FIRE MANAGEMENT AND PRESCRIBED BURNING ON CALM LANDS

A paper prepared for the NPNCA

July 1988

by

R J Underwood

Department of Conservation and Land Management, W.A.

FIRE MANAGEMENT AND PRESCRIBED BURNING
ON CALM LANDS

A paper prepared for the NPNCA

July 1988

by

R J Underwood

IMPLEMENTATION OF POLICY: FIRE MANAGEMENT AND PRESCRIBED BURNING ON CALM LANDS

A paper for the NPNCA

Contents

IMPLEMENTATION OF POLICY: FIRE MANAGEMENT AND PRESCRIBED BURNING ON CALM LANDS

R J Underwood

1. INTRODUCTION

CALM's Fire Policy sets out "the rules" for the use of fire on CALM lands. Under the heading "Use of Fire" the policy states:

"The Department will:

(i) Use planned fire only where this use is in accordance with an approved management plan, or, where such a plan does not exist, to protect and maintain the designated priority land use.

(ii) Prepare written prescriptions in advance, for approval by senior designated officers, before any planned fires are undertaken.

(iii) Use fire conservatively in areas where information about the impacts of fire is limited, and in areas where the primary land use is conservation of flora and fauna.

In such areas, the use of fire will be restricted to:

- protection of neighbouring community assets; and
- providing a diversity of fuel and vegetation ages, but ensuring as much as possible of each major vegetation association is maintained in the mature condition.

(iv) Use prescribed fire or other methods to reduce fuels on CALM lands, where it can be demonstrated that this is the most effective means of wildfire control, and where undesirable ecological effects do not result.

The frequency of fuel reduction measures will be governed by the rate of build-up of fuels, the value of the assets to be protected, and the resources available to carry out the work."

The policy has wide acceptance. However, its implementation does not. In particular there is controversy about the regular prescribed burning of forests, or of parts of other ecosystems in the CALM estate.

As those charged with implementing the policy, CALM's Operations staff have two particular responsibilities: we need to resolve

(i) Firstly, how to judge whether "undesirable ecological effects" do or do not result from the use of fire for fuel reduction; and

(ii) Secondly, how to decide <u>where</u> to use fire, how <u>often</u> to use it and <u>what sort of</u> fires to use?

I have tried to answer the first question (for forest areas) in a previous paper to the NPNCA. This summarised current research findings on fire effects. The conclusion reached in that study was that while all answers are not yet known, the position is encouraging - so long as fire frequency is not too great, it appears that forest ecosystems can cope with a variety of fire regimes. Very little detailed research on fire effects has been done outside the forest zone.

In this paper I have tried to address the second issue: the decision making process which leads to a certain course of fire management action being taken. In doing so I have also tried to clarify the factors which are considered and the options available in determining whether and how fire is used. Most importantly I have provided a simple description of the fire regimes which CALM applies, and indicated how these are implemented on the ground. My aim is to focus the controversy onto the elements of the issue which can be manipulated.

Fire management is a dynamic process: research findings, new technology and new ideas are constantly emerging and being adopted. There can be no one static approach to policy implementation. I have therefore concluded this paper with a look at current operational procedures and at some likely future directions of management.

2. THE FIRE MANAGEMENT DECISION

Fire management on CALM lands is basically an attempt to resolve and deal with the interactions of five sets of probabilities. These are:

(i) <u>The probability that a fire will start</u> - ie, the risk of ignition.

For most of WA this probability is taken as 100%. Only in some permanent wetlands or Kimberley rainforest communities can we say with any confidence that a fire will never start. Elsewhere man or lightning will inevitably start a fire sooner or later. The risk of frequent ignition is in turn related to factors like proximity to settlements, lightning belts or other fire sources.

(ii) <u>The probability that a fire will spread after ignition</u>.

In the absence of suppression action, the spread of fires is determined by weather and fuel. In some discontinuous or unstructured fuel types (spinifex, heathland) fires are largely wind-driven. They develop as headfires and tend to self-extinguish on flanks or overnight when winds drop and fuel moisture rises.

In more complex fuels (eg, forests and woodlands) fires tend to burn on four sides, ie downwind, upwind and across wind on both flanks. Complex fuels dry out progressively over the dry season and fires rarely self-extinguish, even following rain. There are many examples in south-west forests of fires persisting through heavy rain or even over winter.

(iii) <u>The probability that suppression forces are available and can be effective</u>.

An effective fire suppression organisation comprises rapid and accurate detection, a command system, specialised fire fighting equipment and well-trained fire fighters located as close to the fire as possible.

Such organisations only exist in WA in the south-west of the State (in CALM terms: Kalbarri to Esperance). Even within this area CALM relies largely on volunteer brigades whose basic concern is for life and property. Only in the forest regions does CALM itself have an effective stand-alone fire suppression organisation.

(iv) <u>The probability that the fire will cause damage</u> - ie, will destroy or degrade the biota, the physical environment, scenery, towns, farms, or lives, or will burn out an entire small reserve at one time.

Prevention of damage by wildfire is the principal <u>raison d'etre</u> of CALM's fire management programme. However the concept of damage is subjective. The classic conundrum is the karri forest: karri ecosystems are well able to tolerate wildfire (all species regenerate, a new forest springs up); but scenic values can be seriously degraded for a very long time by high intensity fire. Therefore potential damage (the value to be protected) must always clearly be spelled out. If there are conflicting values, a rating system or policy decision, is essential.

(v) <u>The probability that fire will benefit the ecosystem or other values</u>. If it is accepted that fire is a natural element of the Western Australian environment, it clearly must have ecologically beneficial as well as adverse effects. Occasional fire can also enhance some human values - eg, stimulation of showy or spectacular flora, maintenance of grazing for kangaroos, or creation of easier access in, or vistas through thick bushland.

The integration of these probabilities has come to be termed a <u>Wildfire Threat Analysis</u>. Will a fire start? Will it spread? What can we do to control it? What values are threatened? This sort of analysis must be carried out for each unit of CALM land. From it derives a management decision - ie, the action CALM needs to take to deal with a specified threat in a particular place at a given time.

3. WILDFIRE THREAT ANALYSIS

Outside the forest zone, little formal threat analysis has been carried out to date. This is because in these areas lack of resources has constrained our capacity to undertake any interventionist activity other than suppression of fires in liaison with volunteer brigades.

In forest areas threat analysis has been carried out for many decades. However, the process has only recently been deliberately structured. This has been done to provide a more formal statement of the logic which leads managers to adopt one course of action or another in a given area. It is very important that this logic is well understood by staff, and explainable to the public.

The structured approach is still evolving. At this stage its use in decision making is restricted to decisions on <u>priorities</u> (where can we most effectively spend our fire protection dollars?), but with computer assistance, use will expand at almost every level, and across all CALM regions.

The Threat Analysis has two components: (i) What are the risks?, and (ii) What are the values at stake? Under each heading, a range of factors must be considered. The factors are:

3.1 <u>RISKS</u>

(i) <u>Risk of Ignition</u>

<u>High</u>

- Regular path of summer storms and lightning strikes recorded.

- Active land clearing within 3 km of site.
- Fire used/planned on adjoining land (eg, regeneration burns, stubble burns).
- High visitor use on site involving use of fire (eg, barbeques, marron fires).
- History of past ignitions from other sources (eg, deliberate lightings).

<u>Moderate</u>

- History indicates little/no past ignition.
- Moderate visitor use, reasonable access for visitors.

<u>Low</u>

- No history of fires.
- Little/no human activity at or near site, poor access for visitors.
- Summer storms rare. No recorded lightning strikes during the period when fires could start.

(ii) <u>Detection Capability</u>

Poor - no spotter or tower coverage, sparsely populated.

Fair - infrequent spotter coverage, few towers, moderately populated.

Good - regular spotter coverage, good tower coverage.

(iii) <u>Suppression (attack) Capacity</u> (Crew time to the site)

- No fire crews available
- Crews available within 2-3 hours travel time.
- 1-2 hours)adjust according
- 0.5 to 1 hour)to size of
- <0.5 hours)available crews

(iv) <u>Access around Fire</u>

- Area poorly roaded. Off-road access difficult (heavily timbered, dense scrub, creeks and gullies, dunes or swamps).
- Access moderate - open forest, moderate scrub density, even slopes.
- Area well roaded. Off-road access easy, open country, flat, heath or grasslands.

Adjust according to effects of topography on fire behaviour.

(v) Fuels

- Very heavy fuels >2 x standard fuels.
- Heavy fuels 1.5-2.0 x standard fuels.
- Moderate fuels 1.0-1.5 x standard fuels.
- Light fuels 0.5-1.0 x standard fuels.
- Very light fuels <0.5 x standard fuels.

The word "standard" in this context applies to the area or botanical association being considered. Different standards apply in different areas.

(vi) Dieback Risk from Mechanical Fire Fighting

- High
- Moderate
- None

(vii) Wind

- Grass or heathlands (wind ratio 1:1)
- Open woodland (wind ratio 3:1)
- Moderate forest (wind ratio 4:1)
- Medium dense (wind ratio 5:1)
- Dense forest (K1 & 2, regrowth, wind ratio 7:1)

3.2 VALUES

(i) Conservation Values

- Flora and fauna
  - HIGH — If gazetted rare species are present.
  - MEDIUM — If geographically restricted species are present.
  - LOW — If neither are present.
- Maturity of vegetation assemblage
  - HIGH — If the block is the longest unburnt in its vegetation type in the reserve.
  - MEDIUM — If it is the second longest unburnt in its vegetation type in the reserve.
  - LOW — Otherwise.
- Presence of fire vulnerable flora
  - HIGH — If there are species vulnerable to fires over 10 years apart.
  - MEDIUM — If there are species vulnerable to fires from 5-10 years apart.
  - LOW — Otherwise.

- Extra value as habitat if left unburnt
  - HIGH — If there are known to be species of fauna requiring mature vegetation for habitat.
  - MEDIUM — If it is likely that there are species of fauna requiring mature vegetation for habitat.
  - LOW — Otherwise.

(ii) Social/Economic Values

- Life and Property
  - Within 3 km NW to NE of areas where assets/lives concentrated and at potential risk in the event of fire.
    Eg,
    Townships and settlements.
    Fixed camps used in summer.
    Areas where very large numbers of people congregate in summer and cannot be readily evacuated/find refuge in the event of fire.
  - Within 3 km (other directions) of above.
  - Within 3-6 km of first point above.
  - Within 3 km of areas where lesser numbers of people congregate (eg, major recreation sites).
  - Within 1 km of developed private property.
- Honey, wildflowers, timber, water resources
  - Within 3 km generally NW to north east of high value production forest susceptible to damage by wildfire. This may include private plantations, regeneration areas and other nominated Red Action areas.
  - Within 3 km of lesser value fire sensitive forest (eg, smaller patches of regeneration, minor pine areas, important wildflower or honey areas) or is a catchment protection or water production area that would be damaged by wildfire.
  - Within 3 km of high value or high quality mature hardwood forest.
  - Within 3 km of multiple use forest other than first two points above.

(iii) Cultural Values

- The area contains or adjoins areas with important anthropological or historical values which could be degraded by fire.

It is possible to place numerical values on these attributes and therefore to score and map various combinations of hazard and value. A weighting system has already been developed and tested which permits decisions on priorities for action in State forest, and this is being refined for national parks and nature reserves in south-west regions. Progress is slow, because the interactions are so complex. It must also be made clear that weighting assigned to particular factors is subjective and open to debate. The perspective of the fire fighter is different from that of the academic; tourism promotors see the effects of fire differently from plant ecologists; and reserve neighbours have different apprehensions on a hot windy day in mid-summer, to those of people living in the Perth suburbs.

Nevertheless, the structured approach has several advantages:

- It ensures all important factors from both sides of the equation (<u>risk</u> and <u>value</u>) are considered.
- It highlights areas of greatest importance, or where most care is needed or resources should be focused.
- It provides a framework on which further management decisions can be hung.

Once a Wildfire Threat Analysis has been completed, a fire management decision can be taken. This amounts to a selection of a particular strategy for a given area.

4. FIRE MANAGEMENT OPTIONS

Basically CALM can make one of two responses to an identified wildfire threat. We can do nothing, or we can try to ameliorate it.

The No Action response is frequently taken. Where we have no staff, or where there are no neighbours, or where there is no access, such a decision may be forced upon us. Elsewhere a No Action response may be a deliberate decision. But generally across the State, and especially in the south-west region, the usual response is to take action to prevent wildfire damage, and to attack fires when they occur.

The Take Action response has a variety of components: education; law enforcement; liaison; development of access and detection systems; fire break construction and maintenance; recruiting, training and equipping fire fighters; all of these approaches are taken in all CALM districts. In addition, in many places <u>fuel reduction</u> to reduce fire intensities and rates of spread and therefore facilitate the suppression of fires which do start is undertaken.

Fuel reduction can be accomplished by grazing, or physical collection and removal, but on a broad-acre basis in WA it is usually accomplished by prescribed burning. The technique is used most widely in forests, but also in perimeter buffers or strategic strips in many other ecosystems; extending into the Pilbara, Kimberley, South Coast and Goldfields.

There is no blanket prescription for fuel reduction burning. For each unit of land, managers try to select and apply the most appropriate fire regime for a particular ecosystem in its social context.

Fire is also used on CALM lands for reasons other than fuel reduction eg, regeneration, habitat manipulation, research.

But wherever a decision about either the deliberate use, or the deliberate non-use of fire is made, processes of logic are involved, and can be clarified.

5. EXPLANATION OF THE FIRE REGIME

Before looking at the detail of regimes applied in WA, it is necessary to define the term.

A fire regime combines three elements: season, frequency and intensity. In other words, the manager may choose how often fire should re-occur on the same area, how hot and at what time of the year it should be lit.

Fire <u>frequency</u> is normally expressed in years or as a function of fuel accumulation rates.

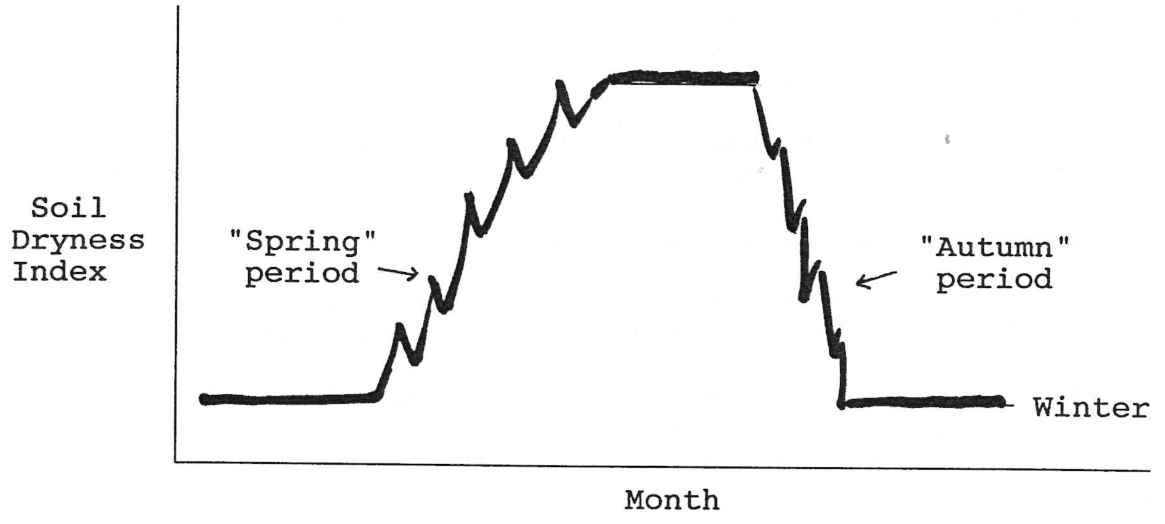
<u>Intensity</u> is expressed as Rate of Spread in metres/hour, or energy output in kw/m.

<u>Season</u> is less easily defined and is often used very loosely - eg, "spring burns", "summer burns", and "autumn burns". It has become an unfortunate habit to use the term "spring" burning for everything which occurs before Christmas. However, spring and summer move south with the sun, arriving in the karri forest a month to six weeks after the northern jarrah forest; summer and autumn similarly retreat earlier.

Furthermore, the actual climate varies from year to year so that so-called "spring conditions" (fuels generally drying, most plants blooming) occur later or earlier than usual or "autumn conditions" (fuels wetting, some plants flowering) may take several days or several weeks.

Although various drought indices have been developed and tried over the years, currently the best physical parameter by which season can be expressed is Soil Dryness Index - a figure constantly calculated and recalculated in CALM districts throughout the year. This index expresses the cumulative drought in the system and (with photo period) is a basic determinant of many natural processes.

This figure shows the normal trend in southern Western Australia:



The actual values on the x and y axes vary each year and for every different locality.

6. **FIRE REGIMES APPLIED BY CALM IN WA**

Basically three different fire regimes are applied by CALM to the land it manages: a No Fire Regime, a Vegetation Management Regime and a Fuel Reduction Regime.

(i) <u>The No Fire Regime</u>

<u>This comprises</u>:

- No prescribed burning for any purpose.
- Wildfires are attacked and their size minimised as far as possible.

<u>It is applied to</u>:

- Research or monitoring reference areas.
- Special management areas where species sensitive to any fire exist (eg, most of Two Peoples Bay Nature Reserve).

- Areas where we feel we have insufficient information yet to do otherwise.
- Areas required to be held unburnt so as to provide a diversity of fuel ages within a particular reserve.

The No Fire regime is currently applied to the bulk of all nature reserves and conservation areas in the State.

(ii) <u>The Vegetation Management Regime</u>

<u>This comprises</u>:

- A single fire, usually in summer or autumn whose purpose is to regenerate a given ecosystem.
- A prolonged fire-free period during which the regenerated area matures.
- A decision time (eg, 20 years after the burn) when the area may revert to Regime (i) or (iii).
- Special burns designed to favour or maintain a given vegetation type, seral stage or plant species, in accordance with a management plan.

<u>It applies to</u>:

- Areas disturbed by, for example, timber production, wind or pests or disease, and requiring regeneration.
- Areas managed for a particular suite of species which require habitat produced by fire.
- Some research areas.
- Areas in which a particular vegetation type, or plant species requires special fire treatment.

Most of the karri forest in State forest and Perup Nature Reserve is managed according to this regime.

(iii) <u>The Fuel Reduction Regime</u>

<u>This comprises</u>

- Cyclic burning to maintain litter and scrub fuels below a specified level.

- Burning under mild, rather than intense conditions, to facilitate control of the fire and to reduce costs.

<u>It applies to</u>

- Areas of strategic importance for local or regional fire control - ie, broad areas, strips, buffers etc.
- Areas where internal or adjacent values must be given maximum protection from high intensity fires.

This regime applies to much of the jarrah forest and to strategic buffers through or around most reserves in the south-west.

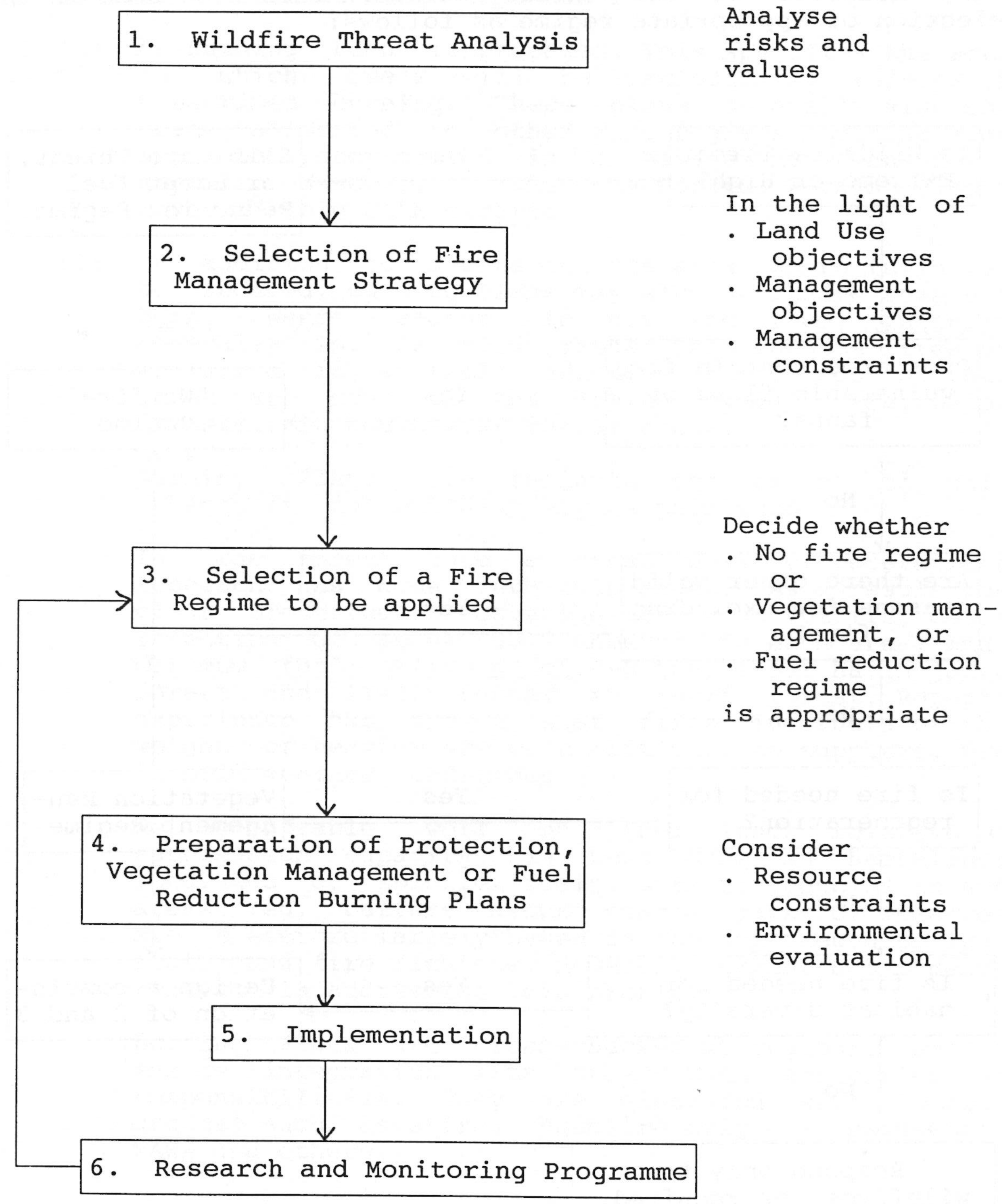
Although each of these regimes is different, their effects overlap. For example any burning for vegetation management has a spin-off in fuel reduction. So have wildfires. Parts of areas designated for fuel reduction burning may rarely or never burn (eg, some creeklines, wetlands in the karri forest).

Furthermore, the whole system must constantly be re-evaluated. "No Fire" areas may be burnt by wildfires; human values may change or disappear, or new values appear.

The whole analytical process must therefore be reviewed and updated on a regular basis.

7. SUMMARY OF DECISION MODEL AND SUBSEQUENT PLANNING

The following flow diagram illustrates the decision process for a specific area of CALM land:

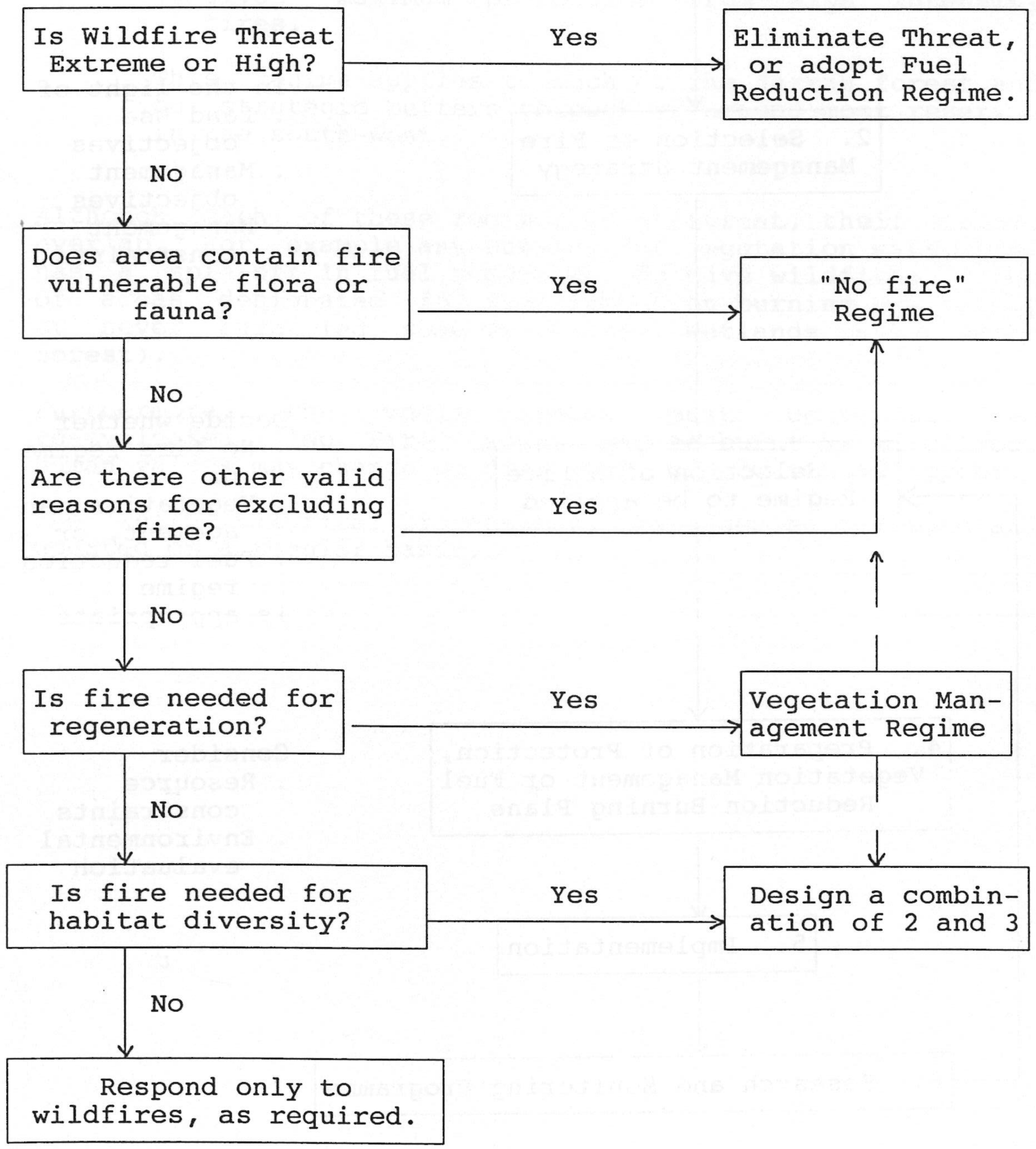


On the next page a sub-routine is presented indicating how Step 3 (selection of regime) is done.

Sub Routine:

SELECTION OF FIRE REGIME TO BE APPLIED

The Wildfire Threat Analysis will indicate whether an Extreme, High, Moderate or Low threat exists. This is used in the selection of appropriate regime as follows:



Note that this is a sub-routine. Research into and monitoring of every decision is therefore implied.

8. IMPLEMENTATION: THE MECHANICS OF PRESCRIBED BURNING FOR FUEL REDUCTION IN CALM

If having done a Wildfire Threat Analysis and worked through the fire management decision model, the outcome is that vegetation management or fuel reduction burning is required, the following steps occur:

(1) A Burning Plan is prepared. This specifies the areas in which fuels will be periodically reduced by prescribed burning. These plans generally also show areas allocated to other fire regimes. Burning Plans may be incorporated in a Management Plan for a specific reserve, or the Fire Control Working Plan to cover a whole CALM district.

(2) In addition to nominating the areas where fuels will be reduced, Burning Plans may also designate <u>season of burn</u>. Where season is not specified, <u>intensity</u> generally is. As mild rather than intense fires are preferred in a fuel reduction burn, most of these burns are done on the drying cycle - ie, before Christmas in south-west forest areas.

Burning Plans also indicate the extent to which subsequent fuel build-up may be permitted.

In the forest zone a great deal of operational research has gone into this aspect. As a result most plans prescribe a <u>coverage</u> of about 70% (ie, ensure retention of about 30% unburnt in each area) and a maximum fuel build-up of 6-8 tonnes per ha in jarrah forest and 17-19 tonnes in karri forest. Repeated experience has proven that fires in fuels of this weight or heavier are very difficult to suppress, even in mild weather conditions.

No comparable work on fuel loads relative to suppression capacity has been done in heathlands, woodlands or spinifex fuels. Burn frequencies in such areas (eg, buffers around coastal parks or reserves) are therefore largely based on the experience of local staff and fire fighters. However, current Departmental research is addressing this problem.

Burning Plans are cross-checked at regional level to ensure integration with other CALM activities and responsibilities. They are discussed with interest groups such as shires, bushfire brigades, beekeepers, WAWA and others.

(3) Burning Plans usually look ten years ahead but are updated every 2-3 years. This is to take account of unforeseen factors such as wildfires or changes in land use for given areas. Each year an annual works programme is derived from the ten year plan. Individual "jobs" are designated.

Each job is surveyed in detail preparatory to burning - eg:

- Fuels are measured by stratified random field assessment (Appendix I).
- An environmental and safety checklist is worked through (Appendix II).
- A detailed prescription is prepared (Appendix III).
- Budgets are drawn up.
- A whole series of notifications are made.

The proposed programme for each district is checked and must be approved by specialist staff. The programme specifies the areas in which fuels will be reduced in the next fire season, the intensity of the proposed fire for each major vegetation type, priorities, the number of lightings, the technique (by air or ground ignition), safety precautions and special environmental constraints.

(4) Job edges are prepared in advance. As the weather warms and the fuels dry out with approaching summer, burning commences. In the district office each morning staff compare predicted fire intensities for the day (using Fire Behaviour Tables, weather forecasts and progressive fuel moisture readings from the field) with prescribed conditions for the various jobs on their programme.

If conditions and prescription match, and if resources are available, the burn is done.

Most fuel reduction burns are completed in a single day. In the case of southern forests, several lightings, often over 3-4 months are needed. This is because jobs contain several vegetation types which dry out at different rates. Karri-tingle types for example will rarely burn before Christmas.

Jobs which are not commenced before the Prohibited Burning Period in summer are carried over and attempted in the autumn. However, it is unusual to get suitable weather conditions for fuel reduction burning in autumn in forest areas - fuels are either too dry, or winter commences too abruptly - consequently the bulk of forest burning is done before Christmas.

All completed burns are assessed to check compliance with prescription.

(5) A similar process occurs for Vegetation Management burning. In this case, the post fire management of the area is also prescribed.

9. RESEARCH AND MONITORING

Research into the components and effects of fire regimes on CALM lands has a high priority. Work has now been going on since the 1930s.

In the forest zone, there is now a very adequate understanding of fire behaviour and the mechanics of prescribed burning and fire suppression. Work is only just commencing on these questions in heathlands, grasslands and woodlands.

A great deal of research has been done on the general ecological effects of fire, across a wide range of ecosystems. The work in forest areas (where the most frequent fires tend to occur) has been recently summarised in considerable detail (Christensen and Abbott, 1987). Current work is focusing on refinements of general studies to work on elements within ecosystems (eg, flowering plants) and to studies of <u>regime</u> rather than <u>single fire</u> effects.

At the same time, the Department has adopted a very sophisticated approach to Ecosystem Monitoring and as this is progressively implemented, so information will become available for incorporation into the management decision progress. Unburnt controls are formally established in all major ecosystems in the forest zone, and will be determined for the other regions.

CALM has shown itself to be very scientifically-oriented and responsive to research-driven changes to land management. This will continue to effect the design and application of fire regimes to given areas in the future.

10. NEW DEVELOPMENTS

Prescribed burning for fuel reduction continues to be controversial - some critics want less, others more.

At this stage, no effective alternative means of ameliorating the wildfire threat in forest areas has been found. Nevertheless, CALM has constantly adopted the view that the fuel reduction programme is a means to an end, and that both policies and techniques will be modified as new information becomes available.

The most important development in recent years has been the modification of Burning Plans in conjunction with changes in land use for forest areas.

This began with the innovative new plans for the Perup, developed in the mid 1970s. The Perup approach has since been extended to a whole range of forested conservation reserves. Other aspects currently under intensive effort are:

(1) Development of a computer model to quantify and map the Wildfire Threat Analysis.

(2) The development of fire behaviour models for heathlands and hummock grasslands.

(3) Research into "vulnerable" species within areas scheduled for fuel reduction (ie, identification of plants or animals which cannot regenerate and mature under a given regime, and which therefore will decline or disappear in those areas).

(4) The use of the "Vegetation Management Regime" as an integral, scheduled part of the "Fuel Reduction Regime" to "break up" long runs of uniform fire frequency and intensity.

(5) The establishment of a formal Monitoring System which can be used to keep tabs on long term effects of any decision, be it fire exclusion or fuel reduction burning.

(6) The development of computer systems to assist with fire suppression systems.

Each of these projects is now developing within the Department and will probably become part of routine procedures before too long.

11. CONCLUSIONS

The implementation of CALM's Fire Policy requires a range of decisions by managers in districts across the State. In many areas, decisions are still necessarily intuitive, but in recent years the process has become more formal and structured, and research is constantly providing new information and ideas.

A number of new developments have flowed from recent land use changes. These are progressively being fleshed out in management plans and district fire control plans. Taken together I consider that they represent a new generation in fire management planning and practice, continuing a tradition of innovative, practical fire management which extends back over more than 50 years in this State.

Furthermore, the advent of CALM has provided a wonderful opportunity for fire management planning to be carried out on an ecosystem, rather than a land tenure or agency basis. The real spin-offs from this new advantage are still emerging.

12. ACKNOWLEDGEMENTS

These notes are based on work by many CALM staff in research, operations and Fire Branch. In particular

- Neil Burrows
- Ian Herford
- Rick Sneeuwjagt
- Chris Muller
- Kevin Vear
- George Peet

provide a driving force for constant review and updating of CALM's approach and practice.

DEPT OF CONSERVATION
AND LAND MANAGEMENT

CLM 576

FUEL ASSESSMENT SHEET

Appendix 1

LOCATION ______________________________

LINE NO. ____________ VEGETATION/FOREST TYPES ____________

AVERAGE TREE HEIGHT (metres) ______ CANOPY COVER ______ %

MAJOR SCRUB SPECIES ______________________________

YEAR OF LAST BURN __________ SEASON OF PROPOSED BURN __________

OBSERV. NO.	1	2	3	4	5	6	7	8	9	10	TOTAL	AVER.
Litter depth (mm)												
Trash height (metres)												
Trash density												
Scrub structural type												
Density of scrub												
Av. height (metres)												
% Foliage dead												

Litter weight (K,M, or J) Total ______ t/ha Available litter ______ t/ha

Trash weight Total ______ t/ha Available trash ______ t/ha

Scrub weight Total foliage ______ t/ha Available foliage (below 1.2 m) ______ t/ha

Total available ______ t/ha

REMARKS ______________________________

____

____

____
Officer Compiling Date

CONSERVATION AND LAND MANAGEMENT W A

CLM 32

PRE-BURN CHECKLIST

Appendix 2

DISTRICT/RESERVE/PARK ____________ JOB NO. ____ DATE ________

LAND TENURE AND PURPOSE ______________________________

PART 1 — ENVIRONMENTAL ISSUES

The purpose of this checklist is to assist District staff in recognizing potential environmental problems in areas subject to proposed burning. It should be completed as the first stage for all burns.

ISSUE		YES	NO	ACTION REQUIRED
SMOKE	Airport			
	City/Town			
	Settlement			
WATER CATCHMENTS	Large part of Catchment involved			
	Water Storage Boundary involved			
	Ash likely over water			
	Burn approval req. from W.A.W.A.			
TIMBER PRODUCTION	Current cutting			
	Cut awaiting burn			
	To be cut 0-5 years			
	Special treatment for Stream Reserves			
	Established Regeneration (state age)			
RECREATION	Will both sides of tourist or major road be burned			
	Are aesthetic effects likely			
	Walk trail/lookouts involved			
	Picnic/Campsites			
	Other public use (nominate)			

CONTINUED ON PAGE 4

PART 2 — PEOPLE AND PROPERTY

Items to be checked		Complete this portion during preparatory stages: Ⓐ Initial to confirm check is completed — Office	Ⓐ Field	Ⓑ Show results and/or action required on check	Ⓒ Is check reqd. just before burn Yes or No — Office	Ⓒ Field	Check before ignition: Ⓓ Initial when check completed for each lighting — Date of ignition
PROPERTY	Buildings						
	Plots						
	Bridges						
	Other						
ADVICE	Burning Notices						
	Low Flying						
	Radio Station						
	Burn Imminent						
	Warning Signs						
	Other						
CLM OPS	Research						
	I.M. & C.						
	Surveyors, Monitors						
	Other						
SERVICES	S.E.C.						
	Telecom, M.R.D. Westrail						
	Shire/C.F.C.O.						
	Water Authority						
	A.P.B.						
	Other						
OTHER USERS	Hunters/Fishermen						
	Research/Students						
	Defence Forces						
	Geologists						
	Surveyors						
	Gravel Licences						
	Recreationists						
	Other						
UTILIZATION	Sawmilling						
	Apiarists						
	Pole Operations						
	Firewood						
	Minor Forest Prod.						

INSTRUCTIONS

It is important that the planning of prescribed burns be sufficiently detailed to prevent injury to persons or damage to property. Any object or operation within the burn area must be identified before the prescription is prepared and action taken to ensure its protection. Staff compiling the prescription must clearly indicate on this form those items which require checking.

Column A - Initial only after the appropriate office and/or field check has been made.

Column B - Briefly indicate result of check or any action required, for example - Buildings: Nil, Burning Notices: See attached copies, Shire/C.F.C.O.: Plan sent to C.F.C.O., Sawmilling: Bunnings - shift by 1/10/86.

Column C - Consider carefully during preparatory stage and indicate whether or not a check is required prior to lighting the burn.

Column D - Enter date of lighting. Where a final check was indicated at 'C' initial to confirm check completed. Ensure this is done before lighting commences.

APIARISTS DETAILS

SITE NO.	OWNER	ADDRESS	PHONE

SIGNATURES

Prepared by: ____________

Date: ____________

District Manager: ____________

Date: ____________

ISSUE		YES	NO	ACTION REQUIRED
SCIENTIFIC	Scientific trials/plots			
	Other monitoring sites			
SPECIAL FEATURES	Caves environment			
	Historical structures (e.g. bridges/buildings)			
	Aboriginal Sites			
	Archeological sites			
	Other			
CONSERVATION	Known Rare Endangered Flora			
	Known Rare Endangered Fauna			
	Are there special requirements for flora/fauna habitats			
	Is a survey required			
	Soil erosion, e.g. dunes			
	Road verges and Reserves			
	Other			
DIEBACK	Is a Seven-Way Test required for (a) Access			
	(b) Burn preparation			
	Is dieback photography planned within 3 years			
	Is dieback demarcation required			

CLM 763
1985

BURN PRESCRIPTION

Appendix 3

LOCATION District ______________ Block or locality ______________

Job No ________ Area ________ ha Map ref ______________ Zone No ________

Closing date ______________ Designated land use ______________

MAP Attach plan showing: burn boundary, fuel ages for burn and adjacent areas, forest/vegetation types, fuel sample lines, buildings, power lines and other structures, logging operations, private property, boundary problems, dieback, rare plant or wildlife species, camping/recreation sites, apiary sites, washdown points.

OBJECTIVE of burn ______________

DESCRIPTION of area

Forest/Vegetation type(s) and height ______________

Scrub structural types ______________

Average slopes: Light fuel ________ ° Heavy fuel ________ °

Logging tops: (species, age, density) ______________

Other hazards: ______________

FUEL ASSESSMENT				PRESCRIPTION		
FOREST OR SCRUB TYPE	FUEL QUANTITY (from assessment sheets)			ACCEPTABLE SCORCH HEIGHT	ACTUAL R.O.S. RANGE	F.D.I. RANGE
	TOTAL RANGE	A.F.F.	AVAIL. RANGE			

EDGING PRESCRIPTION

Edging Objective ______________

EDGE (indicate N,S,E,W)	Fuel Types	F.D.I.	S.D.I. limit	Wind Speed + Direction	Spot spacing

FDI FOR EACH CORE LIGHTING		Season and year ______	
Lighting No	Fuel type	FDI range	Comments

METHOD OF BURNING

Wind direction and max. speed ______

Direction of ignition lines ______ Start time ______

Suppression forces required at each lighting ______

______

Areas requiring special attention ______

______

______

______

______

PREPARATORY TASKS

Notifications - attach PAFSOU and Environmental Checklist. Field checks are required during preparation and before lighting to ensure no persons or property are at risk.

Edge preparation (eg. scrub rolling, stags, etc) ______

______

______

Road maintenance ______

______

______

______

Warning signs (location) ______

______

______

DIEBACK

Quarantine YES/NO Permit No. ______

Hygiene Requirements - define: ______

______

______

______

______

______

______ Refer Dieback Manual Section ______

REGENERATION AND LOGGING

Special consideration for current and future cutting, e.g. regeneration, dieback demarcation, photography, advance burning, regrowth protection etc.

______

______

______

______

COMMENTS By Officer in Charge of District/Region: ______

______

______

______

______

______

______

COMMENTS by Protection Branch Officer: ______

______

______

______

SIGNATURES

Officer/Ranger prescribing ______ Date: ______

Area O.I.C. ______ Date: ______

Approved ______ Date: ______

POST BURN RECORD

FIRE BEHAVIOUR					
Date(s) of lighting	Time of lighting	Strip and spot spacing (m)	R.O.S. range m/h	Time strips joined	Comments

POST BURN INSPECTION

Attach plan of suitable scale showing

(1) Areas of full scorch greater than 1 ha

(2) Internal areas unburnt greater than 10 ha

(3) Any unburnt pockets or perimeter where escapes are possible.

Further action required: ____________________

____

____

____

____

____

Signature of inspecting officer ____________________ Date ____________________