FIRE MANAGEMENT IN THE KIMBERLEY AND OTHER RANGELAND REGIONS OF WESTERN AUSTRALIA: A SYNOPSIS AND INVITATION FOR FURTHER PUBLIC COMMENT

EPA FIRE REVIEW

Environmental Protection Authority
Perth, Western Australia
May 2006

CONSULTATION AND HOW TO MAKE A SUBMISSION

Introduction
The EPA is an independent body set up to advise the Minister for the Environment on environmental issues. The Minister for the Environment; Science requested the Environmental Protection Authority (EPA) in July 2005 to review and provide advice under s16(e) of the *Environmental Protection Act 1986* on the impacts that fires in the Kimberley and other regions are having on the environment.

Purpose
The Minister requested the EPA to consult with key organisations, government agencies, knowledgeable persons and the community as appropriate and to make recommendations on ways and means to improve the current situation. The first step in this process was to distribute an Issues Paper as the basis for discussions at a series of open meetings held at appropriate venues in the regions of interest, and to obtain written submissions from interested parties. This current document represents the second phase in the consultation process. Its purpose is to:

- **seek public input on the matters raised in this Paper (see questions at the end of the sections);**
- ensure that the community is provided with an adequate opportunity to provide feedback to the Review's Paper;
- facilitate a sound process of public consultation prior to the EPA developing its recommendations and report to the Minister for the Environment.

The public consultation process aims to capture both written and in-person feedback to this review of fire management in the Rangelands and in particular the Kimberley Region. The main focus of the public consultation is to obtain views on the current situation and opinions on how this might be improved bearing in mind the key objectives of protecting biodiversity and the impacts on human health.

Document availability
Copies of this paper are available at the public libraries at Newman, Port Hedland, Roebourne, Karratha, Derby, Broome, Halls Creek, Fitzroy Crossing, Kununurra, Kalgoorlie-Boulder and Coolgardie and on the EPA's website (www.epa.wa.gov.au). Copies of the accompanying Appendix are available on the website only.

Written feedback
Feedback is welcome by mail, fax and email. The EPA is aware that there is a wide range of views on this topic in the community. Organisations and individuals are invited to comment on any aspect of the topic of fire management in the Rangelands of Western Australia and the Kimberley Region in particular.

COMMENT ON THE QUESTIONS RAISED IN THIS PAPER ARE PARTICULARLY SOUGHT BY THE EPA.

The review and comment period is for twelve weeks, from **22 May 2006** until close of business on **Friday 11 August 2006.**

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Contents

Figures

1. Introduction

Evidence indicates there has been a significant increase in the extent, intensity and frequency of fire over the past 30 years, and that this is impacting on the environment of the Kimberley and the ecology of other parts of the Rangelands. The impetus for this review is the frequency, timing and extent of fires and the consequent impact on biodiversity, particularly in the Kimberley and the Pilbara regions, and to a lesser extent in the rest of the Rangelands.

As a result of these concerns about the impacts of altered fire regimes outside the South West of Western Australia[1], particularly in the north Kimberley region, the Minister for the Environment; Science requested the Environmental Protection Authority (EPA) in July 2005 to review and provide advice under s16(e) of the *Environmental Protection Act 1986* on the impacts that fires in the Kimberley and other regions are having on the environment.

The Minister provided a scope for the s16(e) review being:

1. Advise on the environmental impacts of the frequency of fire in the Interior and Northern Regions of WA, with an emphasis on the Kimberley Region, in particular with respect to:

    - Biodiversity conservation and protection; and
    - Protection of environmental health,

    in the context of the importance of protection of human health, property, assets and infrastructure.

2. Consult with key organisations, government agencies, knowledgeable persons and the community as appropriate.

3. Make recommendations on ways and means to improve the situation.

The EPA is an independent Statutory Authority which operates under the *Environmental Protection Act 1986* with a primary responsibility for providing independent advice to the Government on the environmental acceptability of development proposals, forming policies on the environment and advising the Minister for the Environment on environmental issues.

EPA members are appointed on the basis of their knowledge and experience of environmental issues, however, they have no specific expertise in fire management and recognise that government agencies and community members have been active in fire management on both a professional and volunteer basis for many years. The EPA's role in this review is to obtain the views of and information from those agencies and from the wider community regarding fire and its impacts on the environment, and in particular on biodiversity; and to provide advice to the Minister based on that information and its wide environmental knowledge.

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[1] *Review of the Fire Policies and Management Practices of the Department of Conservation and Land Management.* EPA Bulletin 1151, October 2004.

The EPA formed a Fire Review Committee comprised of a previous Deputy Chairman of the EPA and two current EPA members to steer the review. The first task undertaken by the Committee was to commission a paper, *Fire in the Kimberley and Inland Regions of WA – Issues Paper*, prepared by Dr Jeremy Russell-Smith. Dr Russell-Smith has a long history with fire research in the northern regions of Australia and is currently based in the Tropical Savannas Management Cooperative Research Centre in Darwin. The paper, including some additional material inserted by the EPA Fire Review Committee, was released for comment in October 2005 until mid December 2005.

The EPA also formed a Reference Group to assist in the review. This comprises representatives from the Department of Conservation and Land Management (CALM), Fire and Emergency Services (FESA), Pastoralists and Grazier's Association (PGA), Aboriginal Lands Trust (ALT), Conservation Commission, Conservation Council of Western Australia, Western Australian Farmers Federation, Pastoral Lands Board and the Western Australian Local Government Association. The role of the Reference Group is to provide advice to the EPA Committee as required.

The EPA has interpreted the Terms of Reference to apply to the Rangelands regions, including the Kimberley, Pilbara, Interior, Goldfields and Nullarbor Regions. Rangelands are generally understood to be areas where rainfall is low and variable and where the predominant agricultural use, if any, is grazing of sheep and cattle on native vegetation. Figure 1 depicts the different Rangeland Regions.

Consistent with its Terms of Reference, the EPA Fire Review Committee met with a variety of people and organisations in the Kimberley and Pilbara Regions and conducted a series of meetings in Newman, Roebourne, Port Hedland, Derby, Kununurra, Kalumburu and Broome. The meetings were held in the week 7-11 November 2005 with further meetings in Fitzroy Crossing and Halls Creek from 28-30 November 2005. Some consultation was also undertaken in the Goldfields Region in March 2006.

The committee wanted to find out about perceptions on fire management practices and importantly, environment and health issues associated with fire. A natural consequence of such discussions was the presentation of solutions and options for improving practices.

In addition to the meetings and consultations, a number of submissions on the Issues Paper have been received from members of the public and government agencies. The submissions, consultation and information provided at the public meetings have guided the EPA in preparing this Paper. It is intended to present the broad based, and often diverse views on the subject of fire management, set in the context of known facts where possible. In some instances the views conveyed to the Committee were anecdotal and although not validated by scientific or statistical work, were reflected in both written and oral submissions to such an extent that the Committee believed that they should be included in this Paper to elicit further comment. Such views reflected local experiences and knowledge.

The paper has been kept brief deliberately, to focus on what are emerging as the major issues identified by the stakeholders and the community. The Appendix provides a more detailed account of the issues.

It is emphasised that the Committee has reached no conclusions at this time. The issues raised in this paper are a reflection of the public and agency input to date, both oral and written. The Committee expects to consult with appropriate parties after receiving

responses to this paper. It will then prepare its report to the Environmental Protection Authority and the Minister for the Environment.

While the EPA has been asked to advise on the Kimberley, the Pilbara and the Goldfields, the major issues expressed to the Committee, and the majority of the information provided, relate to the Kimberley. Hence this Discussion Paper emphasises that region. Many of the issues raised do, however, apply to all regions, for example the paucity of resources for fire fighting and prevention, planning deficiencies and uncertainty about the environmental impacts of altered fire regimes. The Paper has attempted to address any special factors pertaining to the Pilbara and Goldfields regions.

It should be noted that the limited consultation with people in the Goldfields region indicates that the impact of fire on biodiversity is of considerable concern in that region, particularly with regard to the woodland areas and the Nullarbor.

The EPA particularly seeks comments on the options raised and questions posed in this Paper.

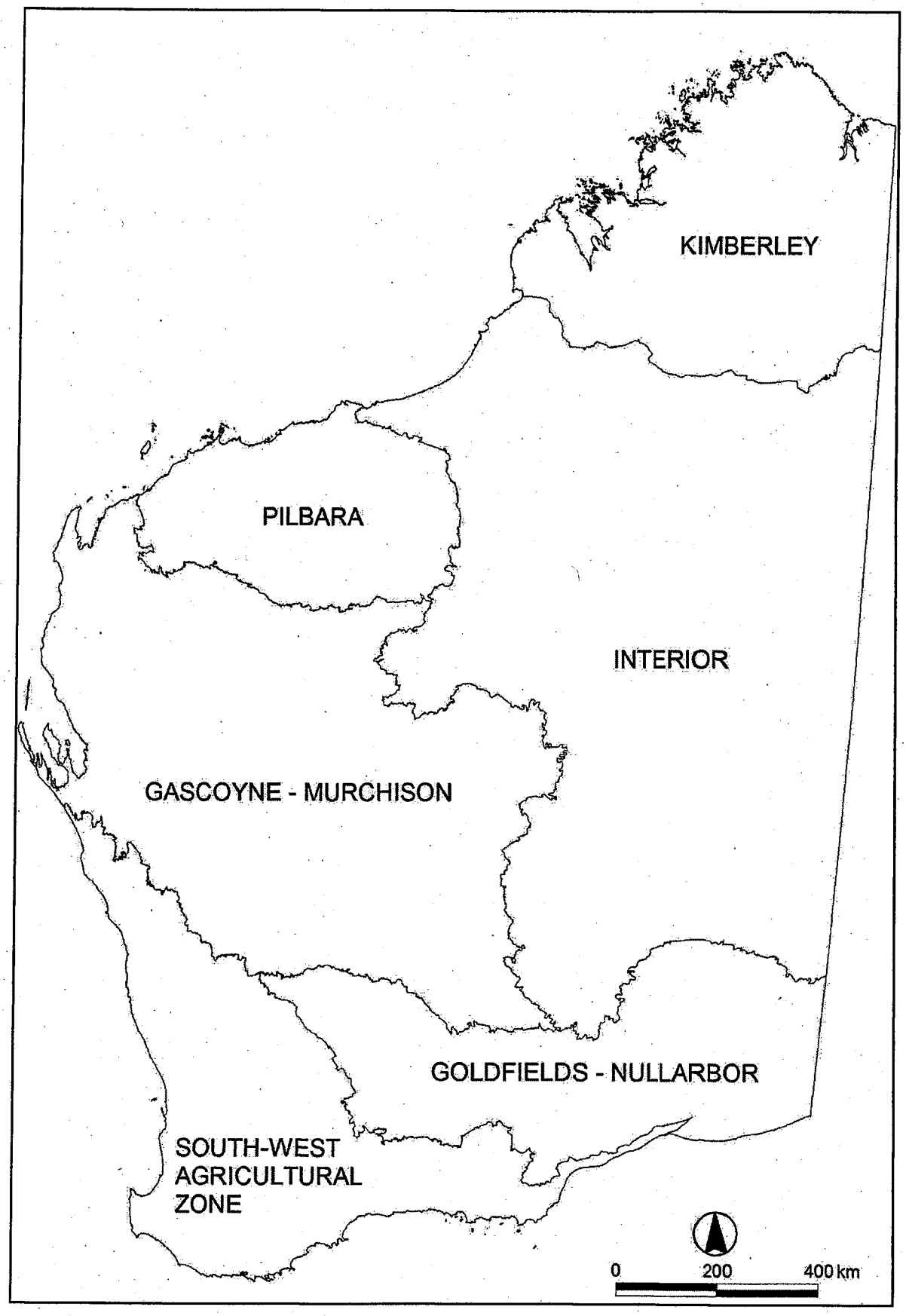

Figure 1: Rangelands Regions of Western Australia

2. Background

While it is recognised that fire is a natural environmental factor in many Western Australian ecosystems, it is evident that altered fire regimes in the Kimberley, Pilbara and the Interior arid zone is a significant issue and there is general consensus it is impacting on a range of environmental and other values.

The *National Strategy for the Conservation of Australia's Biological Diversity* (DEH 1996) recognises fire as one of the threatening processes which can have a negative impact on biological diversity. An objective of the Strategy is to reduce the adverse impacts of altered fire regimes on biological diversity and a cautious approach is recommended to the use of prescribed fire until its impacts and role in vegetation management are better understood. Further research into the role of fire in Australian ecosystems and the coordination and management of management policies which seek to minimise the adverse impact of fire on biological diversity are supported.

The review of the Strategy (ANZECC 2001) found the objective had been partially achieved with some success in the development and implementation of appropriate fire regimes by forest and other land management agencies. The review found resource constraints limited the capacity of management agencies to maintain traditional fire regimes and there was a lack of information about whether biodiversity conservation is being effectively met by State fire management planning.

Causes

It appears most fires in the Kimberley and the Pilbara Regions are lit by people, accidentally, maliciously or deliberately for a range of purposes, with a smaller proportion caused by lightning. In the north Kimberley fires occur predominantly in the late dry season and are often intense, cover very large areas and burn for weeks. Of concern is the frequency with which the same land is burnt annually. Because of the spinifex-dominated vegetation rather than annual grasses, land in the Pilbara Region is not burnt as frequently as the north Kimberley Region but large fires usually occur following above average rainfall periods.

Most of the wildfires in the Goldfields region are predominantly started by lightning. They appear to have been more frequent in the last 10 years, probably as a result of increased fuel loads from above average rainfall over the period. There is evidence that the cessation of traditional Aboriginal burning over the last 50 years or so in the remote and poorly accessible interior has led to extensive areas of fuel build-up resulting in massive wildfires. This is of particular concern for the vast tracts of Unallocated Crown Land and nature conservation reserves in the region.

Impacts

There is a lack of definitive research documenting the extent of biodiversity values that are being lost. Reference to some scientific studies is given below. However, the Committee was provided with considerable anecdotal evidence from members of the scientific and wider community that animal numbers are in severe decline in some regions, some fire sensitive plant communities are declining, complex ecosystems are becoming homogenised and landscapes impoverished. Issues such as soil and carbon loss, sedimentation in waterways and estuaries, feral animals and pests and overgrazing are compounding the problem.

The 2004 Western Australian Greenhouse Strategy indicates that almost half of the WA agricultural sources of greenhouse gas emissions come from savanna burning (Western Australian Greenhouse Task Force 2004).

The impacts of global warming in the Kimberley region are not clear but an ecosystem under severe stress is less able to withstand any future changes. Added to this is the threat to wildlife posed by the imminent impact of cane toads moving from the Northern Territory into the Kimberley region.

The Committee was advised that there were economic impacts of ineffective fire prevention and management as fighting fires takes up people's time and resources as well as destroying valuable pasture. Poor fire management is also a concern for the burgeoning tourist industry.

3. *Significant Issues*

3.1 Biodiversity

3.1.1 Impacts on biodiversity in the Kimberley region

There were strong views expressed that the current fire regime is substantially different from the traditional Aboriginal practice of fine mosaic burning, and has led to biodiversity loss with some plants, particularly fire-sensitive ones, unable to recover. At this stage it has not been possible to totally quantify those losses. Further land degradation is caused when exposed soils erode, litter layers are lost, shrubs disappear and a homogenous landscape is produced. Russell-Smith (2005) reports a range of studies that indicate a significant increase in soil erosion associated with late dry season fires. Stream sedimentation from soil loss also impacts on water quality and riparian vegetation.

Vegetation impacts

Russell-Smith (2005) in his report commissioned for the EPA Committee, considers there is insufficient knowledge about the impacts of fire on biodiversity. However, he indicates that the available studies suggest that the contemporary fire regimes are having severe impacts on fire-sensitive vegetation types in the Kimberley as well as on savanna woodland habitats.

He notes that it is well documented that the relatively fire-sensitive Cypress Pine, *Callitris intratropica*, is being impacted by late dry season fires. Because this plant does not resprout after intense fires and can only regenerate from seed, it was found that only 6% of stands were in a healthy state with a full range of size classes (Graham 2004 in Russell-Smith 2005). The survey by Graham (2001), carried out primarily in the North and Central Kimberley and Victoria Bonaparte areas found 50% of mature *Callitris* individuals were dead with little sign of regeneration.

Fire-sensitive vegetation types, such as mulga shrublands, are also negatively impacted by the contemporary fire regimes (Russell-Smith 2005) in more arid inland regions with increased occurrences of spinifex.

Fauna impacts

According to Russell-Smith (2005), the impact on fauna is not so clear. He considers, however, the simplification of the vegetation due to a lack of fine scale fire-induced mosaics would have severe consequences for small fauna with limited home ranges. Anecdotal evidence about the loss and decline of fauna was given to the EPA Committee

from long-term residents. Scientists who have visited the area over a number of years voiced similar concerns. The reported range declines of medium size mammals and granivorous birds in both the arid interior and north Kimberley is attributed in part to intense and frequent fires (Russell-Smith 2005).

Graham (2004), in the conservation case study of the Mitchell subregion of the North Kimberley, identifies several fauna which are now either extinct, restricted to islands off the Kimberley coast or in isolated coastal areas. These fauna, including the *Isoodon auratus auratus* (Golden Bandicoot), *Phascogale pirata* (Northern Phascogale), *Dasyurus hallucatus* (Northern Quoll) and *Erythrura gouldiae* (Gouldian Finch) were previously found over quite extensive ranges. Graham included changed fire regimes among the threatening processes which have impacted these species.

In most subregions several bird species are considered to be at risk from fire (CALM 2003). Woinarski (2005) has warned that some bird species will increase and some decrease in northern Australia because of the change from a reasonable stability in vegetation patterning due to *an erratic, inconsistent and far less knowledgeable management of fire.* Woinarski warns that some of the bird species which decrease are likely to *suffer at least regional extinctions.*

There appears to be a strong relationship between fire frequency and changes to vegetation and fauna loss and decline, highlighted in the Biodiversity Audit (CALM 2003), but clearly this requires further scientific investigation.

Other impacts

The Biodiversity Audit (CALM 2003) of Western Australia in 2002, identified threats to biodiversity values in nine of the subregions of the Kimberley. Wetlands of National Significance at risk because of fire and other impacts, include the Mitchell River system, Prince Regent River system, Yampi Sound Training Area, Drysdale River, Parry Floodplain, various soaks in the Gardiner Range, the Bunda-Bunda mound springs and the Roebuck Plains system. A number of wetlands of subregion significance are also at risk because of fire (CALM 2003). Almost all riparian zone vegetation is at risk because of changed fire regimes compounded by grazing pressure, and other factors such as feral herbivores, and changed hydrology (CALM 2003).

At risk also are some threatened ecological communities, for example the organic mound springs of the North Kimberley bioregion and the Theda Soak rainforest. Other ecosystems identified at risk in almost all parts of the Kimberley are the Savanna communities, of which *Callitris intratropica* is a component, rainforest patches and assemblages of permanent/ephemeral wetlands and damplands (CALM 2003).

In terms of general conservation, the Biodiversity Audit (CALM 2003) report identifies a number of concerns for the Kimberley region including:

- The effect of fire on critical weight range mammals, granivorous birds and savanna composition and structure;
- There is evidence that changes have occurred and continue to occur in the balance between annual and perennial grasses ; and
- Impacts of fire on rainforest patches of inappropriate fire regimes and especially rainforest fire/cattle interaction.

Recovery
The Biodiversity Audit (CALM 2003) recommends that an appropriate species recovery action for fire management is to move to biodiversity-driven approaches to fire management strategies. This would mean reducing the incidence of frequent, broad scale, hot, late dry-season burning in savanna. Fire is considered to be the main driver, with grazing the next most important, in terms of the savanna ecosystem threat.

3.1.2 Impacts in regions other than the Kimberley

Similar threats to biodiversity due to changed fire regimes have been documented for other areas of Western Australia, including the Pilbara and the Goldfields (CALM 2003). The Biodiversity Audit (CALM 2003) identifies threatened ecological communities including the *Themeda* grasslands of the Pilbara region and many annual herbs and grasses. The hill-top floras of the Hamersley Range are threatened as well as woodlands and shrublands of the north-east Goldfields (CALM 2003). A number of wetlands are threatened in the Southern Cross region as well as the vegetation complexes of the Greenstone/banded ironstone ranges of the Goldfields (CALM 2003). One species of mammal and two species of birds are threatened in the Southern Cross region (CALM 2003).

In your experience, have you observed any impacts of fire on flora and fauna in yo area? Do you have any actual evidence of a decline or increase in plant species, vegetation communities or birds and animals which could assist the EPA in this review?

3.2 Human Health Impacts

The Kimberley and Pilbara communities do not regard smoke from the fires in the region as a primary health concern, however, studies carried out in Darwin (Johnston et al 2002) suggest that there is a strong relationship between respirable particles and attendance at hospital. Although the Kimberley region represents just 17% by area of the northern Australian savanna, it is estimated to produce 28% of total annual emissions from biomass burning (Russell-Smith 2005).

The limited consultation in the Goldfields region indicated a similar lack of concern about bushfire smoke and health except when the smoke results from hazard reduction burning of rehabilitation sites close to residential areas in Kalgoorlie.

The EPA, in its Discussion Paper on the fire policies and management practices of the Department of Conservation and Land Management (EPA, 2004a), pointed out that smoke from bushfires is a complex mix of particles, containing gases such as carbon monoxide, carbon dioxide, oxides of nitrogen and volatile organic compounds. Some compounds found in wood smoke are possible human carcinogens while particles can be inhaled deeply into the lungs and cause respiratory and cardiovascular problems.

Do you think smoke from bushfires is a health issue in your region? If so, what measures do you think are needed to reduce exposure to bushfire smoke?

3.3 Governance

There are a number of organisations that have interests in fire management. These include:

Government agencies:
Department of Conservation and Land Management (CALM) - nature conservation and research;
Fire and Emergency Services Authority FESA) - community protection and response;
Environmental Protection Authority (EPA) - environmental protection;
Department of Environment – protection of the environment;
Department of Agriculture - sustainable range management;
Department for Planning and Infrastructure – planning and management;
Pastoral Lands Board – land management;
Land Councils – Aboriginal interests particularly Native Title;
Local government - asset protection, community safety and fire suppression;

Other Stakeholders:
Aboriginal communities - cultural;
Conservation groups – nature conservation
Mining companies - asset protection and rehabilitation;
Pastoral interests - feed management;
Tourism operators - landscape aesthetics and smoke management; and
Tropical Savannas Cooperative Research Centre - research.

The responsibility for fire protection and suppression in Western Australia is currently controlled by the *Fire and Emergency Services Authority Act 1998*, the *Bush Fires Act 1954*, the *Fire Brigades Act 1942* and the *Conservation and Land Management Act 1984.*

According to Westplan-Bushfire (FESA and CALM 2005) the arrangements under the current legislation are as follows:

- *FESA is responsible for the risk management of all fires within Gazetted Fire Districts throughout the State (see map, Figure 2);*

- *Local Governments are responsible for the establishment and management of Bush Fire Brigades and the holistic risk management relating to all fires for areas outside the Gazetted Fire District, with the exception of CALM managed lands. Bush Fire Brigades will also respond to fires burning on Unallocated Crown Land (UCL) outside of Gazetted Fire Districts;*

- *CALM is responsible for risk management on CALM managed lands, including State Forests, Timber Reserves, National Parks, Conservation Parks, Nature Reserves, Unallocated Crown Lands and Unmanaged Reserves, except where they exist within Gazetted Fire Districts, townsites and the Metropolitan area. CALM is not responsible for fire suppression on Unallocated Crown Land and Unmanaged Reserves. (FESA and CALM 2005).*

The Fire and Emergency Services of Western Australia was formally established on 1 January 1999 as a Statutory Government Authority replacing the Fire Brigades Board and the Bush Fires Board. FESA has operational responsibility for bushfires inside gazetted fire districts which include some rural townships, most regional centres and most of the Perth Metropolitan Region. It also administers the Emergency Services Levy (ESL)

which funds Western Australia's fire and emergency services, including all fire stations, volunteer fire brigades and State Emergency Service units.

Under the *Bush Fires Act 1954*, local governments are responsible for fire protection in all areas of Western Australia within their districts except for the Conservation Commission estate, other CALM managed lands and gazetted fire districts (Boulter 2002). Local governments are therefore the bodies legally responsible for fire protection in most of the Kimberley and Rangelands.

Under section 13 (4) of the *Bush Fires Act 1954*, FESA may authorise a bush fire liaison officer to take control of all operations of a bush fire burning in the district of a local government at the request of the local government. As a result of the Coronial Inquiry at Tenderten a formal process was established to facilitate that transition. FESA has these formal processes in place with two Kimberley local governments, Wyndham – East Kimberley and Halls Creek and Derby; West Kimberley have advised that they do not see a need as there is a provision in the Act for FESA to take over.

FESA may also exercise its powers or perform its functions under section 35(5)(a) of the *Bush Fires Act 1954* and instruct a bush fire liaison officer to take such action as considered necessary to remedy the default or neglect where a local government neglects to carry out its duties under the provisions of this Part of the Act.

A number of issues associated with the current legislation have been addressed through the establishment of the *Emergency Management Act 2005*.

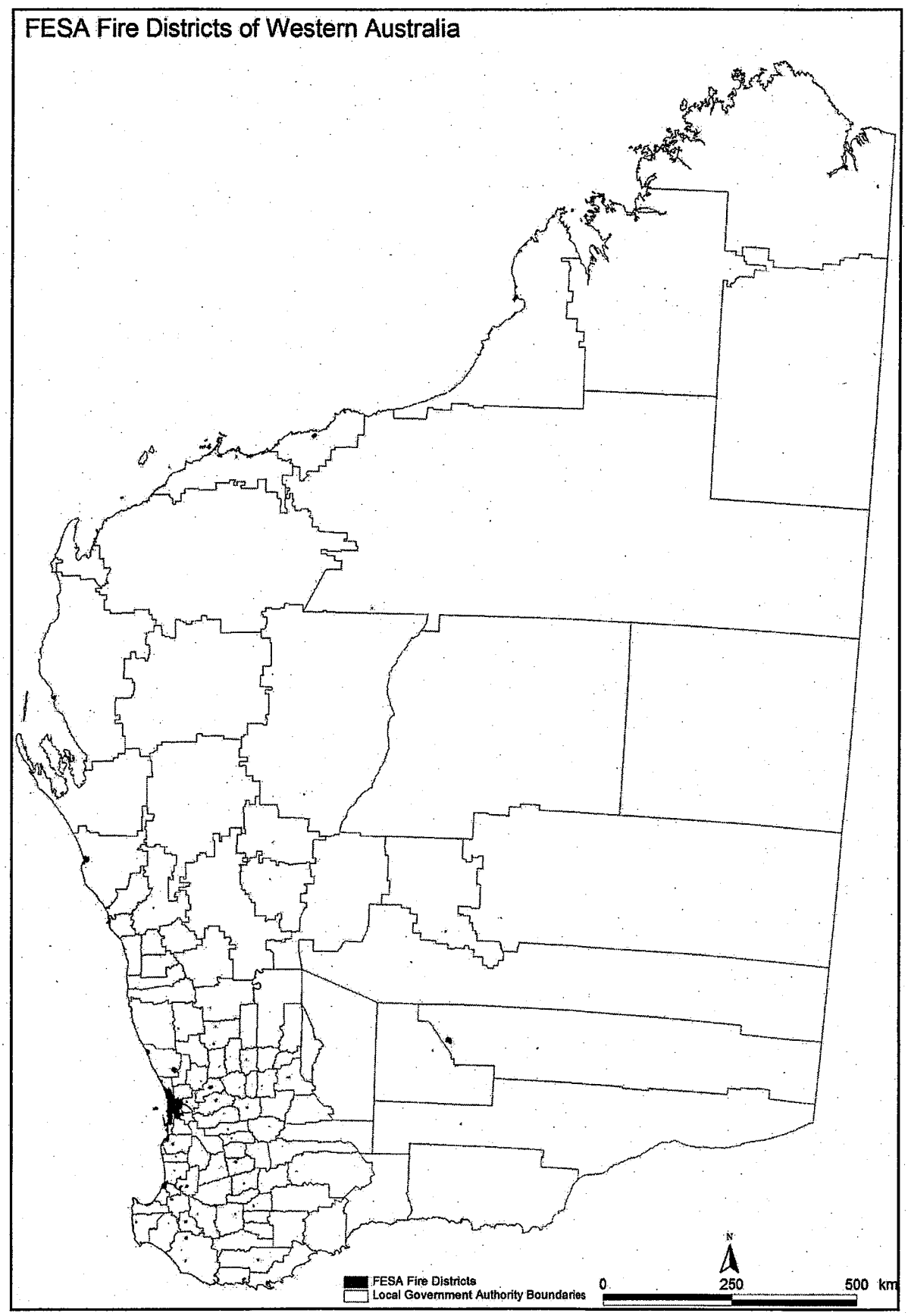

Figure 2. Gazetted Fire Districts

Local government has considerable obligations and powers under this legislation including authorising the taking of such measures as appear to be necessary or expedient for preventing the outbreak of bush fires. This includes a notice to the owner or occupier to make a firebreak or abate a fire risk (Boulter, 2002). Anecdotal views were that not all local government authorities were exercising these powers to their fullest extent.

Local government is also responsible for issuing permits for burning in designated 'restricted burning times'; in the case of the Kimberley zone this is from 1 April to 14 January (Russell-Smith 2005). Local governments are not required to consider the biodiversity loss associated with a pre-emptive burn of native vegetation when considering applications (Boulter, 2002).

Occupiers of rural land, including pastoralists, also have duties and obligations under the legislation. This includes a duty to use all means possible to extinguish fires burning on their land during fire danger periods (either restricted or prohibited), to extinguish bush fires occurring on their land, to notify the outbreak of fire during fire danger periods and to report the existence and location of a fire which cannot be extinguished, if practicable means of communication are available (Boulter, 2002).

CALM takes responsibility for fire management on land under its control as part of its land management and biodiversity conservation functions. While it does not have legal jurisdiction for fire control on CALM managed land, nevertheless, *fire management is an inherent responsibility in being responsible for the management of land* (Inquiry into Fire and Emergency Services Legislation, Transcript of Evidence, 2005).

Reviews and inquiries

There are a number of State and Federal reviews and inquiries which are relevant in any discussion about governance. The Auditor General for Western Australia (2004) pointed out that WA is the only Australian State which places the legislative responsibility for fighting major bushfires with local governments. The Auditor General recognised that there is a need for better coordination across organisations during major bushfires. He considered there is no command structure to ensure that a more experienced person can take control of a bushfire which is beyond the local expertise and there is also no single body which has the legislative authority to prioritise how resources are used at a local, regional or State level during multiple bushfires.

The Auditor General noted that the State's Bushfire Emergency Management Plan, *Westplan Wildfire*, lacks legislative backing, has not been endorsed by local government and needs improvement. This has now been corrected through the *Emergency Management Act 2005*. He also considered the Australian Inter-Service Incident Management System (AIIMS) needs to be uniformly established. It is not known what the level of adoption of this system is in the volunteer Bush Fire Brigades which are the subject of the Auditor General's review. The Auditor General's report also pointed out that training and development needs to be addressed and that major bushfires have exposed weaknesses in planning and communications.

The Western Australian fire and emergency legislation is currently under review by the Legislative Assembly of Parliament through the Community Development and Justice Standing Committee, chaired by Mr Tony O'Gorman MLA. The Inquiry into Fire and Emergency Services Legislation is required to examine, report and make recommendations on fire and emergency services legislation in Western Australia. The Legislative Assembly Committee has taken evidence from the key agencies involved in

fire prevention and suppression and other interested parties and intends to report around August 2006.

There have been a series of Inquiries at the Federal level, the most recent being the 2003 House of Representatives Select Committee on the Recent Australian Bushfires, *A Nation Charred: Report on the Inquiry into Bushfires* and the 2004 Council of Australian Government's *National Inquiry on Bushfire Mitigation and Management* which reported to the Prime Minister on 2 April 2004. There is some overlap between the inquiries, however, the *National Inquiry on Bushfire Mitigation and Management* examined a wider scope of research than the Select Committee.

The *National Inquiry on Bushfire Mitigation and Management* included 29 recommendations to improve bushfire readiness, many of which were recommended to be undertaken by the Bushfire CRC in Canberra. This organisation was established in 2003 and undertakes research under a series of programmes aimed at prevention, preparation, suppression and fire management as well as education and training. The Australian Government's response to both reports was that, while it supported many of the recommendations, it was considered too difficult to change significantly the current research program. Some of the recommendations related to the development of management tools which would provide better information on levels and accumulation rates of fuel loads.

The Australian Government (Australian Government 2005) allocated $24 million over 3 years from 2004 to assist local communities to prepare better for bushfires. This money included an additional $6 million for the Bushfire CRC and was in addition to the Government's commitment of $68.5 million for the Natural Disaster Mitigation Programme announced in the 2003-2004 budget. It is not known how much was available for rural WA communities through this program.

Community views

There is a considerable body of opinion that the current arrangement for fire management does not work, lacks clarity, is failing to protect biodiversity or the pastoral industry, and is confusing in regard to the roles and responsibilities for fire management outside of gazetted fire districts and CALM Act managed land. Few people in the Kimberley and Pilbara region understand the relationship between FESA, the local authorities and CALM and cannot readily identify who is responsible for taking action, whether preventative or reactive.

In the Goldfields region, the role of CALM and the local government appears to be well understood; however, FESA's role outside the towns is not clear. Some people in the Kimberley region believe that the limited resources should not be used to put out fires which are not likely to cause damage to property and where lives are not at risk.

Other submissions (see Community comments and suggestions section in the Appendix) expressed concern that FESA's existing fire regime does not produce fine scale mosaic patterns, is not meeting biodiversity or pastoral needs, and that fires often get out of control.

Suggestions made to the Committee

Several alternative institutional arrangements have been suggested to the EPA Committee. One which related to the Kimberley Region, was that the State Government ought to control fires through a single agency. This well documented submission favoured a single Fire Management Authority with all contact and coordination through

this agency. This submission proposed that the most appropriate authority would be an autonomous group with a CEO, salaried staff and volunteers and agency people seconded as technical support and to manage specific areas of an overall program. It was suggested that a Kimberley Bushfire Authority be established by legislation and that a Memorandum of Understanding should be developed first between the key agencies of CALM, FESA and the local authorities through the relevant Ministers to ensure roles and responsibilities were clear.

The same suggestion proposed that a Kimberley Bushfire Advisory Panel should be established with representation from stakeholders to meet with the management authority to discuss matters relating to fire and other biodiversity issues and provide regular advice to the Fire Management Authority and land managers throughout the region.

Under this regime, the proposed new Authority would have a permanent fire-fighting team whose responsibility would be to protect the environment from fire through education, prevention and suppression. It was proposed that all land managers would need to participate in the development of a strategic policy to address natural resource management. It was also suggested there should be a single telephone number for reporting fires. FESA has advised that it is well-known that the 000 emergency number is used State-wide for reporting fire and emergencies.

This approach bears comparison with that suggested by CALM to the EPA Committee to establish a Kimberley Fire Council (KFC). A community representative could chair the KFC with executive support from FESA. Other members would be representatives of the local stakeholders with the addition of a representative with fire research knowledge, possibly from the Tropical Savanna, Desert Knowledge or Bushfire Cooperative Research Centres. CALM recommends the role of a KFC to be:

- To develop and maintain a strategic fire management plan for the Kimberley that accommodates the interests of the stakeholders;

- To develop and maintain a prioritised annual fire management program specifying a program of works to establish and maintain a sustainable fire regime in the Kimberley;

- Broker the arrangements and obligations to achieve the annual program of works; and

- Provide a forum for interaction between all stakeholders and a conduit between State Government and stakeholders.

The Bushfire Front, a voluntary organisation which describes itself as being dedicated to protecting householders, farmers and forests from the ravages of bushfires, provided a submission on the review and suggested a similar body to the above, which might be called a Bushfire Council, with representatives from all the relevant agencies and interests. The body would develop objectives and plans for fire management. The body could be coordinated through a Ministerial Council of the Ministers for the Environment, Police, Planning, Emergency Services and Local Government which could provide direction for bushfire management, including biodiversity.

A dedicated "Fire Management Officer" stationed in each local authority or region was another suggestion which could provide a better link between key stakeholders and communities and provide continuity of service. It was also suggested a Fire Research Officer should be located in the Pilbara, similar to that in Kununurra.

Other people said that responsibility should remain with local government, and those who actively manage the land.

If the legislation is changed, the question arises as to which agency or agencies would be appropriate to take over that responsibility outside the gazetted fire districts.

The EPA Committee sees biodiversity conservation as an essential central principle of fire management and, while CALM has fire management responsibilities on land it administers, it may not be the appropriate body to undertake overall fire management responsibility for all land. On the other hand, it appears from submissions and comments received that FESA is not currently resourced or focussed on ensuring that biodiversity management is an essential central principle in fire management.

The claims for customary burning to be legally recognised should also be examined because exclusive native title has been granted over some large areas of Unallocated Crown Land while several native title decisions have found that native title coexists with pastoral leases and the conservation estate.

What is the best way for environmental protection to be incorporated into the fire management system?

Which agency or level of government do you think should be primarily responsible for the overall responsibility of fire management (from planning to prevention and suppression) in your region?

What do you think of the suggestions that an overarching body be established to coordinate fire management?

If a coordinating or overarching body was to be established, do you see it being done through legislation or through an advisory committee?

What do you think about the other suggestions, eg to have dedicated Fire Officers located in regions?

What other fire prevention, management and suppression arrangements do you favour?

Do you think Aboriginal customary burning should be recognised and permitted legally?

If so, should there be an advisory or supervisory body to monitor such burning?

3.4 Fire Management Practice

3.4.1 Fire Management Planning

Good fire management planning is a necessary element of best land management practice in the Kimberley and Rangeland regions of Western Australia to prevent wildfires, protect overall biodiversity, including areas of environmental significance; promote pasture; and protect infrastructure.

Planning involves risk analysis and appropriate fuel management strategies and identifies what areas should or should not be burnt, and how and when. It should also include a wildfire response plan and inter-agency agreements and responsibilities. It is based on a knowledge of previous fire history, topography, vegetation, biodiversity values and other assets, areas of significance worthy of protection and available resources, and is usually tailored to the specific region or local area such as a pastoral lease. Mapping of key biodiversity values and areas requiring protection and a prescribed burning plan should form the basis of such plans and be revised when new knowledge from research is available.

Information to assist fire management planning, such as mapping fire potential, is essential in order to understand how the land burns. This information is called the 'fire index' and indicates how different vegetation, topography, geology, land units and biodiversity regions have an impact on burning patterns.

The EPA Committee noted that, while some fire management planning is occurring, it is patchy and fragmented. The EPA Committee has not been able to ascertain what fire management planning currently occurs, however, it is aware that CALM undertakes prescription burning. FESA has advised it undertakes fire planning with the pastoralists on aerial burning and is working with pastoralists, the Pastoralists and Grazier's Association and the Indigenous Land Corporation to improve pastoral fire management. While the general community recognises fire management planning is required, there were different views on whether this should be approached primarily from a local or a regional level.

Local government officers in the Kimberley generally involved in fire management consider they lack expertise and knowledge of plants and animals and the effect fires have on habitat. According to them, areas of environmental significance should be identified by experts in that field.

FESA has been successful in obtaining funds to undertake two projects in mapping and remote sensing through its application under the Bush Fire Mitigation Program. From a total fund of $550,000, FESA was allocated $71,000, Local Government $53,500 and CALM $425,500 for work in the south west of the State. The projects are for mapping and remote sensing. The mapping project will commence in the Perth area, then the south west of WA covering major towns, farm lands, private property and plantations and will be expanded further north and east depending on work load and information. This type of information will ultimately be useful for fire management planning.

A Statewide Bush Fire Threat Analysis is being developed in partnership between FESA, CALM and Western Power with supporting finance from the Natural Disaster Committee. The Bush Fire Threat Analysis will apply across the whole of the state regardless of land tenure.

The consultant preparing the Bush Fire Threat Analysis will develop a model that will provide a standard approach for all bush fire management in WA for application to all natural lands in the State. A Spatial Decision Support System will be developed for the model. The work will entail a literature review of models and decision support systems in other parts of the world and development of a model suited for Western Australian conditions.

FESA has developed a project in the Kimberley Region for strategic pastoral station bush fire management. This project will enhance the capability of the pastoral community in the Kimberley to better manage the bush fire prevention and response capability through FESA undertaking strategic bush fire planning and implementation through on-ground work on pastoral stations. The on-ground work will provide a basis for "best industry practice" to be identified and applied across the Kimberley. Pastoralists will be able to review and identify which of the components are applicable for their stations. This project will enhance the current bush fire management and planning activities undertaken by pastoralists in accordance with the *Bush Fires Act.*

The project will liaise with industry bodies such as the Pastoralists and Grazier's Association and the Indigenous Land Corporation, and with individual pastoralists, with a view to gathering data and information from experienced fire managers and pastoralists in the Kimberley. This information will be used to augment information gathered during the preparation for the 2006 dry season fire season and also the 2006 aerial burning program.

During the liaison with the bodies and pastoralists FESA will support the work with a financial contribution to the pastoralists and to the aerial controlled burn program across all participants. FESA will gather the data and anecdotal information, compile the report and distribute to the pastoralists. It is intended to undertake a similar project in the Pilbara next financial year.

FESA, in partnership with pastoralists and other property owners, has been developing visual fuel load guides for the non-southwest forest region of Western Australia. To date the fuel measurement has been undertaken for the Geraldton Sand Plain and the Swan Coastal Plain, and FESA is finalising the compilation of the first draft document. The Kimberley fuel load measurement has been undertaken but work on the guide has not yet been completed. It is planned to undertake work in the Pilbara and Goldfields in forthcoming months.

FESA is in the final draft stages of the development of a "Guide and Tables for Fire Management in Western Australia". This document utilises the four CSIRO fire danger and fire spread meters and therefore covers all Interim Biogeographic Regionalisation of Australia (IBRA) regions in Western Australia.

While it may not be either possible or desirable to emulate traditional Aboriginal burning practices, an understanding of this provides knowledge about the predominant fire regime under which these ecosystems have persisted for thousands of years. In the absence of sound scientific knowledge, understanding historical fire regimes (season, interval and scale of fires), together with western science, provides important guidance to contemporary fire management (Burrows and Christensen 1991, Burrows 2003). Thorough documentation of the traditional use of fire by Aborigines should be a high priority while old people with knowledge are still present.

Start (2003) believes that the natural resources are those currently present and that maintaining biodiversity means maintaining all the biological elements. He believes that management may have to manipulate the status quo if it is not appropriate, for example, to improve ground cover to reduce erosion.

One consideration for fire management planning relates to the legal requirement to protect native vegetation. Under Division 2, section 51(A) of the *Environmental*

Protection Act 1986, burning of vegetation is classified as clearing, however, Schedule 6 of the Act provides a number of exemptions for hazard reduction burning during prohibited or restricted periods done under the authority of the *Bush Fires Act 1954*. These exemptions provide for burning and clearing by fire control officers, and other authorised officers, under the *Bush Fires Act 1954* and the *Fire Brigades Act 1942* in preventing or controlling a fire.

Schedule 6 also provides for exemption for clearing undertaken by CALM under section 3 of the *Conservation and Land Management Act 1984* provided it is carried out as part of its land management function.

A transitional exemption is contained in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* for fire hazard reduction burning that is done outside of the restricted or prohibited periods under the *Bush Fires Act 1954*. The clearing must be conducted in a way that minimises long term damage to the environmental values of the vegetation (DoE, 2005). Primarily designed for the reduction of risk to persons or property, the hazard reduction burning should not be carried out so frequently that it would prevent the ability of the vegetation to recover. This exemption does not apply to environmentally sensitive areas of which there are many in the Kimberley and other regions.

Prescribed clearing under the Regulations includes clearing to maintain existing cleared areas for pasture if it has been used as pasture within the previous 10 years.

Suggestions made to the Committee

CALM, in its submission, considers that fire management should be undertaken in an adaptive management framework while building a greater capacity to carry out experimental research. CALM's submission urges the use of the 'Precautionary Principle' recognising that lack of certainty about the threat of environmental harm should not be used as an excuse for not taking action to avert that threat.

There were a number of suggestions made about fire management planning, including one that it should occur at the local level and be properly coordinated and integrated to achieve effective containment and prevention at a regional level.

Another option suggested in a number of submissions which may be worth exploring is a combination of both regional and local planning. If a strategic approach is taken, similar to land use planning, all land managers will have to participate in order to achieve an integrated plan. Planning on an individual land holding or pastoral basis will also have to fit in with the broad management plans.

There is support for regional, local and individual pastoral station level planning. However, the Pastoralists and Grazier's Association does not support compulsory fire management plans for pastoralists. The Pastoralists and Grazier's Association has advised that it actively encourages the pastoral industry to participate in the FESA aerial controlled burning programme and other related work to prevent bushfires.

One of the functions of the Pastoral Lands Board, established under the *Land Administration Act 1997*, is to ensure that pastoral leases are managed on an ecologically sustainable basis. Lessees of pastoral land are required to use methods of best pastoral and land management practice appropriate to the area and have to maintain the indigenous pasture and other vegetation on the land under the lease to the satisfaction of the Board.

It was generally considered fire management planning should be undertaken in consultation with neighbouring stations and properties. If regional fire management plans were developed, the PGA questions who would administer them, who would enforce and finance them. They also question what a region would constitute and what structures would be put in place to support a regional planning process. They supported full consultation with pastoralists.

The Bushfire Front advocates the preparation and implementation of plans covering all land tenures which are implemented. They see this as something an overarching body or organisation responsible for fire management could coordinate. The Bushfire Front also sees the need for a State Bushfire Policy and that landowners and land managers should have a policy position to underpin management plans.

The Bushfire Front also advocated that the government should develop a set of statements for Best Practice in bushfire management in the rangelands, covering all tenures. It was suggested this should be developed by the various parties working together and then used as a basis for funding, staffing, research and operational priorities. This could then be used to assessed if management was effective as a basis for public reporting on outcomes.

It was also suggested that fire management plans should be mandatory for all major projects and mining operations.

Do you think planning for fire management is important?
If so, who should prepare such plans?
Should they be developed at a regional or local level, or a combination of both?
Who would coordinate and monitor implementation of the plans?
Should they be compulsory?
What should such plans include?
What additional information would be necessary to be able to undertake comprehensive fire management planning?
Should all land managers participate in fire management planning?

3.4.2 Fire Containment

There are immense practical difficulties in containing fires in the Kimberley and Rangelands of Western Australia because of the vast distances and the lack of good ground access. If fires are caught at the early stages, however, it can enhance the possibility of controlling them before they spread into inaccessible country. It was suggested that an early notification system and the use of response aircraft may assist in rapid containment.

Public consultation to date has confirmed there is a desire to reduce the number of fires, particularly the number of late dry season fires, and to reduce the scale, intensity and duration of fires that are occurring. It was considered fire must be a tool in the land management system to maintain biodiversity rather than destroy it and that the long-held myth that any fire is a good fire needs to be challenged.

Many people think that greater enforcement action should be taken against those who deliberately light fires although it is recognised that convictions are difficult to obtain given the distances and limited resources to investigate arson incidences.

The Committee was reminded that changes in the pastoral industry which occurred since the 1960s has resulted in far fewer people available on the ground to either prevent or suppress fires.

The Bushfire Front suggested that fire should be better controlled and managed, and that there was a need to reinstate the system in which they were frequent, mild and relatively small.

Do you think wildfires should be put out in the early stages if at all possible or left to burn, and why?
If an early response to extinguishing fires is adopted, what resources would be needed?
What fire regime do you support, with respect to frequency, intensity and size?
Do you think people who deliberately light fires should be prosecuted?
Are there other programmes for reducing the number of fires, eg training an education?

3.4.3 Fire prevention

There was a general consensus that a fine scale mosaic pattern of land burnt at different times needs to be established to prevent the large hot dry season fires from spreading too far and to promote and protect biodiversity rather than destroy it. Given the inaccessibility of much of the Kimberley region, this mosaic can only readily be achieved through the use of fire to reduce high fuel loads rather than machinery or grazing

There was only limited support for Aerial Control Burning as it currently operates in the Kimberley region. There was a strong view that aerial burning is a very blunt instrument to apply to a delicate area such as the Kimberley where out-of-control fires can have detrimental and long lasting environmental impacts. Also that despite some efforts by fire management agencies to take the landscape and environmentally sensitive areas into consideration, in practice this did not always occur, and there are a number of instances where burns have been uncontrolled. FESA advises that it is working with the pastoral industry to develop guidelines that will assist the industry better manage fire and fire prevention and planning activities on their stations, including consideration of environmental issues.

The general consensus of the community was that the process is inflexible because flights are planned some months in advance and the opportunity to take a late wet season and

other climatic conditions, or the 'cured' status of the vegetation into consideration was limited. There was also consensus that better ground-based backup is needed and greater flexibility in commissioning flights so that they can be conducted at a few days notice if conditions are suitable. In addition the use of water bombing aircraft and helicopters as well as better ground equipment would greatly assist in fire containment.

During the consultation the EPA Committee was frequently reminded of the internal differences, in landscape, climate and biodiversity, within the Kimberley, apart from the obvious differences from the Pilbara and Goldfields and how important this was to the approach taken to fire prevention.

The consensus view was that an important first consideration is to decide what practices are going to be most successful for the region and values in question. Also that decisions will need to be made on whether there should be more early season burning, or burning in the wet season and how this should be undertaken, as well as whether late dry season fires should be suppressed, and how.

There was a suggestion that a temporary fire regime should be pursued, eg to burn extensively in the early dry season for one or more years to prevent the late dry season fires, prior to implementing an ecologically sustainable fire regime. In addition methods of extinguishing and lighting fires should be tailored to the area's particular requirements, bearing in mind fire does not recognise cadastral boundaries.

Given the size of the country, particularly the Kimberley region, and difficulty of access, aircraft is the most likely tool to be used for planned burns to reduce fuel loads, create firebreaks and establish mosaic burn patterns, and for fire suppression. This may be applicable to other regions where ground access is difficult.

There is a proposal by which industry may provide funds for fire management in Arnhem Land in the Northern Territory covering an area of 20,000 km^2. The intent of the proposal is to turn around a fire regime of 40% late dry season and 5% early dry season to 16% early dry season and 16% late dry season (Russell-Smith pers. comm.)

The issues of suppression response capacity are addressed in the Wildfire Threat Analysis and Fire Prevention Plan for Crown Lands between Coolgardie and Southern Cross developed by CALM (Daniel no date). FESA has advised, however, that both FESA and CALM have identified significant issues with the CALM Wildfire Threat Analysis and as a consequence are developing a State-wide Bush Fire Threat Analysis.

Suggestions made to the Committee

There may be an opportunity for fire teams to play a role. The Kimberley Regional Fire Management Project (KRFMP), funded through the Natural Heritage Trust (NHT), established two successful Fire Control Teams, primarily constituted from Aboriginal people, to undertake on-ground burning and suppression. Their work is said to have been successful with few late season fires where it was carried out. However the funding for the project was not continued and the fire teams disbanded. A number of pastoralists said they would be willing to use such a service if it was subsidised, with suggestions this could be funded by the Emergency Services Levy.

There were also suggestions that helicopters and heavy equipment could be used to suppress fires, particularly in the Kununurra area where water is readily available. There is the potential to further explore the option of using helicopters. FESA has undertaken a

limited analysis of the potential use of helicopters in the Kununurra area and found them to have limited application.

Increased stock numbers on pastoral stations was also put forward as a mechanism of reducing fuel loads.

What fire prevention practices would be appropriate for your region?
What changes could be made to the effectiveness of aerial controlled burning?
Should aerial controlled burning be used in other Rangeland regions, apart from the Kimberley?
What fire regime do you consider is appropriate for the different regions which are being considered in this review?
Should there be more preventative burning in the early dry season?
If you agree, how should that be done?
Do you think on-ground Fire Teams similar to that organised through the Kimberley Regional Fire Management Project should be established?
If you agree, what role should they play and how should the teams be funded?
What do you think about the suggestion that the Emergency Services Levy be used to finance Fire Teams, if they were established?

3.5 Resources

The EPA Committee noted widespread concern among all agencies, land managers and occupiers about the lack of resources, particularly for fire prevention and suppression but also for fire planning on a regional and local scale. There is a widespread perception the south-west of the state receives much greater attention and resources and that the State should provide similar resources, equipment, personnel and arson investigation capabilities for fire management in the Kimberley and Pilbara region in particular.

FESA has advised it has trained bush fire investigators based in the Kimberley and other country and city regions across the State, and has also trained fire investigators within the Police and CALM. FESA considers important issues with the fire investigation is not so much the resources to undertake the task but instead the time between detection, the ability to physically arrive at the scene and to identify potential witnesses and offenders.

There is a view that resources should be provided to whoever has the legal responsibility to enable them to carry out those responsibilities properly. Also that the scale of the issue of fire management in the Rangelands regions is such that vastly improved resources are required across the board whatever governance arrangements are put in place.

Funding collected by local government for the Emergency Fire Services Levy, and given to the State Government, should be, but is not returned for training, fire investigations,

building inspections, community safety programs, emergency management planning and other support programs, according to at least one Shire.

FESA advises that all volunteers are trained and equipped with the appropriate levels of personal protection, and that fire investigation training is conducted for all agencies in Western Australia eg FESA, Police and CALM. Building inspections are undertaken by FESA through Operational Services and also the FESA Built Environment Branch. The FESA Community Safety Division undertakes a range of community safety programs across the State, with significant time and effort being put into the Kimberley and Pilbara.

Equipment held by local government is considered to be inadequate to manage fires outside the towns. For example, the Committee was advised that Shire of Broome currently has one regional light tanker of 600 litres capacity and 9 volunteer fire fighters. In general, the community expressed views that training in fire fighting was crucial and needed to be ongoing because fire volunteers often only stay a short time in the area.

A great deal of reliance is placed on volunteers with most shires having around 15-20 volunteers at any one time, but that can vary according to the time of year. They are not paid but are provided with uniforms, boots and training by the ESL. The volunteers mostly operate within and around the towns.

There is currently only one aircraft available in the Kimberley for the aerial controlled burning (ACB) programme created by FESA and CALM with little scope to adjust for weather conditions or even time of day. Some pastoralists use their own helicopters and carry out their own aerial burning to have greater control, but this activity is limited. Water planes and helicopters are considered to be very effective suppression tools in the eastern Kimberley but are very expensive and are consequently only used in special circumstances.

Pastoralists usually have some equipment, such as a tank on a trailer with a pump while others have bulldozers and graders. Kalumburu Mission reported it has no equipment to fight fires, and does not even have a water truck, leaving it highly vulnerable in the event of either an Aerial Control Burn or wildfire getting out of control.

Web-based fire mapping products, such as FireWatch, Fire Fax and Vegetation Watch, which would enable fire management decisions to be made, are not readily available to everyone. Vegetation Watch measures greenness of the vegetation cover and is used to predict pasture growth but can be adapted for fire management.

Satellites can provide early detection of bush fires which can also be faxed or emailed to property managers. This Fire Fax service, which provides updated information on fire hotspots thereby alerting land managers to fire outbreaks, can be accessed by subscription. Currently there is a charge for subscribing to the service of around $200 per year depending on how many properties are covered, while Fire Watch is free. In December 2005, 37 people subscribed to Fire Fax, down from 47 the previous year.

Suggestions made to the Committee

The type of resources suggested were several planes for carrying out aerial controlled burning, more people to carry out fire suppression and control at ground level, more equipment such as graders, fixed wing aircraft and helicopters to fight fires and police to investigate and prosecute deliberately lit fires. It was suggested that subsidies should be

available to provide fire fighting equipment available on properties, such as occurs in Queensland.

Some suggestions for better fire management included relocating some of CALM's south-west fire fighting equipment and personnel to the northern regions in the winter months.

Another suggestion is that mining companies could provide some of their equipment to help contain fires. FESA has advised this is currently undertaken in the Kimberley and Pilbara where FESA has an MOU with Pilbara Iron and the Pilbara Iron funded fire and rescue service. BHP also provide heavy fire fighting equipment and Woodside Energy can provide mobile control unit. Pilbara Iron rail operations also works closely with FESA on providing resources and equipment during emergencies. FESA has provided bush fire training to a number of companies in the Goldfields, and to rail maintenance gangs.

The PGA also sees the need for cooperation between neighbours in emergency fire response. This type of cooperation is already identified by CALM in its draft 'Good Neighbour Policy', released in September 2005.

Better mapping was seen as essential, both for fire occurrences at a finer scale and for vegetation mapping. Training in the use of such systems was seen as essential. The Kimberley Region Fire Management Programme trained some pastoralists in utilisation of those systems and many people consider this should be continued.

Aboriginal people at Kalumburu, and other areas, are prepared to be trained as rangers and to set up on-ground Fire Teams. This would permit them to protect areas of significance to Aboriginal people such as rock art sites and for the knowledge to be passed on to future generations. There was a credible view that such teams should be ongoing, not of short duration (i.e. project based funding). An important element was considered to be acknowledgement of their role through, for example wearing a uniform, as this would enhance the rangers' authority and status. FESA has advised that the people at Kalumburu can join the bush fire volunteer system to achieve the above objectives.

Do you think there are adequate resources in your region for fire management?

If not, can you outline what resources you consider should be supplied?

How should these resources be allocated?

What do you think about the suggestion that CALM's equipment be used to suppress fire in the Kimberley region during the late dry season months?

Should mining companies and other industry provide more resources to help suppress fires?

3.6 Role of Indigenous People in Fire Management

Much has been written about fire in Australia and a debate still continues about how much the vegetation was changed by Aboriginal people following their arrival on the continent.

Customary Aboriginal burning

Bowman (1998) examines the environmental impact of Aboriginal landscape burning and concludes that ethnographic evidence leaves little doubt that *Aboriginal burning played a central role in the maintenance of the landscapes subsequently colonised by Europeans.* On the available evidence, Bowman is of the opinion that Aboriginal burning was skilful and that there is an urgent need to directly involve Aboriginal people in collaborative research on the fire ecology of various ecosystems where there are still close links with the land. This is consistent with the findings of Burrows and Christensen (1991) who investigated the traditional use of fire by Western Desert Aborigines. Burrows *et al.* (in press) have demonstrated a dramatic change in fire regime with the cessation of traditional, or classical Aboriginal burning and implicate this in adverse environmental impacts such as mammal declines in the arid zone.

Russell-Smith (2002) examines the pre-European burning regime in the Kimberley and comments that the record is both sparse and biased, however, he draws conclusions similar to that made about the Northern Territory and Queensland. His summary of traditional fire management around Kalumburu is that the major period of burning in traditional society occurred in the period from May to August. The fires could be relatively easily controlled as the nights tend to be cool. Burning started on the high ground and would then move towards the lower ground and around creek lines as the dry season progressed. The hot time between September to November was reserved for burning unburnt areas along watercourses. There was no burning in the period around November to December when the wet season commenced.

Bowman suggests burning still is to some extent highly organised within the community and was done principally to provide for easy travel, to clear *rank grasses* and to encourage new growth for fauna. It was also used for hunting macropods such as euros and wallabies with fire drives pushing the animals towards small gaps where hunters would be waiting with their spears. This research demonstrates that customary burning considered the different landscapes and vegetation in each area.

Customary burning practices vary and have changed considerably with the introduction of pastoral activities. Walsh and Cross (2004) undertook research through the Kimberley Regional Fire Management Project (KRFMP) into aspects of Aboriginal knowledge and practice in areas of the Kimberley. The researchers divided the historical record into time periods and related the fire burning activities in each time zone. This identified the Station and Mission times as occurring from around the 1920s to the 1960s, a period of about 40 years, when areas were burnt for green pick for cattle by stockmen and women on horseback or on foot under the direction of the station manager.

The 'drifting' times from the late 1960s to the early 1980s, was a time when equal wages were introduced and people moved between the towns, missions and stations. The burn regime at that time is described as being *all over the place* being a combination of traditional and pastoral practices.

The 1980s to the present time, a period of approximately 30 years, is described as the Outstation times when small remote settlements were established on leases and reserves.

This period is characterised as a time of accidental fires, signalling fires from broken down vehicles, burning on the way to town then returning to hunt along the patches, clear areas around camps and buildings, 'clean up' the country and 'trouble' burning to exert influence when feeling powerless.

Current Aboriginal burning

The Kimberley Regional Fire Management Project found that widespread landscape burning takes place in the northern Kimberley region. Burning along roads is a common practice among both pastoralists and Aboriginal people. There is a widespread view that Aboriginal people are the source of many of the current fires, but not in the context of their traditional use of fire. Concerns about this were expressed to the Committee by community elders as well as pastoralists.

Aboriginal people still practice customary burning in the Gibson Desert. Some indigenous controlled areas in the Goldfields region are burned frequently but not according to traditional methods.

Aboriginal people are keen to be consulted on fire management and are very interested in practising their customary burning in general and to protect cultural sites.

Suggestions made to the Committee

The Kimberley Land Council, in its submission to the Review, considers customary burning should be recognised in legislation and that the knowledge should be continued through practical programs such as the Kimberley Regional Fire Management Project Fire Teams. The Council considers that customary burning is a native title right as it is an integral part of laws and customs. Native title claims have been granted over many areas in the Kimberley. FESA is of the view that traditional burning can still continue within the current legislative framework.

The submission states that several native title decisions have found that *native title coexists with pastoral leases and the conservation estate, and that Traditional Owners have customary right and management responsibilities to these lands, including the right to maintain cultural sites such as rock art shelters.*

The impact of the current fire regime on rock art was raised recently by the media with the release of the book by Wilson (2006) about Bradshaw rock art. Wilson is concerned that repeated hot fires are degrading many of the sites and that paintings which may be 20,000 years old can be destroyed when heat from fires cracks the rock surface (ABC broadcast 10 February 2006). This view is shared by other people.

As discussed in Section 3.4.3, Fire Teams could be used to provide early detection of wildfires, be the ground-based backup teams for ACB, advise tourists and other visitors in the region, assist pastoralists in fire management, assist in weed control and eradication of other pest species, protect rock art and provide the focus for educational programs. There was strong consensus that, if established, ongoing funding for the work would be essential.

What role do you think Aboriginal people should play in fire management?
Do special measures need to be put in place to protect cultural and heritage sites, such as rock art?
If so, what measures do you suggest would be most effective?

3.7 Research

There is only limited research on the impact of fire on the ecosystems of the Kimberley, Pilbara and Interior of Western Australia particularly in comparison with that undertaken in the Northern Territory.

Radford (in press) believes there are major gaps in the knowledge about how plant and animal groups respond to fire and the possible causes of those responses. One gap is limited understanding of landscape responses to fires with high spatial and temporal variability Another area requiring further work is the biodiversity response to wet season burning which can be effective in reducing *Sorghum* biomass and flammability of vegetation in the following year.

According to Radford (in press), other areas where little work has been done is in the invertebrate response to fire although they play a key role in ecosystems; this is of particular importance in the Kimberley region as it is the final refuge for a number of nationally significant mammal species. Radford (in press) suggests that research is required into meta-population ecology with respect to the concept of patch mosaic burning because it can assist in determining what spatial structures of burnt patches would best assist in maintaining species numbers.

There has been little research into the primary mechanisms behind fire responses by plants and animals according to Radford (in press) and no research into nutrient fluxes post-fire which have implications for many ecosystem aspects. Information about nutritional benefits from recently burnt grass are apparently well understood for cattle but little work has been done in this area for native animals. Another knowledge gap according to Radford (in press) is the changes in the physiological and behavioural responses of animals to changes of vegetation structure in response to fire.

Radford (in press) considers there must be research into the mosaic hypothesis to determine whether this approach has a biodiversity benefit as this has not been proven. He considers this work is particularly pressing for the Kimberley region.

A critical issue is obtaining information on not just the presence of flora and fauna, but also whether populations are declining. The EPA Committee was informed about increasing mammal populations in some areas, for example kangaroos, and decreasing populations of birds and emus in others. Research conducted in the arid zone has attributed mammal declines to the combined effects of altered fire regime, predation by introduced predators and competition from introduced herbivores (Burbidge and McKenzie 1989, Burrows and Christensen 1991).

Recent research by Macquarie University has been undertaken in the eastern Kimberley area, primarily in Purnululu National Park (Bungle Bungle) and Conservation Reserve (Purnululu) focusing on the effects of fire on fauna, specifically small mammals, reptiles and ants. The University researchers advised that they have conducted research in various parts of the East Kimberley which included fire and fauna in Mirima National Park and the effect of fire and grazing on ants in Parry Lagoons Nature Reserve and Kachana pastoral station. The results of the research are not yet available, however, they advise that land managers need to be aware of how different habitats respond to fire and what the consequences of different management actions might be.

The Macquarie University researchers informed the Committee that, despite some important surveys, there are still many gaps in knowledge in many areas and habitats of the fauna assemblages. While there is a considerable body of research in the Northern Territory and Queensland about similar issues, there is a need for an understanding of the specific conditions in the Kimberley and other Rangeland areas.

Russell-Smith (2005) recommends better vegetation mapping to identify small but very significant biodiversity assets such as rainforest patches and better remotely sensed information about the moisture or curing status of fuels to assist in the timing of ACB flights.

An example of coordinated research is that being undertaken by the South-East Queensland Fire and Biodiversity Consortium which aims to bring together and disseminate information on fire management that will support conservation of the biodiversity of South-East Queensland (SEQ Consortium 2005). The Consortium has wide representation from local authorities, Queensland Government key agencies including Parks and Wildlife and Rural Fire Service and Griffith University.

A number of inputs suggested a coordinated and funded programme similar to the Northern Territory's Tropical Savannas CRC, established in the Kimberley with a view to carrying out research into the conservation status of the flora and fauna as well as assist in researching the impact of fire on species and how best to tailor fire management for the various distinct parts of the Kimberley, Pilbara and Rangelands could be very beneficial. Space-for-time surveys, using the records of fire history, is also a very useful scientific method to better understand the long term effects of various fire regimes and to compliment longitudinal studies.

The Bushfire Cooperative Research Centre aims to increase scientific understanding of bushfires and their social and economic impacts. This is achieved through a coordinated, multidisciplinary research programme which involves Australian land and fire management agencies and government and university research agencies. The research is conducted under 5 programmes, one of which is the management of fire in the landscape. Other programmes concentrate on safety and protection of people and property as well as education.

CALM has recently appointed a fire ecologist to the Kimberley, based in Kununurra. This person will work in collaboration with CSIRO and other researchers in the Northern Territory to better understand the role of fire in tropical savanna ecosystems. CALM is also undertaking a Pilbara Region Biological Survey 2002 – 2007.

FESA has proposed that a group headed by an independent person and containing representatives from FESA, CALM, Museum, local governments, DoE, DIA, PGA, WAFF and other significant groups with a vested interest be established to ensure that, as research into biodiversity is undertaken within WA, it is circulated to those that can have an influence on protecting that biodiversity.

What areas of research are needed?

Which geographical regions do you consider require most research and why?

3.8 Audit and Monitoring of Fire Management Practices

An intrinsic part of a management programme is that it be audited and monitored during its implementation. The first step in identifying the most appropriate fire regime for any region is to identify the aims and outcomes and what landscape should be maintained. Once the fire management regime has been agreed, the implementation will need to be constantly reviewed and changed if necessary if it is not being met.

There will have to be monitoring, accountability and follow-up to assess the success or otherwise of whatever fire management regime is adopted. Start (2003) suggests there are indicators, including certain plants and birds, which can be used to assess whether biodiversity is improving or not. The 2002 Biodiversity Audit (CALM 2003) provides comprehensive lists of ecosystems and species at risk which could serve as benchmarks for future audits.

It is also necessary to audit and monitor the research which will assist in improving the fire management planning and fire management practices. Monitoring of the long-term trends of flora and fauna, in relation to fire impacts will also be necessary.

Should auditing and monitoring of the effectiveness of an agreed fire regime be carrie out?
What indicators might provide useful measurements to determine if the correct fire regime is being achieved?

3.9 Communication, consultation and education

Communication

The EPA Committee was informed communication between agencies and between the agencies and the community, especially in the regions was imperative and needs improvement. Communication was raised at the Inquiry into Fire and Emergency Services Legislation by the Office of e-Government which outlined the development of a strategy for emergency services radio communication (Transcript 23 November 2005). It was suggested to the Committee that there is a need for a common telephone number so that the public can report fires or to find out if any fires are likely to be a threat to them. It was also suggested that pilots should be required to report fires.

Consultation

Consultation with the community is regarded as essential, particularly with Aboriginal people. They constitute around half of the Kimberley population, with a median age of 21 years (Bureau of Statistics 2001 census data in Russell-Smith 2005). The PGA considers that pastoralists must be consulted about any proposals to change the fire regime. Fire management planning would necessitate coordination and would only be successful if land occupiers and managers are involved in the process.

Education

FESA already provides extensive fire information including brochures for general travellers and for people preparing to camp or caravan in the north of Australia. They also provide general community awareness campaigns. They provided information at the Majarrka Festival on safe fire use and the fire calendar year to aboriginal participants from all over the Kimberley. Targeted bush fire reduction activities have been conducted since 2001 to attempt to reduce arson around and within the towns of the Kimberley.

Recommendation 3.1 in the *National Inquiry on Bushfire Mitigation and Management* is that state and territory governments and the Australian Government jointly develop and implement national and regionally relevant education programs about bushfire, to be delivered to all Australian children as a basic life skill (COAG 2004). The Council of Australian Government (COAG) supported the recommendation and considered it important that it be integrated into the curriculum, in the context of competing pressures. Education outside schools was recognised as significant but difficult to formalise. This matter deserves greater attention.

Improvements in training and access to web-based fire information such as Fire Fax and Fire Watch would enhance communication with affected land managers and fire management agencies. This could be enhanced by remote sensing information at greater resolution than currently available for better planning and spotting of fires.

Do you think current communications for reporting and suppressing fires are adequate Should there be more consultation and information exchange with the community and between agencies and, if so, who should be consulted? What form should communication about fire management take, is written material adequate or should there be more use of meetings, video, radio, TV and the Internet? Do you think information sources such as Fire Fax and Fire Watch are useful? Should there be more information similar to those? If so, what information do you think should be prepared and distributed?

3.10 Other Issues

There was concern about a perceived failure of CALM to fulfil its own guidelines and that it had permitted fires to get out of control. The submission from CALM recognises previous mistakes and maintains it is developing a number of strategies to improve the situation. This includes the development of a regional fire strategy for the Kimberley region, a recognition of biodiversity as a key focus of fire management, increasing both fire prevention and suppression, undertaking more prevention burning in the wet season and early dry season, using ground ignitions to supplement ACB and increasing monitoring and evaluation. CALM is concerned, however, that resources to achieve landscape scale change are inadequate.

Other suggestions are that CALM and other facility providers should redesign BBQs at roadside stops so that fires were better contained, tourists should be briefed about the necessity of preventative fires and tour guides should be trained in fire awareness.

Are there any other issues you would like to inform the EPA about?

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