064269

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
CALM*fire*, Como

To: District & Regional Managers
Directors

SCIENTIFIC ADVISER
THREAT SPECIES UNIT
CONSERVATION & LAND MANAGEMENT
WILDLIFE RESEARCH, WOODVALE

Your Ref:
Our Ref: rjs143
Enquiries: Mr Sneeuwjagt
Phone: 334 0366

Subject:

The Conservation Council of WA has recently released its policy on "Fire in the Natural Environment". This document is seriously flawed and mainly aimed at misleading the public about the fire management policies and practices of CALM and bushfire brigades. A detailed response to this policy statement is attached, along with a set of CALM*fire* briefing notes on relevant fire management issues that receive regular public comment. Managers are asked to circulate these amongst their staff so that they are in a position to provide informed advise to the public. Please contact me or other CALM*fire* Branch staff if you wish to provide feedback on these matters.

R.J. Sneeuwjagt per

Rick Sneeuwjagt
MANAGER
CALM*fire*

10 October 1996

Att.

CALM*fire* RESPONSE TO THE CONSERVATION COUNCIL OF WESTERN AUSTRALIA POLICY ON "FIRE IN THE NATURAL ENVIRONMENT"

The Policy on "Fire in the Environment" developed by the Conservation Council of WA (CCWA) in January 1996 is in two parts - the first part provides background material whilst the second is a series of policy statements. Neither segment deals in any detail with "fire in the natural environment", as most of the document is aimed at attacking prescribed burning regimes and fire management practices.

The "Background" statement is an amazing mixture of half truths, opinions, misleading and erroneous statements which ignore the wealth of information and research findings that are available for anyone interested in fire management in Western Australia. It is clear that the main objective of the policy paper is to denigrate the fire management policies and practices of CALM, the bushfire brigades, and country shires by misrepresenting the implementation and impacts of current prescribed burning regimes applied by these authorities.

The statement begins well enough by acknowledging that fire has always been part of the Australian environment and that Australia's ecosystems have adapted to natural fire regimes. However, it qualifies this by stating that natural fire frequencies have ranged upto several centuries. Such long-term frequencies have never been identified within any of Western Australia's ecosystems, with the possible exception of some rainforest communities in the Kimberleys. This statement fails to recognise the well accepted findings that natural fire regimes that occurred prior to European settlement in the early 19th Century, was characterised by frequent, low intensity fires in many vegetation types. Contrary to the CCWA's statement on the scarcity of information on Aboriginal burning, there is indeed a great deal of scientific and recorded anecdotal information from a wide range of sources on Aboriginal burning practices. Recent studies by a CALM scientist on Grass Tree scars from specimens located in the jarrah and wandoo forest, show that much of the dry forest and woodlands of the south-west were subjected to fire every two or three years.

It is partly correct to say, as stated in the 3rd paragraph of the CCWA's document, that European settlement in Western Australia beginning from 1829, has drastically changed the fire regimes in Western Australia, and that large intense and damaging wildfires are more common today. What is implied in CCWA's comment is that the frequency of fires has increased as a result of European settlement. Quite the opposite is true. As the Grasstree scars study reveals, the average frequency of fires since the influence of European settlement in about the middle of the 19th century has decreased in much of the jarrah and wandoo forests from about four times a decade to approximately once a decade.

Fire scars in tree trunks only reveal the effects of very intense fires that are hot enough to damage the cambium. Such fires are normally associated with those which burn heavy fuel load present within long unburnt forests. Scar damage does not occur from the low intensity fires that are characteristic of frequent burns. It is therefore not surprising that few fire scars are evident in the periods prior to European settlement.

Given the title of the CCWA's policy paper, it is indeed strange that there is no further reference to the role and effects of fire with various components of WA natural ecosystems. No recognition is given to the vast amount of fire ecology research undertaken by WA scientists from CALM and other institutions which provide a good understanding on the environmental impacts of current prescribed burning practices in the south-west, including effects on flora, fauna, nutrients, water catchments and aesthetics.

Contrary to the CCWA's assertion in paragraph 7 that "spring" burning "is the worst possible time for most native flora and fauna", the overwhelming scientific evidence is that current fire management practices involving the application of burning over a range of frequencies, times of ignition, intensities and sequential regimes, are appropriate for the maintenance and conservation of natural ecosystems in the south-west vegetation types. The Ministerial Review Panel which included renowned fire ecologists and fire research scientists reported that their comprehensive enquiry into CALM burning practices found "no evidence that the current practices have resulted in major disruptions to the natural ecosystems". In fact the findings from a wide array of fire ecology studies show that flora and fauna species richness is greatest within three or four years following low intensity prescribed fires, and is least in long-unburnt forested ecosystems.

The claim made in the CCWA Policy paper (paragraph 8) that "many prescribed burns become very hot, and some escape and burn larger areas than intended" is a wild exaggeration. In fact the extent of burns that escape their boundaries is small, and has declined over the past four years. The percentage of wildfires attributable to escapes from CALM prescribed burning has declined from a high of 7.5 percent in 1989/90 to between 3 and 5 percent in the past 6 years. The bulk of these fire escapes occur during the milder weather of spring and autumn, and therefore are easily suppressed and do little damage.

The comment that prescribed burns have even resulted in the death of people may possibly be a reference to the death of three lighting crew from the Forests Department nearly 40 years ago. Since then there have been no fatalities in Western Australia. On the other hand, fuel reduction burning buffers has been effective in saving millions of dollars of properties value, plantations and timber values from damage or destruction from wildfires. Despite the severe fire climate experienced in WA each year, there have been very few losses of lives of householders or fire fighters during bushfires.

There is no recognition in the CCWA's paper that fire fighters would be faced with intolerable risks to their lives in the face of extreme fire behaviour that would become commonplace if the Conservation Council's push to abolish prescribed burning were to be realised.

The statement in the 1st paragraph on page 2 that "native flora and fauna and natural ecosystems are not adapted to the current fire regimes and are rapidly being altered and degraded by it probably irreversibly" demonstrates a complete lack of understanding of the ecological processes. First of all, there is no one single fire regime being applied currently, as there are many varying and changing regimes, including "no planned burn" fire regimes. Even the fuel-reduction burning regime described in paragraph 5 on page 1 which is irregularly applied to less than half of the forested estate managed by CALM, has much longer rotation periods than the frequent fires applied by Aborigines for many thousands of years prior to European settlement.

Secondly, many ecosystems in the south-west have evolved in the presence of very frequent fires. These very frequent fires appear to have encouraged the formation and maintenance of very open forests with a native grasses understorey. As fires have become less frequent with the demise of Aborigines in the south-west, many of these native grasses have disappeared, and the open forests have been replaced by highly stocked forest stands supporting shrub understorey species.

There is no evidence which indicates that there are any species within south-west ecosystems that cannot survive or recover from periodic fire. Studies clearly show that native plants in particular, display a wide range of highly effective traits which enable them to survive, or recover from bushfires of varying intensity, season and frequency. It is unlikely that the native plants and animals of the south-west would be here today, if they did not have the capacity to survive the periodic fires that occurred before European settlement.

The CCWA paper makes claim that there is "evidence" that prescribed burning actually increases the amount of flammable material. This can occur where exotic weed (eg: veldtgrass, annual grasses) are present, such as within metropolitan reserves and on the fringes of the forests where these are bordered with pastured and domestic gardens. Weed invasion is most likely where forests adjoin farm paddocks and where there is some fertiliser drift into the forest from farming operations. In the interior of the forests, exotic annual grasses are almost never found.

Decades of research refute the claim that natural forest fuels increase as a result of prescribed burning. Fuels are always light after a fire, then accumulate at different rates depending on the forest canopy and the "dryness" of the forests. In high rainfall zones (eg: karri, tingle forests) it builds more rapidly and to higher levels than in drier forests. Fire or not, fuels become heavy after a few years and do not decrease in the absence of fire.

The CCWA paper displays a total ignorance of the aerial prescribed burning operation when it makes the claim in paragraph 3 of page 2 that during such an operation "... very large areas are lit from aircraft and burnt in a single fire, ... leaving most native fauna no chance to escape". In fact prescribed burns are made up of hundreds of individual ignitions which burn slowly until they either join up or go out in the cool of the evening, leaving a patchy mosaic in which between 10 to 40 percent of the area remains unburnt. Extensive research on the impact of prescribed burning on numerous fauna species shows that these are rarely affected by such low intensity patch burns. Mammals are able to easily move out of the way of these slow, low intensity fires, whereas they can be seriously impacted by wildfires that are large, intense and frequent. None of the 31 mammal species that were believed to have inhabited south-west forests at the time of European settlement have become locally extinct since the initiation of prescribed burning in the mid 1950's.

Two mammal species, including Lesueur's Rat Kangaroo and the Rabbit Eared Bandicoot have disappeared earlier this century, probably as a result of predation by foxes and cats. These mammals occurred outside of the main forest zones. Populations of threatened fauna species are now making a spectacular return to former high numbers as a direct result of the application of widespread fox baiting programs. These increased populations of threatened species is occurring in areas with a history of regular prescribed burns, as well as areas kept free of fire for long periods!

In paragraph 4 of page 2, the CCWA paper is critical of the large volumes of greenhouse gases that are released from prescribed fires. What the paper fails to mention is that in fact, intense summer wildfires release much greater volumes of gases as much higher volumes of organic fuels are burnt in wildfires than in the low intensity, patchy prescribed fires. Also, the vigorous past-fire regeneration extracts substantial amounts of CO_2 from the atmosphere. There will inevitably be a greatly increased release of Greenhouse Gases from large wildfires if prescribed burning programs were to be curtailed.

There is a perception that smoke from both wildfires and prescribed burns constitute a health hazard as indicated in the CCWA paper. Medical studies throughout the world indicate that bushfire smoke is more a temporary inconvenience than a health problem. Several of these studies indicate that there is only a very remote risk of aggravation of asthma, respiratory illness, heart disease or the development of cancer from occasional exposure to bushfire smoke.

The complete cessation of prescribed burning on the grounds of its perceived impacts of pubic health will inevitably create another social problem: the cost and tragic impact of destructive wildfires on communities and forest ecosystems in the south-west.

Policies

In the second part of its policy document, the CCWA lists 16 strategies for fire protection and management in natural areas. The bulk of these are sensible and indeed are currently applied by fire authorities in WA. Each strategy is examined in terms of current practices and outcomes.

CCWA Policy Statements

1. ***Formulating and enforcing regulations to minimise the human causes of unwanted fires and imposing heavy penalties for breaches. As a matter of urgency, research must be conducted into the reasons for arson and the findings incorporated into fire protection and management policies and practices.***

   Comment: State Government has increased penalty for arson to $250,000 and/or 14 years gaol. CALM, FRS and BFB are undertaking extensive work into community education programs to minimise arson. Police and CALM have collaborated on anti-arson programs, particularly in high-risk areas such as Gnangara pine plantations. A restructuring of the Arson Council is being considered to improve the development and application of strategies to reduce the number of deliberately lit fires. In any event, legislation and harsh fines will not eradicate the arson problem.

2. ***Responding to fires very rapidly, as soon as they start.***

   Comment: CALM, FRS and BFB already have a rapid response fire call-out system. FRS now runs the initial call-out system for all brigades in the Swan Region. A special three-agency call-out system is in place for the highest risk area long the Darling Scarp. Aerial waterbombers will be used on a trial basis for the 1996/97 summer fire season to assist ground forces contain wildfires, whilst these are still small and manageable. CALM has consistently been able to detect and attack more than 95 percent of all wildfires in the south-west forests before these exceed one hectare in the highest value zones, or two hectares in the second highest value zones.

3. ***Improving fire detection, emergency communication systems, fire fighting equipment and mobilisation procedures, and providing the funds necessary to fully resource them.***

   Comment: CALM maintains a network of fire towers and aerial reconnaissance throughout the south-west forest areas, which ensure that any wildfire is detected within a few minutes of starting. In the past two years or so there has been a significant upgrading program put in place for Shire and Bushfire Brigades and CALM fire fighting resources, particularly pumpers.

4. ***Improving liaison between fire fighting agencies, including developing a formal code of cooperation between fire fighters, to achieve the objective of putting out fires very rapidly, as soon as they start.***

   Comment: Liaison between the three fire agencies has never been better than it is currently. This has been brought about through the development of Partnering Agreements and the formation of a joint agency Steering Committee and three Fire Strategy Groups that deal with Operations, Prevention and Planning, and Human Resource Management issues. These cooperative arrangements have lead to the joint development and implementation of Incident Control Systems, common training programs, compatible equipment and communication systems; agreed call-out arrangements; resource sharing and common terminology. The Project FIREBIRD which is designed to evaluate the cost-effectiveness of aerial suppression systems has been initiated this year through the close liaison established between the fire agencies.

5. ***Having well-trained, well-equipped fire suppression units patrolling high fire-risk areas in the south-west throughout the fire season, to deter arson and detect and put out fires as soon as they start.***

   Comment: The high risk areas are monitored continuously in daylight hours by CALM towers and aerial surveillance. On days of Very High or Extreme fire danger, additional crews from private contractors and the timber industry are kept on standby. Ground patrols are undertaken in high risk and high value areas on days of severe fire weather.

6. ***Controlling the expansion of urban development and settlement into fire-prone areas.***

   Comments: CALM, FRS and BFB have input into development plans proposed by local authorities and private developers. A set of guidelines have been developed by Local Government, BFB, DPUD and CALM to assist in the integrated planning for fire protection of sub-divisions, plantations and other fire prone areas.

7. ***Encouraging land-occupiers to build and maintain their homes so that they are as fire-proof as feasible, and their surrounds are effective fire buffers.***

   Comment: The "Planning with Fire" document referred in 6, provides planners, the land development industry, land managers, local government, owners and builders with comprehensive guidelines on the design, technical standards and fire protection plans for residential sub-divisions that may be affected by bushfires.

Community education programs such as Community Fireguard and Summer Safe have been initiated by the fire agencies to encourage householders to take responsibility for managing fire hazards and fire ignitions around their neighbourhood. This program is likely to expand rapidly throughout fire prone areas in the south-west in future years.

8. ***Placing strategic buffers around vulnerable towns, settlements and property in need of protection from fire. In the buffers, the amount of flammable vegetation must be minimised, preferably by mechanical means (slashing, mowing, raking, pruning, thinning) or, as a last resort, by burning.***

   Comment: Strategic buffers are used as a priority fire hazard reduction mechanism around high risk towns and communities. All methods (mowing, slashing, burning, etc. are used), however, fuel reduction burning is the only proven effective means of restricting the spread of high intensity wildfires under hot, summer conditions.

9. ***Educating the whole community, especially land managers and fire fighters, about the serious ecological damage now being caused by fire, including prescribed burning, in natural areas.***

   Comment: It is agreed that current education programs on the role of fire in our natural ecosystems may not be highly effective despite the large volumes of articles, brochures and other information material that has been developed and circulated by CALM and other scientific institutions. New material for inclusion in Education Department curriculum is being developed to ensure primary and secondary school children develop a better understanding of fire ecology.

   The ecological impacts of prescribed burning are taught to volunteer fire fighters in courses conducted under the auspices of the BFB. Prescribed burning is used as a tool to minimise "serious ecological damage" of unwanted wildfires.

10. ***Educating the whole community about what to do in case of fire.***

    Comment: CALM, FRS and BFB regularly update information on what to do in the event of fire. This information is circulated in a number of formats, including brochures, articles, Fire Awareness Expos, and the Community Fireguard and Summer Safe Projects.

11. ***Keeping people out of fire-prone natural areas during periods of high fire hazard.***

    Comment: National parks, forest recreation areas and other high risk areas can be closed to the public on days Extreme fire danger. Fire bans are enforced on days of Extreme and Very High fire danger.

12. ***Developing fire protection and management plans for all natural areas and incorporating them into an overall fire management plan for each region. The plans will aim to protect sensitive areas from fire.***

    Comment: CALM has developed both formal and interim Fire Management Plans for most large reserves throughout the south-west. A large number of small reserves which require fire management plans will be dealt with whenever staff resources are available. All formal management plans for terrestrial reserves prepared by CALM include specific fire management regimes for fire sensitive ecosystems.

    Draft management plans which include fire management are prepared in consultation with the local community and released for public comment for periods of at least two months and often more than three. Therefore, there is a high degree of opportunity for the public to participate in preparing fire management regimes for conservation areas through the planning process.

13. ***Not burning natural areas when they are not adjacent to populated areas or property in need of protection from fire, except for demonstrated ecological reasons.***

    Comment: Prescribed burning is used to not only protect life and property values, but is also needed to protect plantations, high conservation values and wildlife habitats. Fire is required to regenerate forest following harvesting and for other silvicultural treatments. Fuel reduced buffers are also necessary throughout natural lands in Western Australia (eg: Kimberley's, Goldfields, range lands etc) to restrict the spread of large wildfires that for various reasons cannot normally be attacked by direct suppression methods.

14. ***Conducting research in Aboriginal burning and incorporating the findings into fire protection and management policies and practices to ensure they are ecologically sustainable.***

    Comment: Research into Aboriginal burning practices is a current priority in CALM's fire ecology research. An innovative project involving the use of fire scars on trunks of Grass Trees to determine pre-European fire regimes is soon to be written up and published.

15. ***Investigating and evaluating the effectiveness and impacts of current prescribed burning and of ecologically sustainable alternatives to prescribed burning, and incorporating the findings into fire protection and management policies and practices.***

    Comment: CALM continues to place high priority on maintaining a large number of studies into fire impacts of different fire regimes within south-west ecosystems. The findings from these various studies that have been undertaken over the past 40 years are rapidly incorporated into CALM's fire management policies and strategies. A review by an independent panel of fire experts set up by the Minister for the Environment in 1993/94 found that CALM's prescribed burning programs did not have adverse long-term impacts on the south-west forest ecosystems, and that in fact extra funding should be provided to CALM to enable it to achieve an increased burning program.

16. ***Establishing a large number of sizeable "no planned burn" control areas in all ecosystem types to investigate the long-term effects of "no burn" management on natural ecosystems and ground fuel levels, and incorporating the findings into fire protection and management policies and practices.***

    Comment: There are currently more than 100 areas within the south-west forests and other conservation reserves where "no planned burn" and scientific reference areas have been identified. These areas are supplemented with many more long-unburnt areas which are protected from fire because of their vulnerability to damage from intense fires. These areas total more than 340,000 hectares throughout the south-west. Fuel reduced burning buffers are maintained adjacent to "no planned burn" areas to protect these high fuel zones from wildfire damage.

Conclusion

Fire agencies like CALM and Bushfire Brigades have a legal and moral obligation to protect the community assets from fire damage. Along with this comes the responsibility for implementing Government approved fire management policies. Consequently, these organisations are also held liable if things go wrong. These organisations have been spectacularly successful in their endeavours to prevent and limit the incidence and spread of large, damaging wildfires in the south-west over the past 35 years. Any changes in current policies and practices must lead to a maintenance or improvement in this excellent record. The CCWA Fire Policy does meet this criteria

CONSERVATION COUNCIL OF WESTERN AUSTRALIA

POLICY NO : 50 *FIRE IN THE NATURAL ENVIRONMENT*

ADOPTED : JANUARY 1996

BACKGROUND

1. Naturally caused fires have always been part of the Australian environment, and Australia's flora, fauna and ecosystems have adapted to natural fire regimes, with frequencies ranging up to several centuries.

2. The vegetation over most of the continent was also subjected to many thousands of years of burning by Aboriginal people, which, over time, may have significantly altered many ecosystems. However, reliable information about Aboriginal burning is generally scarce.

3 Judging from the evidence of, for example, fire scars in tree trunks and changes in the composition of plant and animal species, it is apparent that European settlement in Western Australia, begun in 1829, has drastically changed both the natural and Aboriginal fire regimes and in much of the State has greatly increased the frequency and extent of intense fires.

4 Faced with the destructive impacts of unwanted fires in natural areas, land managers in Western Australia have implemented a program of deliberate burning to reduce the amount of flammable vegetation and thereby the extent and intensity of unwanted fires. This burning is called 'prescribed', 'controlled', 'hazard reduction' or 'fuel reduction' burning.

5 For example, the Department of Conservation and Land Management (CALM) practises prescribed burning throughout much of the land it manages. It conducts prescribed burns every five to seven years in the jarrah forest and every six to eight years in the karri forest, including the forest in conservation reserves.

6 CALM says that prescribed burning is essential to protect life and property and, in the South West, the timber in State forest, especially pine plantations and regrowth after clearfelling.

7 In the South West, like CALM, many volunteer bush fire brigades, country shires and other land managers practise frequent regular prescribed burning, mainly in Spring. This is the worst possible time for most native flora and fauna.

8 Many prescribed burns become very hot, and some escape and burn larger areas than intended. Escaped prescribed burns have destroyed property and burnt out pasture and crops as well as bushland, and prescribed burns have even resulted in the death of people.

1 Native flora and fauna and natural ecosystems are not adapted to the current fire regime and are rapidly being altered and degraded by it, probably irreversibly.

2 There is evidence that prescribed burns actually increase the amount of flammable material because they promote the growth of weeds and native plants that respond prolifically to fire and interrupt the processes that decompose plant material lying on the ground.

3 For reasons of economy, in many instances very large areas are lit from aircraft and burnt in a single fire. These burns leave most native fauna no chance to escape. Fauna that does survive may have no food, no shelter from predators and nowhere to live.

4 Prescribed burns release considerable quantities of greenhouse gases into the atmosphere and cause serious air pollution. This makes them a significant health hazard.

5 There is considerable scientific evidence which shows that under the current fire regime, many natural ecosystems do not have time to recover from one prescribed burn before the next occurs. However, the public is being offered no option for fire protection and management other than frequent, regular, extensive prescribed burning.

POLICY

The Conservation Council believes that the environmental, financial and health costs of WA's current fire protection and management in natural areas, which rely almost entirely on frequent, regular, extensive prescribed burning, are too high. Instead, the Council believes that fire protection and management in natural areas should rely on:

1. Formulating and enforcing regulations to minimise the human causes of unwanted fires and imposing heavy penalties for breaches. As a matter of urgency, research must be conducted into the reasons for arson and the findings incorporated into fire protection and management policies and practices.

2. Responding to fires very rapidly, as soon as they start.

3. Improving fire detection, emergency communication systems, firefighting equipment and mobilisation procedures, and providing the funds necessary to fully resource them.

4. Improving liaison between firefighting agencies, including developing a formal code of cooperation between firefighters, to achieve the objective of putting out fires very rapidly, as soon as they start.

5. Having well-trained, well-equipped fire suppression units patrolling high fire-risk areas in the South-West throughout the fire season, to deter arson and detect and put out fires as soon as they start.

6. Controlling the expansion of urban development and settlement into fire-prone areas.

7. Encouraging land-occupiers to build and maintain their homes so that they are as fire-proof as feasible, and their surrounds are effective fire-buffers.

8. Placing strategic buffers around vulnerable towns, settlements and property in need of protection from fire. In the buffers, the amount of flammable vegetation must be minimised, preferably by mechanical means (slashing, mowing, raking, pruning, thinning) or, as a last resort, by burning.

9. Educating the whole community, especially land managers and firefighters, about the serious ecological damage now being caused by fire, including prescribed burning, in natural areas.

10. Educating the whole community about what to do in case of fire.

11. Keeping people out of fire-prone natural areas during periods of high fire hazard.

12. Developing fire protection and management plans for all natural areas and incorporating them into an overall fire management plan for each region. The plans will aim to protect sensitive areas from fire.

13. Not burning natural areas when they are not adjacent to populated areas or property in need of protection from fire, except for demonstrated ecological reasons.

14. Conducting research into Aboriginal burning and incorporating the findings into fire protection and management policies and practices to ensure they are ecologically sustainable.

15. Investigating and evaluating the effectiveness and impacts of current prescribed burning and of ecologically sustainable alternatives to prescribed burning, and incorporating the findings into fire protection and management policies and practices.

16. Establishing a large number of sizable 'no planned burn' control areas in all ecosystem types to investigate the long-term effects of 'no burn' management on natural ecosystems and ground fuel levels, and incorporating the findings into fire protection and management policies and practices.

BRIEFING NOTES

PRESCRIBED BURNING ON CALM LANDS

* WA is the only part of the world which combines a hot, dry Mediterranean climate with tall forests, producing large quantities of combustibles. Our severe summers turn the forest into a vast arena ready for conflagration. If fuels have not been reduced, fires started by lightning or human activity become uncontrollable infernos.

* Fuel is the only factor which can be managed. It consists of ground litter, and live and dead vegetation. Also some tree species have stringy or fibrous bark which can be blown aloft as burning brands, setting spot fires far ahead of the main fire. "Hopovers" are common in forest fires, and nearly always occur with heavy, dry fuels.

* Fuel-reduction burns are WA's first method of defeating wildfires. The other is a fast response by well-trained fire fighters. The first method makes the second effective.

* Fire is as natural phenomenon in Western Australia as rain, storm and drought. Our forest ecosystems have evolved in its regular presence, and need it to survive. No species of plants or animals are known in WA's forests which do not survive or recover from periodic fire, either by seed germination, resprouting or recolonisation. Some plants and animals are favoured by long periods without fire, but can still recover after it, and other species actually flourish in the presence of frequent fire. Despite more than 30 years of research, there is no evidence that planned burning causes long-term, irreversible, deleterious damage to the environment. In fact, a burnt area will usually recover quickly, and invariably is richer in species and diversity than long-unburnt areas.

* In the case of fuel reduction burns, in forest stands, the Department aims to burn out 70 to 80 percent of the block, leaving 20 to 30 percent unburnt from which native animals and birds recolonise the burnt areas.

* After a low-intensity planned burn, very little of the tree canopy is affected, and only part of the understorey vegetation is blackened, and many areas are left unburnt. In tough, resilient ecosystems like the jarrah forest, the visual effects of low intensity planned burns, unlike those of severe wildfires, disappear within a year.

* Some people worry that planned burns cause the wildfires they seek to prevent. It is true that despite the efforts of well trained staff, a few burns do escape from their boundaries, often because of an unpredictable wind change. The percentage of wildfires caused by these escapes is very small, and less than 5 percent of all fires are the result of escapes from planned burns. These escapes are usually small as fire fighters are on the spot whenever these incidents occur.

* The planned burning program has a wide range of constraints. These include both environmental and operational factors such as the availability of suitable weather conditions, suitable fuel moisture contents, limits to funds, manpower and equipment. Other constraints are imposed by statutory requirements such as, the Bush Fires Act which requires that burns cannot be conducted during the Prohibited Burning Period and on days of Very High and Severe fire danger.

* Smoke management guidelines, which have been agreed to by CALM, EPA and Bureau of Meteorology, must be complied with. Burns cannot be lit which will deposit ash on water supply dams. Threatened fauna and flora must be considered and the burn modified if there is a risk of permanent damage. Fire is minimised around granite outcrops, peat swamps and other sites likely to contain fire sensitive species. Burning is limited to only one side of a main public road to minimise the aesthetic impacts to view sheds.

* As a result of the prescribed burning program Western Australia has had a good record in forest fire control since 1961. There have been no major property losses, few large fires, few injuries or deaths and many significant "saves" even under extreme conditions. More than 90 percent of the fires that CALM staff attend in the forest are kept to less than 10 hectares. There have been many cases (eg: Manjimup, 1978; Walpole, 1987; Augusta, 1992) where planned burning is the reason major wildfires did not burn out towns and large areas of forest.

* CALM has a legal and moral responsibility to ensure that uncontrolled wildfires on the land it manages do not threaten life and property. But the Department also has the responsibility of ensuring that the ecosystems on this land are sustained and that public use for a variety of purposes is optimised. Planned burning is just one of the management strategies that are achieving this vital, delicate balance.

BRIEFING NOTES

THE ECOLOGICAL IMPACTS OF PRESCRIBED BURNING

* Fire is a natural environmental factor in the southwest of Western Australia and has helped to mould the unique and species rich ecosystems over thousands of years. Fire is important for maintaining natural processes and bio-diversity.

* The ecological effects of fire and the response of the ecosystem depends on the intensity of the fire, the periodicity of the fire, the season in which burns, and the size and patchiness of the fire. It is also necessary to consider the culmulative impacts of more than one fire and the varying effects of different fires and changes in local climate during the periods between fires.

* There is a long history of fire ecology research in Australia, in particular in Western Australia. This work has focused on the impacts of fire on the vascular plants and invertebrate and vertebrate fauna. Relatively less work has been done on soil micro-organisms and fungi. A comprehensive review of the effects of fire on southwest forest and woodlands ecosystems has been carried out by Drs Christensen and Abbott (1989). They concluded that there is irrefutable evidenced that fires occurred periodically in the southwest forests over many thousands of years, and that prior to European settlement the combination of lightning-caused fires and burning by Aboriginals resulted in a mosaic pattern of fire ages and intensities through the forest. These findings have recently been confirmed through studies on fire scars that exist on the exposed trunks of grass trees (Xanthorrhoea spp.) that have been sampled throughout the jarrah and wandoo forest and coastal woodlands.

* Christensen and Abbott's review of forest fire ecology studies published in over 100 scientific papers found no evidence of any decline in plant species richness after several cycles of spring and autumn burning, and they concluded that the southwest forest had a high capacity to cope with the changes associated with periodic fire, and to return to the pre-fire condition.

* Public concerns are often expressed about the extent and frequency of CALM's planned burns. A number of studies on the post-fire regeneration strategies of understorey vegetation in jarrah and karri forests show that the periods between burns applied by CALM are sufficient for all plant species to flower and seed. CALM is developing an extensive database on the fire response of southwest flora including DRF.

* The interval between successive fuel-reduction burns is influenced by the rate of fuel accumulation. In the southwest forests it takes between 5 and 8 years for fuel weights to exceed critical levels beyond which fires become too intense to control on most summer days.

* CALM's fuel reduction burning program is determined on the basis of a wildfire threat analysis which takes into consideration the location and type of values threatened; the probability of ignition of fire by natural and human factors; the fuel accumulation rate and the expected fire behaviour; and the capacity of available fire fighting resources in controlling the fire(s).

* In this process strategic buffer areas are identified for fuel reduction by planned fire. These buffers are considered for burning when ground fuel loads begin to exceed critical levels above which fire suppression is unlikely to be successful.

* This strategic approach to fuel-reduction burning means that less than 10 percent of southwest forest areas are burned each year, and less than 1 percent of conservation reserves outside of the southwest of WA. Approximately 25 percent of the forest is kept free from fire for periods in excess of 15 years.

* Burn rotations within fuel-reduced buffers range from 5 to 10 years. Approximately 70 percent of burns in the southwest are conducted in the spring and early summer months, whilst 25 percent are done in the autumn months.

* Studies on the effects of different fire regimes on the structure and floristics of southwest forests have confirmed that the forest flora have evolved fire adaptive traits which enable these ecosystems to regenerate and persist under a wide range of fire regimes including the fuel reduction burning regime. Flora species richness is greatest in the first four years or so after fire, then steadily declines. However the species maintain presence onsite by seed banks.

* Time to first flowering after fire varies with rainfall. In high and intermediate rainfall forests, all understorey species on upland sites flower within 3 years of fire. In low rainfall forests, all plants flower within 4 years of fire. The time to optimal viable seed production is estimated to be about twice the age to first flowering.

* The season of fire does not significantly affect the floristic composition of seedling regeneration. There is very little germination in the absence of fire.

* Studies by a number of researchers show that there is a short-term reduction in bird populations after low intensity burns in both spring and autumn months. The level of disturbance to bird populations is proportional to the level of vegetation scorched or damaged by fire, and the rate of vegetation recovery. Low intensity spring burns only affect birds utilising the ground and low shrubs, whereas autumn burns which scorched much of the forest profile, affected most bird species.

* There is some mortality of nestlings following spring fires of near-ground level habitat. However, 70 percent of breeding is completed by the time spring fires are set. Also parent birds are highly mobile, and many species are able to breed several times during the lengthy breeding season in the southwest forest. Within 1 to 2 years of the burn the bird populations that occupy the lower vegetation strata have returned to pre-fire abundance levels.

* Mammals are affected according to the impact of the fire on their food and shelter. Impact is greatest when fires are large, intense and very frequent. The mosaic of burn-unburnt patches that result from low intensity prescribed burns allow small mammal species to escape the slow spreading fires and rapidly recolonise burnt areas. Larger mammals such as Brush Tail Possum, Woylies and Chuditch are affected more by the presence or absence of feral predators than fire.

* Public concerns are also expressed about the impact of the season of the burn on the welfare of native plants and animals. Extensive research studies indicate that there are both positive and negative ecological aspects of spring and autumn burning (see Attachment Table 3). For example autumn fires are hotter than spring fires and can cause greater initial disturbance to habitat and to birds and animals. Spring burns usually result in a patchy burn with pockets of unburnt vegetation especially along streams. Spring burns may disrupt flowering at the peak flowering period and may cause a short term disruption to birds nesting and foraging in low shrubs. However the effects of spring and autumn fires are relatively short lived as the vegetation recovers fully in the first 4 years after fire.

* There is no evidence that low intensity prescribed burns have any long-term impact on the abundance and species composition of invertebrates inhabiting the jarrah forests. Responses to fire depend on their life history characteristics, particularly their requirements for food and shelter. The effects of year-to-year variability in climate generally outweigh any changes attributable to fire in the longer term.

* CALM scientists are continually monitoring and studying the effects of fire in burnt and long-unburnt forests. They have found no evidence of any wildlife threatened with extinction as a result of the forest fire management methods currently being applied.

* It seems that a variable fire regime, incorporating fires in different seasons and at varying time intervals, is most appropriate for optimising plant and habitat diversity and structure. Continuing research and field experience will help to refine the methods used.

* It is an axiom of land management that the first step to managing land is to protect it. Frequent wildfires can damage human and conservation values in the natural environment. The challenge is to control wildfires while maintaining the ecological integrity of our unique bushland

BRIEFING NOTES

SMOKE MANAGEMENT AND AIR QUALITY

* In the southwest of WA, bushfire smoke comes from two different sorts of fire - wildfire and planned burns.

* Wildfires are caused by lightning, arson or accident, usually on hot, windy days in summer and autumn. Large, intense wildfires generate a huge amount of smoke because of the large volumes of forest fuels consumed.

* Planned burns may be lit for a variety of reasons, including hazard reduction, wildfire habitat management and forest regeneration. By far the most common reason is to reduce the quantity of dead leaves and twigs on the forest floor, and therefore starve a future wildfire of much of its fuel.

* Low intensity planned burns usually generate less smoke than summer wildfires. The problem, however, is that the safest condition under which to light planned fires is with the southerly winds which can bring smoke straight from the forest into the city.

* Unfortunately, the conditions that are normally suitable for a safe fuel-reduction burn in the forest are most often the same that lead to poor smoke dispersal and high smoke accumulation. There are relatively few days each year when conditions suit both the planned burning objectives and the air quality objectives.

* The Department of CALM has worked closely with the Department of Environmental Protection and the Bureau of Meteorology to develop an agreed set of smoke management guidelines that will help to limit the incidence of undesirable smoke haze levels in Perth to less than 3 or 4 days a year.

* These smoke management guidelines are based on a number of strategies including:

  - identifying suitable meteorological conditions for rapid dispersal of smoke;
  - limiting the total area to be burned throughout the southwest forests on any one day on the basis of the forecasted meteorological conditions;
  - dispersing burn jobs so that there is a maximum separation of large burning areas;
  - modifying burn prescriptions to reduce the incidence of re-ignition and smouldering;
  - maximising the use of upper winds from the north and west to blow smoke away from Perth and coastal centres.

* The Bureau of Meteorology is currently developing more accurate forecasting systems that will be able to predict the path of smoke plumes and thereby assist fire managers in identifying suitable burn locations that will have minimal impacts on population centres. It is anticipated that these predictive models will be applied in the 1996/97 burning season.

* Occasional brief exposures to low concentrations of bushfire smoke is more a temporary inconvenience than a health problem. Public perception appears to be that the medical evidence linking bushfire smoke haze with various health problems is more conclusive than it actually is:

  Studies in New South Wales, Victoria, USA, and Canada indicate only a remote risk of aggravation of asthma, respiratory illness or the development of cancer, from occasional exposures to bushfire smoke.

  The 1994 NSW bushfires resulted in an extended 10 day period when Sydney residents were exposed to high levels of smoke

  At the June 1996 Health and Urban Air Quality Conference in Sydney Researches from NSW Health and the Environmental Protection Authority confirmed that the contribution of bushfire smoke to urban air pollution is only transient and at very low levels compared to cars, heavy diesel vehicles and industry.

  Medical Researchers who monitored hospital admissions for asthma and heart attacks during the 1994 NSW bushfires found there to be no increase in the incidence of these diseases even in the worst hit areas in Sydney. Similarly an analysis of Sydney's coronial and medical records showed that rates of daily deaths during and after the bushfires did not change.

  Experts at the Conference agreed that air pollution in general is at best only a minor factor in the incidence of asthma and heart attacks, with allergens, lifestyle, infection, season, age and heredity being the main causes. The contributions to these diseases from bushfire smoke is considered by the health experts to be negligible.

* Nevertheless, this public perception in itself is sufficient to justify efforts to minimise potential impacts, and CALM takes seriously its responsibility to deliver fire protection services with a minimum inconvenience to the public.

* The complete cessation of prescribed burning on the grounds of its perceived impacts on public health will inevitably create another social problem: the cost and tragic impact of destructive wildfires on communities and forest ecosystems in the southwest.

* It is not considered acceptable to put rural communities and our natural assets at risk to wildfire damage and destruction in an attempt to eliminate occasional bushfire smoke from the city.

BRIEFING NOTES

FIRE MANAGEMENT OF THE RED TINGLE-KARRI FOREST NEAR WALPOLE

- The red tingle forest occurs within 5000 hectares of the Walpole-Nornalup National Park near Walpole. The ecosystem has evolved and adapted to periodic drying and regular fires over many thousands of years.

- Mature red tingle recovers from moderately high intensity fires by growing a second crown to replace the burnt crown. The species is readily killed or severely damaged by high intensity fires as shown by the many dead and stag-headed trees that remain as a result of the intense wildfires in the national park in 1937, 1951 and 1987.

- Fire ecology studies in the national park have shown that all understorey plant species in red tingle-karri stands reach flowering age within three years of fire. Adequate build-up of seed occurs within six years after the original plants are burnt.

- Gondwanan relictual invertebrate species in the forest have persisted over many millions of years and appear to be able to cope with regular fire.

- The biological requirements of the red tingle forest in relation to fire were taken into account in the development of the Fire Management Plan for the Walpole-Nornalup National Park. CALM's fire scientists, including Grant Wardell-Johnston, were closely involved in preparing the Plan. Wardell-Johnston was recently quoted as saying the plan is "the best compromise of a whole lot of factors, and we can't do better than that."

- The Fire Management Plan in the WNNP Management Plan took more than four years to develop and involved an exhaustive public consultation process. The plan was approved by the Government in 1992 and is due to be reviewed in 2002.

- The Fire Plan aims to maintain a wide range of fuel ages for each major vegetation type so that there is a diversity in vegetation structure and habitat types. It is totally undesirable for extensive fires to burn out most or all of each major vegetation association.

- The Fire Plan attempts to provide protection for the park and surrounding private properties and communities, while allowing for extensive areas of the tingle forest and other vegetation associations to be kept free of fire.

- Only 11 percent of the red tingle forest within WNNP has been burnt in the past six years. More than 35 percent has not been burnt for 30 to 45 years.

- About 89 percent of the red tingle forest is carrying heavy fuel loads and therefore is vulnerable to uncontrollable and potentially damaging fires.

- Fuel loads in the tingle-karri forests continue to accumulate over 20 to 30 years before they begin to level off. There is no evidence that fuel load decreases with time, even in stands unburnt for 45 years where fuel levels generally exceed 60 tonnes per hectare.

2

- The amount of fuel on the ground is a major factor influencing fire behaviour and the capacity to suppress fire. For example, the town of Walpole and the rest of the national park were saved from the 1987 wildfire only when it ran into three-year-old fuels within a fuel reduced buffer immediately east of townsite.

- Under summer wildfire conditions, flames heights normally exceed 50 metres and spread rates can exceed 8000 metres/hour. Such a fire burning in fuel loadings of 40 tonnes a hectare would release energy at the rate of 160,000 kilowatts per metre of fireline per hour, enough energy to power four cities the size of Bunbury. Such fires are impossible to combat unless they run into areas with reduced fuel loadings.

- The three prescribed burns proposed this year were in line with the Management Plan. Two of the three burns were completed in March 1996 - Mt Clare (90 ha of red tingle) and in Giants Block (220 ha tingle). These two burns represent only 1.5 percent of the park, but provide protection against wildfires to at least 20 percent of the park.

- Both burns were carried out under strictly prescribed conditions which included relatively moist litter fuels, mild weather and calm winds. Great care was taken to minimise damage to individual trees on the burn perimeter. Flame heights in tingle forest fuels averaged between 0.5 m and 2.0 m, and spread rates were between 15 to 40 metres/hour.

- In the two recent prescribed burns, a few hollow-butted trees burnt down. A survey of the Mt Clare burn revealed that 8 tingle trees were burnt down, or 1 tree in 1,000. This is an inevitable consequence of even a low intensity burn given the heavy fuel accumulation at the base of the trees. The number affected, however, is few compared with the devastation caused by past wildfires.

- The Douglas Hill area of the national park has yet to be prescribed burnt as planned. It contains 600 ha of tingle-karri forest, much of which has been unburnt since 1937. Fuel loads are between 60 and 120 tonnes/ha.

- The burn was given special mention in the Management Plan which states (p. 34) "..... wildfires in other areas of tingle forest that are long unburnt (around Douglas Hill) pose a threat to Nornalup townsite and to adjacent tingle forest, and will be progressively burnt during the life of this plan."

- The Douglas Hill burn also provides protection from fire for an adjacent no-planned burn area of 720 hectares, and another 2,000 ha of nearby tingle-karri forests

- In line with the Management Plan, CALM will establish further fire ecology monitoring plots within and next to the recent red tingle burns to increase the current scientific data on the effects of fire on the red tingle ecosystem.

Table 3: Spring vs Autumn Burning

Autumn: The beginning of the rainy season which establishes rapidly and is usually characterised by conditions experienced in March-May. Wetting of a dry soil, vegetation and fuel profile.

Spring: The end of the rainy season which tapers off into a dry summer period and is usually characterised by conditions experienced in September-November. Drying of a wet soil, vegetation and fuel profile.

Spring Burning	*Autumn Burning*
Operational considerations	
• More days available to safely execute fuel reduction burns, therefore: ➢ better able to achieve protection program.	• Fewer days available.
• Fire weather and behaviour more predictable and stable, therefore: ➢ facilitates good planning and efficient resource allocation; ➢ low risk of escapes; ➢ lower intensities therefore easier, cheaper control; ➢ low ignition rate of logs etc. so reduced pre-suppression and mop-up costs.	• Fire weather and behaviour less predictable and more unstable, therefore: ➢ burning opportunistic, poorer allocation of resources; ➢ high risk of escapes; ➢ higher fire intensities so increased costs; ➢ higher ignition rate of logs and trees, so increased pre-suppression and mop-up costs.
• Low impact on commercial and aesthetic values.	• High impact on commercial and aesthetic values.
• Higher risk of re-ignition over following summer.	• No risk of re-ignition over following summer.
Environmental Considerations	
• Less physical damage to vegetation/habitat.	• More physical damage (higher levels of scorch and defoliation).
• Incomplete removal of litter and vegetation.	• Complete removal of fuel, especially leaf litter, scrub, logs and some trees.
• Burns patchy, with pockets of unburnt vegetation especially along streams therefore greater habitat diversity, refuge areas.	• Burns complete, entire area including streams burnt therefore reduced habitual diversity, no refuge sites.
• High retention of hollow logs, dead and old trees therefore available habitat.	• High consumption of logs, dead trees and old trees often burnt down.
• Lower losses of volatile nutrients (function of fuel consumption).	• Higher losses of volatile nutrients especially from green foliage burnt.
• Disruption to flowering at peak flowering period.	• Flowering not disrupted during peak flowering period.
• Gradual depletion of soil stored seed (but not eliminated).	• Superior germination of soil stored seed.
• Lower germination and seedling survival rate.	• High seedling germination and survival rate.
• Decreased abundance of hard seeders (acacias, legumes, obligate seed species), but these are not eliminated.	• Increased abundance of hard seeders and obligate seed species.
• No effect on resprouting vegetation. These are often favoured.	• Resprouting vegetation can be reduced in density, but not eliminated.
• Low Impact on fauna (mammals, birds).	• High adverse short-term impact on fauna.
• Short-term disruption to birds nesting and foraging in low shrubs.	• Short-term disruption to birds using shrubs and trees for food shelter.
• Lower emission of smoke and of greenhouse gasses especially CO_2.	• High emission of smoke and greenhouse gasses due to higher levels of fuel consumption.