land managers, communities and fire agencies. Systematic planning, development constraints and building codes in bushfire-prone areas reduce risk to life and property.

Readiness. As individuals and as a community, Australians know how to defend themselves and their property effectively against fire. The previous culture of complacency, blame and risk avoidance has been replaced by shared understanding and valuing of all assets, cooperative assessment of the most suitable risk-reduction measures, and shared responsibility for action.

Response. Bushfire response is planned, coordinated and managed by the states and territories, and cooperative arrangements facilitate cross-border assistance. Aerial firefighting resources are coordinated nationally. State and territory bushfire services operate within integrated emergency services, structured for a range of hazards. Volunteers are integral to rural firefighting. The states and territories deliver training to national standards, and there are many examples of interagency and interstate deployments of personnel affording greater experience. Volunteers are valued, encouraged and recognised.

Recovery. Recovery occurs concurrently with the response effort and focuses on individual support, community and economic renewal, and environmental restoration. Part of recovery is learning from the experiences of each fire event, and from other emergencies, to maintain our awareness and improve our knowledge, planning and responses.

Reproduced from COAG Bushfire Inquiry (Ellis *et al.* 2004), p. ix.

recent bushfire inquiries that will determine the extent to which these inquiries effect lasting change for the better in Australian bushfire mitigation and management.

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