

# 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<sup>1</sup>, 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

<sup>1</sup>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 inquiries; 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:

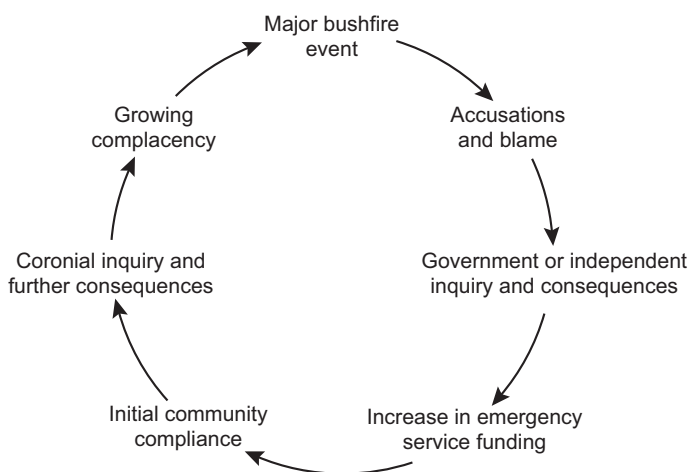
- take account of and draw on bushfire inquiries, distilling from them the common threads and lessons in relation to opportunities for national cooperative bushfire mitigation and management;
- be mindful of the capacity of existing strategies and arrangements, including urban design and land use planning, 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	<i>Report of the Royal Commission to inquire into the causes of and measures taken to prevent the bush fires of January, 1939.</i> L.E.B. Stretton.
1961, Western Australia	<i>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.</i> G.J. Rodger.
1967, Tasmania	<i>The bush fire disaster of 7<sup>th</sup> February, 1967: report and summary of evidence.</i> D.M. Chambers and C.G. Brettingham-Moore.
1977, Victoria	<i>Report of the Board of Inquiry into the occurrence of bush and grass fires in Victoria.</i> E. Barber.
1984, Victoria	<i>Report of the Bushfire Review Committee on bushfire preparedness in Victoria, Australia, following the Ash Wednesday fires 16 February 1983.</i> S.I. Miller <i>et al.</i>
1984, national	<i>Bushfires and the Australian environment. Report by the House of Representatives Standing Committee on Environment and Conservation.</i> P. Milton, Chair.
1994, NSW	<i>Report of the Select Committee on Bushfires.</i> Parliament of New South Wales, Legislative Assembly.
1996, NSW	<i>Recommendations from the New South Wales Inquiry into 1993/94 Fires.</i> NSW State Coroner's Office. J.W. Hiatt.
2001, NSW	<i>Recommendations from the Inquiry into the Fire at Mt Ku-Ring-Gai Chase National Park.</i> NSW State Coroner's Office. J. Stevenson.
2002, Victoria	<i>Report of the Investigation and Inquests into a Wildfire and the Deaths of Five Firefighters at Linton on 2 December 1998.</i> State Coroner's Office, Victoria. G. Johnstone.
2002, NSW	<i>Report on the Inquiry into the 2001/2002 Bushfires.</i> Joint Select Committee on Bushfires, Parliament of New South Wales, Legislative Assembly. J. Price, Chair.
2003, ACT	<i>Inquiry into the Operational Response to the January 2003 Bushfires in the ACT.</i> R.N. McLeod.
2003, Victoria	<i>Report of the Inquiry into the 2002–2003 Victorian Bushfires.</i> B. Esplin <i>et al.</i>
2003, national	<i>A Nation Charred: Inquiry into the Recent Australian Bushfires.</i> House of Representatives Select Committee on the Recent Australian Bushfires. G. Nairn, Chair.
2004, national	<i>Council of Australian Governments National Inquiry into Bushfire Mitigation and Management.</i> S. Ellis <i>et al.</i>

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

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 to 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<sup>3</sup>. 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.

<sup>3</sup>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 Co-ordination 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.

### 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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