DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Wildlife Research Centre
Woodvale
4 February 1993

To: As per list below (highlighted)

From: Gordon Friend, Management Disturbance Ecology Program Leader

Phone: (09) 405 5121
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Subject: Summaries of presentations given at Program meeting, Stirling Range N.P., 23-25 November 1992

Attached please find summaries of the talks presented at the (ex Fire) Program meeting held in the Stirling Range National Park in November last year. I hope the information is useful. Thanks again to all those who attended and helped make the meeting the great success that it was.

P.S for Regional staff: Please note that the former Fire Program is now known as the

Management Disturbance Ecology Program.

Distribution:

Roger Underwood
Ric Sneeuwjagt
R/M Goldfields
R/M Swan
R/M Southern Forest

R/M South Coast
R/M Wheatbelt
MDEP RS's Woodvale
(please circulate)

R/M Central Forest
R/M Mid West
MDEP RS's Manjimup
(please circulate)

NOTES FOR A TALK TO THE FIRE PROGRAM AND FIRE MANAGEMENT PEOPLE AT STIRLING RANGE NATIONAL PARK IN NOVEMBER 1992

1. The two most difficult issues CALM has to deal with are timber production from native forests, and fire management. The reasons are similar:

   - After a fire, and after logging, areas appear to have been destroyed. The community does not want CALM to go around "destroying" public forests and reserves.

   - Both are dramatic events, involving controversy and high emotion and providing excellent photo or television opportunities - the media therefore adore them, provoke them and never let them die away.

   - Both are very hard to manage, and are becoming harder as resources in the department are declining. One consequence of this is that errors are sometimes made. In a situation where some people are passionately opposed, and where they are supported by a largely uncritical media, errors are magnified out of all proportion. This makes management even harder.

   - Finally, in both cases, the better we do our job, the worse it goes for us. In the case of timber production we could probably slip quietly through the forest taking out the odd tree here and there and few people would notice - but we would be abandoning the fundamental principle of properly regenerating forests after harvest. In the case of fire, we could step back, do no prescribed burning, just wait for the fires to come and then accept the glory of being courageous firefighters battling overwhelming odds every summer. There would be plenty of fires and plenty of damage done. Maybe a few of us would die for the cause, but on the whole it wouldn't hurt us - even though we lost, we would be the good guys! As it is at present, however, the better we do the job of fire prevention and fire damage mitigation, the more we cop it from those opposed to prescribed burning, and from the media.

2. I mention all this because at a meeting like this we tend to concentrate on the scientific/technical aspects of the task and forget the political/social aspects. I don't mind concentrating on the former for a while, but I remind you all that if we continue down the current track in the politics of fire, we are on a one-way track to disaster.

   The disaster will occur because we can never prevent fires starting on a bad day; all we can do is try to maximise our chances of reducing fire size and intensity. At present we are being forced by the opponents of fire-mitigation work (and many of these opponents are "scientists") to do less and less prescribed burning. As a result, fuel levels are expanding; worse, every time we do a burn, increasingly it is up against heavy fuels and so the risk of the burn escaping is higher.

   There is no doubt in my mind that we will soon be faced with a "Fitzgerald River National Park type" fire in the forest country. There will be a time when multiple lightning strikes hit very dry fuels during several days of hot strong northeasterly or gale-force nor'westerlies and we will be unable to cope. If the pressure on us to do less burning continues (eg from the EPA because of smoke, or from the environmentalists through their manipulation of political processes) damaging high intensity forest fires are inevitable. This will be a disaster because, unlike the Fitzgerald, the South-West forest country is full of people and valuable human assets, all vulnerable to fire.

When that disaster comes, the EPA and the environmentalists will not be out there fighting the fires; nor will they be held accountable for what happens. CALM will be. And CALM scientists will be just as accountable as CALM managers. We are all in this together.

3. I am emphasising all this for a very good reason. Out there in our districts and parks, CALM field staff are very hard-pressed at the moment. The numbers of fire fighters and budgets have been cut. In one district they can no longer afford to have a Heavy Duty! Fuel levels in the forest and in many large parks are increasing way beyond what represents a safe limit. On top of this, the attacks from the critics are unabating.

In short, our operations staff are looking for help and support. And one area in which they are looking, is to our research and specialist people.

4. Let me make very clear an important point of policy: There is no intention anywhere outside the main forest belt of the South-West to undertake regular prescribed burning of blocks or whole reserves for fuel-reduction purposes. In the heaths and woodlands and in the north and the arid country we will be installing wind-driven strips and we will be burning buffer zones around high-value spots. For these areas we mainly need technical information on the mechanics of getting this done. When do we light, how will the fires behave once alight, and what return time is required to ensure this approach is effective from a fire control viewpoint?

Massive and complex ecological studies are not the priority in these areas. There is ample information already available to enable us to write simple holding guidelines to protect rare or vulnerable species at the macro level.

In the forest country on the other hand, we already have excellent information on fuels and on fire behaviour, but our ecological support base is regarded as inadequate; in addition, in the lower South-West we now have the new issue of smoke to manage, and there is a deficient technical support base for this as well.

There are two questions here. The first is to ask do we *really* not yet know enough to allow us to design a fire-mitigation system for South-West forests which is ecologically sound *and* effective in helping us deal with wildfires? The second is, are we *really* dealing with a scientific issue here, or an ideological one - and where do our scientists stand on this?

Outside of a minority of officers who work for CALM I doubt if I could find a single scientist prepared to stand up and support the scientific credibility of our fire management program in South-West forests.

For example, recently there was a full page article in the *Albany Advertiser* criticising CALM's prescribed burning program; amongst other things, it was claimed that fuels in fact do not accumulate in karri forests. Not one West Australian scientist wrote a letter or spoke out challenging this nonsense. Similarly, the Wilderness Society recently stated unequivocally that 32 species were at risk of extinction in the forest as a result of CALM's management. Again the scientific community was as silent as the grave.

5. I could elaborate on all this for the rest of the day. Let me summarise.

- I love meetings like this, because we can all get together and talk about our favourite subject. But unless our favourite subject includes CALM's most pressing fire management problem, we are simply indulging ourselves. Self-indulgence at this stage of CALM's history is tantamount to sin.

- CALM's most pressing fire management problem is to get some community support for what we are trying to do in the forest country. At the moment we are going backwards - the community is being led to believe that we are stuffing the forest, rather than protecting it; and those who are being protected don't appreciate what is being done for them. The most vulnerable species in the South-West is man - and he doesn't realise it!

- CALM's research scientists need to refocus their efforts to where the operations staff are most crying out for help. Apart from all the operations research needs I have listed elsewhere, and which are still valid, the most help we need is some credible research which either supports views on the ecological benignity of the present system or tells us exactly what changes need to be made and where, so we can get on and make them.

- If there are changes to be made, we will make them - but I need to know exactly what is proposed and what are the consequences. Vague criticism or compliant silence is not enough. They are insufficient reason to dismantle the entire protection system.

- When it comes to the budget process in years ahead I will not be supporting fire research programs which do not directly attack the main problem faced by CALM field staff: how to protect humans and human values in South-West districts while maintaining ecological values.

6. Finally, I hope this helps set the scene for the days ahead, and I look forward to some good debates.

Roger Underwood
GENERAL MANAGER

FIRE AND THE DISTRIBUTION OF LOCALLY ENDEMIC FOREST EUCALYPTS

Grant Wardell-Johnson

A project designed to understand patterns of distribution of four locally endemic forest Eucalypts: *Eucalyptus ficifolia. E. brevistylis, E. jacksonii and E. guilfoylei* is one of my four major projects in the Biogeography and Management Disturbance programs of the Wildlife Science Group of the Science and Information Division of CALM. Other projects include birds, edge effects and gap creation, research on the recovery plan on endangered frogs and a regional floristic survey of the Warren and Menzies Botanical Subdistricts. A database of responses following disturbance (fire and Phytophthora) is also being compiled. Responses to disturbance of the vascular plant species associated with the distributions of the Eucalypts being studied, have been documented.

Questions about the role of fire in the tingle forest are worth asking because, although each species is geographically restricted, their dominance in the forest community ensures that they are disproportionably important components of the system (key species). In addition an understanding of the role of fire allows understanding of the origin and evolution of the species and their environment, and provides a guide to future management requirements. It also allows predictions of future stand structure under different regimes.

Data was presented on diameter size class distribution, regeneration success, bark thickness and fire scars measured in permanently located quadrats covering the ranges of each species. Data on longevity, response of regeneration following high intensity fires and the spatial and temporal pattern of fine biomass accumulation for these forest areas was also presented. Ten conclusions were also presented.

1. There is a need to consider time (management, ecological and evolutionary) and spatial scale in all operations concerning fire.
2. The three tingles occur in moist fire prone Mediterranean environments where occasional moderate to high intensity fires are inevitable. *E ficifolia* occurs in environments subject to more frequent fires.
3. None of the species studied are fire sensitive (cf. *E. regnans*).
4. The four species are fast growing with lifespan approximating 350-400 years. *E ficifolia* may live much longer because of its mallee-like clumping habit.
5. The four species each have different regeneration responses following gap creation and fire. For example *E. jacksonii* does not possess a lignotuber and regenerates from seed in gaps created by fallen or dead trees following disturbance.
6. Butt attrition of *E. jacksonii* occurs following fire even of low intensity.
7. On an evolutionary time scale, lower biomass accumulation, greater seasonality and greater frequency of fires is likely.
8. Under a regime of more frequent fires: *E. calophylla, E. marginata* and *E. guilfoylei* will become more dominant while *E. jacksonii* and *E. brevistylis* will become less so.
9. Regeneration success of *E. jacksonii, E ficifolia* and *E. brevistylis* is problematical and will require further investigation.
10. Early establishment of these species is especially worthy of investigation.

GIBSON DESERT BIRDS

EFFECTS OF RAIN AND FIRE

INTERIM REPORT - NOVEMBER 1992

by Andrew Burbidge and Phil Fuller

BACKGROUND

When the Gibson Desert Nature Reserve fire ecology study was set up it was decided to establish experiments to measure the effects of aerial patch burning on several animal groups. We accepted the task of looking at bird communities.

METHODS

There have been very few studies of the effects of fire on desert bird communities anywhere in Australia. We consulted scientists in the Northern Territory Conservation Commission, who were doing similar research, and after taking into account our own experience with biogeographical surveys of arid areas, e.g., of Nullarbor Plain birds, we set up the following design.

Four paired quadrats, each of 1 km^2, were selected to represent the range of environments to be burnt in the first aerial burning experiment (for quadrat descriptions, see Appendix 1). In practice, because of the design of the burning experiments, three pairs were opposite each other on either side of a cut line and the Gary "Highway" and the fourth pair was about 5 km apart on the same side of the track.

Initially, we counted birds in some of these quadrats for repetitive periods of one hour and developed species accumulation curves. These established that we would have to count birds in each quadrat for at least 6 X 1 hour periods for each visit to get reasonable comparability between the species in a quadrat pair.

Counts were commenced soon after dawn, with the observer(s) walking at random through the quadrat for one hour, with both quadrats of a pair being counted at the same time. The starting quadrat was changed each day so each quadrat was counted at dawn at least once per trip. Bird activity is low from late-morning to mid- to late-afternoon, so we counted for four one-hour periods in the morning and one hour in the late afternoon. With travelling time between quadrats and to and from camp, this consumed about 9 to 10 hours per day. Data recorded included species, number, feeding records and breeding records.

Pre-burning counts were conducted in May 1988 and September 1988, with the burning being done shortly after our September count. Post-fire counts were carried out in May 1989, September 1989, May 1990, August 1990, August 1991, June 1992 and September 1992.

As well as conducting counts on the quadrats we recorded all birds sighted elsehwere on the nature reserve, and we made visits to wetlands such as Lake Cohen (a large ehemeral freshwater claypan) and Lake Gruszka (an ephemeral freshwater lake among open coolabahs) to record species presence.

PRELIMINARY RESULTS

The quadrat data have been compiled and are about to be analysed. Preliminary examination of the data and analysis of some data by PATN revealed that, before burning, the bird communities of quadrat pairs were more similar to each other than to any other quadrat, although the bird communities of quadrats 3 and 4 were similar (Fig 1). Immediately post-fire the similarity between quadrats decreased (Fig 2), but the picture returned to the pre-fire situation in all further counts (e.g., Fig 3).

The study area was subjected to a major drought following the fires and there was no significant regeneration of vegetation in burnt areas until autumn 1992. During the drought there were significant plant deaths on both burnt and unburnt quadrats. For example, extensive areas of *Plectrachne schinzii* died on quadrats 3A and 3B, and 80 to 90% of the *Grevillea stenobotrya* died on the dune crests in quadrats 1A and 1B.

The rain, when it did come, was extremely heavy and widespread. It caused much erosion, both in the burnt areas and in unburnt areas. While there was extensive germination of annuals and perennials in the burnt areas, there was also extensive germination of the same plant species in the unburnt areas.

Bird species and total counts dropped significantly during the drought (e.g., Table 1). All nomadic species disappeared and numbers of residents gradually dropped. Some resident species that were reasonably common in our pre-fire counts, for example Rufous-crowned Emu-wrens and Inland Thornbills, disappeared from the quadrats during the drought and had not reappeared by September 1992. Some one hour counts at the peak of the drought produced a zero result, or a record of one Singing Honeyeater.

Re-invasion of the area by nomadic species after the heavy rain was rapid. Species that re-invaded and increased rapidly in abundance included Pied and Black Honeyeaters, Budgerigar, Masked Woodswallow, Spotted Harrier, Little Button-Quail and Zebra Finch. Diamond Doves appeared on the quadrats for the first time. The data from bird counts since the drought has yet to be analysed, but inspection suggests that there are no significant differences within quadrat pairs.

PRELIMINARY CONCLUSIONS

The Gibson Desert Nature Reserve has a comparatively rich bird fauna for such an arid area. Our own data and data from other visitors to the reserve provides a list of 114 species (with data still being added). Many of these are nomads or vagrants and only a relatively few species are present year round under all conditions.

From the quadrat data we can conclude that bird species diversity and numbers are greatly affected by rainfall (see Table 1). The effects of fire are not so clear. At the level of patch burning that resulted from the aerial burning experiment it seems that there was no significant effect on bird species diversity or numbers. Because we considered it very important to collect pre-fire data on all quadrats and because we could not predict the per cent burn that would result from aerial ignition, we did not have burnt quadrats that had a higher burn than 40%. In retrospect, it might have been better to place one pair of quadrats after the burn was concluded, but, if we had done this, it would have been impossible to show that the bird communities of the pair had been similar to each other before the burn took place, negating the value of this type of research to a significant degree.

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PUTTING TOGETHER THE PIECES: RESEARCH TOWARDS A FIRE MANAGEMENT STRATEGY FOR QUEEN VICTORIA SPRING NATURE RESERVE

David Pearson
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CALM manages a vast estate of desert nature reserves, totalling some 6 million hectares. Fire is a frequent and inevitable disturbance throughout most of this area, and its harnessing to create or maintain habitat heterogeneity and species diversity has been widely recommended.

In a study in hummock grassland on the south-western edge of the Great Victoria Desert, the effects of summer wildfires and cooler spring "prescribed" fires on species richness of terrestrial vertebrates and plants was examined. Species richness is one part of the widely and often misapplied term of "species diversity". Species richness refers to the number of different individual species which occur in a given area.

Spring fires usually result in a inter-digitating patchwork of fire scar and unburnt vegetation. Summer burns, when burning under good winds and hot conditions, tend to remove all above ground leaf material leaving few unburnt patches. Nonetheless, even fierce wildfires leave occasional areas unburnt because of landform effects (eg. steep dunes or salt lakes) or less severe fire conditions during night-time periods.

Species richness amongst reptiles was highest on the patchy burnt spring plots, because the fire opened up opportunities for a number of open area specialists but there was still sufficient spinifex cover to support those species which are dependent on it for foraging or shelter.

Summer fires led to a decline in species richness, at least in the short term. However, species typically thought of as spinifex-dependent began to reinvade burnt areas 3 years after fire, even though spinifex cover was very low. They appeared to be using the cover provided by the many herbs in the regrowth. The speed and success of recolonisation of burnt areas by such species may depend on the availability of unburnt refugia in fire scars. Patches of spinifex as small as 3 m^2 have been sufficient for the survival of some species.

Amongst the small mammals, species richness declined after the summer fire with the loss of *Ningaui ridei*. There was also a reduction in the abundance of all other dasyurids. *N. ridei* appears to do much of its foraging within spinifex hummocks; it did survive in spring burnt areas. Several dasyurids have good dispersal capabilities, particularly *Sminthopsis hirtipes* and *S.*

dolichura, the juveniles of which dispersed rapidly into summer burnt areas.

The question of the effect of fire on species richness in plant communities is more complex. The passage of a fire irrespective of season or intensity leads to the germination and growth of many ephemeral herbs and short-lived shrubs. It would appear superficially that fire increases plant species richness; but probably all non-sprouting species have regenerated from soil-stored seed which was present on the site prior to the fire. Hence species richness has not really changed, just the manner in which it is manifested. No plant species were found to become locally extinct due to fire although the abundance of some fire-sensitive species (eg. *Callitris pressei*) may initially decline.

The results from this study thus far, would suggest that the adoption of a spring patch-burning programme will result in higher small mammal and reptile species richness per unit of area. However, before we embark on an extensive programme of prescribed aerial or ground-based burning, we need to be clear about what we hope to achieve. We will never have the funds to patch-burn all the flammable plant communities in desert nature reserves (or any other region for that matter), and indeed, I would suggest that we should have no wish to.

We need to identify communities and species which have specific fire requirements and those high productivity sites (such as palaeo-drainages) where the application of fire could increase heterogeneity in biotic communities. Much of the remainder of the reserves could then be left to burn under "natural fire regimes", that is infrequent, lightning-ignited wildfires. This strategy would loosely resemble that of desert Aborigines who maintained seral patchworks in productive areas but burnt the remainder of their estates either irregularly when conditions permitted visitation or merely left them to burn by lightning-ignited fires.

To accurately plan and execute a fire management strategy for any desert nature reserve, which will be of benefit to nature conservation, we need to know more about their biotic and edaphic characteristics. Obviously, funds are just not available to carry out detailed surveys in each reserve in the next few years. We need to decide what information is required now to permit sensitive management for nature conservation. Whilst burning to prevent major wildfires is a laudable and justifiable objective on much of CALM's estate, we must look to more conservation-oriented goals in many of our nature reserves. Intervening to prevent wildfires expends considerable resources, resources which could be spent learning more about the reserves or monitoring other management problems.

We do need to use fire for nature conservation. But knowledge and expertise is available to make our management more

sophisticated than simply burning buffers or blocks to reduce the likelihood of large wildfires. In the list below, I have listed some preliminary ideas about the information we need to collect to adequately plan fire management strategies for the primary goal of maintaining or enhancing nature conservation values. This list is incomplete (particularly for faunal data), but nonetheless I hope it is of value in identifying what data is needed and how some of that data might be obtained at minimum cost. I would welcome suggestions and comments about factors which should be included or removed.

We are charged with an onerous responsibility; to act as custodians over a biotic heritage which needs to last for a long, long time. To do this to the best of our ability, we must use the best available information, spend time thinking about, and discussing our objectives, and how they can best be satisfied with the resources available.

Minimum Critical Data Set for fire management in a desert nature reserve

1. A detailed vegetation map at a scale of 1:50 000 to 1:80 000 - using old B&W aerial photography, TM imagery or borrowed colour aerial photography (mining companies?).

2. Accurate locations of DRF, poorly known and restricted plant taxa - from Herbaria records, books and experts, followed up by field survey.

3. A survey of fire regeneration strategies of above taxa from literature, experts or observations in fire scars.

4. Survey for fire-sensitive species and communities - look in places likely to escape fire on most occasions, eg. dune crests, creeklines and around rock outcrops.

5. Determination of regeneration requirements of any fire-sensitive communities or species, particularly obligate re-seeders - from field observation, etc.

6. Preparation of a fire history map at the same scale as the vegetation map to permit overlay.

7. If possible, determination of the time taken for species to regenerate, flower and set seed.

* . Design and implement a monitoring scheme based on permanent plots with the collection of pre-fire data wherever possible.

* Adopt a cautious and conservative approach to the scale of burning undertaken; retain large areas in an unburnt state.

TALK FOR FIRE PROGRAM MEETING/FIELD DAY - STIRLING RANGE NATIONAL PARK 23-25 NOVEMBER 1992

WHEATBELT REGION FIRE MANAGEMENT ISSUES - WHAT INFORMATION DO MANAGERS WANT IN THE WHEATBELT?

We want to know the answers to two types of questions:

* If I burn this bush for fire protection every "x" years, or whenever it reaches "y" fuel level, will this result in an unacceptable environmental impact? [That is, an environmental impact statement.]

* Should I use fire in this situation to increase long-term viability of current biodiversity? [That is, a question of biodiversity management.]

While a particular piece of research may help to answer both questions, the questions themselves are fundamentally different, and they should not be confused (but they often are).

I will look at these two questions and their implication for research with particular regard to the wheatbelt.

ENVIRONMENTAL IMPACT QUESTIONS

Plants

Crucial aspects are:

* time for plants to set sufficient seed store of viable seed. (Rule of thumb is 2 to 2 1/2 times years to first flowering).

* fire effects on ecosystem functions essential to plants (eg effects on pollinators, note this function may be at threat in remnants).

* relationship between fire, plants, and episodic events (eg locust plagues, summer rainfall, drought - these particularly important in the wheatbelt).

Animals

* see overhead. Note that crucial factors in the wheatbelt include size of bush, size of patches within, presence/absence of corridors.

Physical

* effects on soil and relationship to erosion.

* smoke pollution.

* effects of nutrient release.

* firebreak effects.

Social

* How do we educate people about land management issues and decisions?

* How do we help people to see pasts the myths. That is, that labelling an area for nature conservation doesn't automatically increase the fire hazard, that the fire hazard of bush doesn't increase as the area of bush decreases, that fire control in bush isn't essential to ensure fire control on farmland, that some fires will be unstoppable wherever they occur, and so on?

HABITAT MANAGEMENT QUESTIONS

Indices for Management Intervention

Potential indices include:

* population/biomass levels (note dangers).

* biodiversity index (note dangers).

* area of specific habitat/seral stage.

* status of keystone species (and what are they anyway?).

* status of ecosystem process, eg nutrient cycling.

* etc.

Options for Management

In this regard it is important to know the physical outcome desired and relative merits. For example, if it is protection from fox predation, then options would include using fire to increase cover, or fox baiting. Which is most cost effective?

Episodic Events
see previous.

Appropriate Fire Regime

* danger of transferring regimes across climate.

* Potential impacts on non-target habitats (eg nest hollows).

* difficulties we have predicting the impact of regimes in the long term, particularly in fragmented lands

Safe Implementation of Fire Regime

Experimental Management

* importance of documenting use of fire.

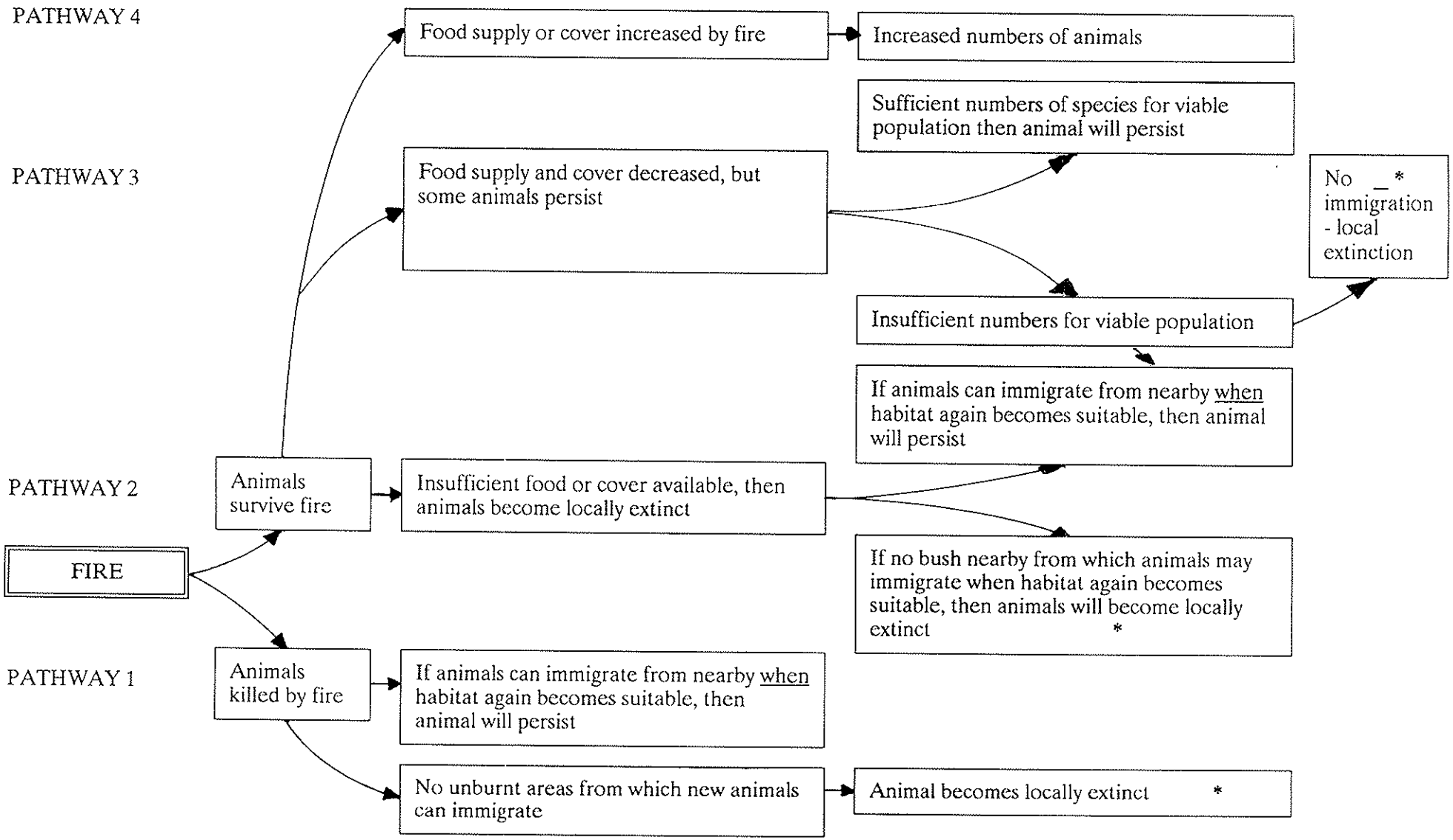
* lack of suitable information systems for storage, collation and analysis.

* importance of my philosophy/ethic

KJW 20 November, 1992
B:5firetlk.doc

I forgot this during the talk.

Effect of fire on an animal species, a simplified view



EXTRACT FROM "MANAGING YOUR BUSHLAND"
BY HUSSEY AND WALLACE (IN PRESS)

FIRE PROGRAM MEETING

STIRLING RANGE

23 - 25 NOV 1992

Fire Behaviour Studies in Mallee heath Shrublands

L. McCaw, R. Smith & J. Neal
Manjimup Research Centre

ABSTRACT

An experimental study of fire behaviour in mallee heath vegetation was begun at the Stirling Range National Park in 1989. The objectives of the study are to (1) describe the fuel characteristics of mallee heath, (2) identify the factors controlling the initiation and sustained spread of fires, (3) compare the observed spread rate of experimental fires with predictions from a number of existing fire spread models, and (4) develop a simple, robust model for predicting forward spread rate and intensity using weather variables readily measured in the field.

Line-ignition fires have been set under a wide range of weather conditions, and the behaviour of the fires recorded using electronic timers and photography. Weather conditions and the moisture content of a series of fuel components have been monitored during each fire.

The moisture content of the shallow litter layer has been found to play a critical role in sustaining fire spread, with fires only sustaining once the litter is below about 8%. factors controlling the moisture content of both live and dead fuel components have been investigated. Forward rate of spread is largely determined by wind speed, and experimental fires have exhibited spread rates up to 3000m/h.

Observations from wildfires and prescribed burns in structurally similar shrublands at other sites in the south-west suggest that results from the Stirling Range study may be broadly applicable.

Vegetation responses to fire are being examined in plots burnt during spring, summer and autumn conditions. Post-fire flowering and seedling regeneration are being recorded on a regular basis.

SHRUBLAND FIRE CONTROL SEMINAR
STIRLING RANGES 23-25 NOVEMBER

MIDWEST REGION AND FIRE MANAGEMENT

The Midwest Region is primarily a conservation Region. It stands to reason then, that the Departmental mission to 'conserve for present and future generations' must guide all our activities.

To achieve this mission we need to know what we are conserving and the management practices that will ensure those conservation values are protected.

In relation to fire management, the most important issue (leaving aside the need to protect life and property), is to know the fire ecology of the diverse ecotypes within the Region and to manage fire to ensure that conservation values are maintained and where possible enhanced. This is the case whether we burn or not.

There is a broad range of vegetation types across the region which respond differently to fire. Bowgada thickets and spinifex hummock grasslands dominate the Peron Penninsula, Banksia woodlands, open mallee, acacia thicket and coastal heath occur on coastal reserves between Shark Bay and Lancelin, York Gum woodlands, mallee woodlands, Banksia Woodlands and heath types occur on inland reserve's and Salmon and the Gimlet Gum woodlands occur in the east of the Region.

Our understanding of the fire ecology of these communities is limited. There is certainly the significant resemblance between the coastal heathlands on the Southcoast (which have been the focus of considerable study) and those on the Midwest Regions coastal strip. However there will almost certainly be ecological variables related to geography, the low rainfall, semi arid climate etc. that will mean fire management principles are not altogether ecologically portable, (though they may well be operationally portable).

Many of the Midwest Reserves are relatively small islands of remnant vegetation in a sea of agricultural estate and pressure. Additionally the Midwest Region is comparable with the Southcoast in relation to the number of Declared Rare and Priority flora species. Without knowledge of the fire ecology, some areas could be changed or species lost through unappropriate fire management practices. To compound these issues, the area of conservation estate in the Region is rapidly increasing without a commensurate increase in management resource.

Where does this lead? - To a Region with important conservation values; with remarkable ecological biodiversity; with a requirement to conserve on a scanty ecological information base.

There are undoubtedly operational issues of great importance such as how to burn to protect life, property and conservation values. There are crucial social issues such as the demands of the public in relation to fire. There are fiscal issues - how will it all be funded?

Though the importance of these issues cannot be diminished, if we are to achieve our mission to conserve, we must increase our knowledge in fire management and ecology. Without this we operate in a vacuum.

Nigel Sercombe
OPERATIONS OFFICER
Midwest Region
15 December 1992

"IMPACT OF FIRE ON THE FOREST UNDERSTOREY SPECIES"

Fire has long been a contentious issue and at present social attitudes are changing to the point where many more ecological issues are being questioned and in particular the role of fire. This study was aimed at monitoring the long term effects of different fire regimes imposed on various vegetation types in the South West.

Four locations in the Jarrah and Karri forests are being monitored with a series of plots and five fire regimes are being tested. These include;

An unburnt control
Half rotation (3-5 years) burnt in Spring
Half rotation '' burnt in Autumn
Normal rotation (5-7 years) burnt in Spring
Normal rotation '' burnt in Autumn
Twice rotation (10-12 years) burnt in Spring

To collect data on tree growth /damage, and vegetation responses, 10 nested quadrats have been located within each plot. Fire weather, fire behaviour and post fire data are collected so that the level of prescribed fire can be directly compared between successive burns. A flowering calendar showing the month in which each specie flowers and the time after fire for each specie to flower are also being measured.

This project was initiated in 1986 and to date the;

- Half rotation treatments have been burnt twice
- Normal rotation treatments have been burnt once
- Twice rotation treatments have yet to be burnt.

Detailed analysis of the data collected so far will be carried out during 1993, however, effects of these treatments may be very long term and may only become apparent after several successive rotations.

Bruce Ward
Fire Research
Manjimup.

1st December 1992.

SUBMISSION TO MINUTES OF THE FIRE RESEARCH CONFERENCE, AT STIRLING RANGE NATIONAL PARK ON 23RD TO 25TH NOVEMBER 1992

Rick Sneeuwjagt summarized the role and responsibilities of Fire Protection Branch in relation to the rest of the Department.

The Fire Branch's overall mission is:

To provide leadership and perform a quality support function in the form of expert advise, co-ordination of planning and operations, and provision of specialized services in the matters of fire management to client groups within and outside the Department.

The main functions of the Fire Protection Branch include:

- fire management policy development and review;
- advise on fire policy and procedures;
- establish and maintain standards;
- fire management planning and development;
- fire training;
- co-ordination and operation support;
- provision of specialized fire services;
- operations research and development;
- publicity and education;
- liaison;
- administration of records, maps, other data.

It was the aim of Fire Branch staff to provide a quality service to CALM managers and staff and relevant external agencies, so that the Department's fire management programs are achieved in an effective, efficient and safe manner, while ensuring that the Department's legal and moral obligations are fulfilled, and all environmental concerns and resource management requirements are met to the full extent possible.

Rick Sneeuwjagt
MANAGER
FIRE PROTECTION BRANCH

29 January 1993

rjsn.111

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Form CLM 808

To: MR GORDON FRIEND, CALM, WOODVALE

BRAD COMMINS, CALM, MARGARET RIVER

Your Ref:
Our Ref: 0113 BFC:WR
Enquiries: Mr Brad Commins
Phone: (097) 57-2322

Subject: **SUMMARY OF CENTRAL FOREST REGION PRESENTATION -**

FIRE PROGRAMME MEETING - 23 TO 25.11.92

The following is a summary of the combined issues presented at your meeting by myself on behalf of the Central Forest Region:

i) Our primary concern with the use of fire in the environment is that we are not fully satisfied that we know the full effect, beneficial or otherwise of our current burning regimes on flora and especially fauna.

ii) Most information available, outside of study areas such as the Perup and Dryandra forest etc is very broad scale which does not specifically cover targeted areas of fire control activity in the form of prescribed burning.

iii) Once we have carried out a prescribed burn no monitoring of environmental effects of the operation is carried out. The main reason for this is lack of research personnel and more importantly field staff are not adequately trained to carry out scientifically valid monitoring before or after prescribed burning or wildfire events.

iv) Field staff need to be confident in what they are doing in management. We are quite at home with fire behaviour prediction, wildfire suppression and carrying out prescribed research burns because we are well trained to do so. However, assessment of habitat, fauna presence or abundance and monitoring native vegetation and fauna population we have very little training in.

v) Public information with scientific support is limited. People are mainly afraid of what they don't understand. Better information that can be supported by literature and distributed by field staff is required.

vi) What does the scientific wing of CALM require from Management Plans specifically in the fire area? eg flexible management areas which can be for habitat enhancement, flora values etc. More pro-active involvement is required from the scientists.

.../2

vii) An area the field staff is moving into more and more is heath and woodlands with additions to our National Park estate and fire protection is a part of the management.
Information is urgently required on fire impact on small mammals and avifauna in heaths and woodlands.

viii) Life cycles of the coastal Melaleuca woodlands is an urgent knowledge area that is required as prescribed burning is beginning to encroach on this environment.

ix) The effect of prescribed burning on Cave environs. Recent years is witnessing increased necessity to burn in karst areas and some questions are being raised about effects on micro-fauna and cave features. Current information being put to the public is based on fire events in the eastern states and may not be valid for our areas.
Research or at least monitoring is required in the area.

This is only a summary of Central Forest Region's presentation at the Stirlings.

Also I would like to express the Region's appreciation for the very valuable opportunity to have access to you and your colleagues in such a forum. The value to the participants was enormous and I would encourage you to pursue this forum on an annual basis.

Well done.

B F. Commins
FORESTER

10 December 1992

Copy to:
District Manager, Collie
District Manager, Harvey
District Manager, Kirup
District Manager, Nannup
District Manager, Busselton
Fire Protection Branch, C.F.R., Bunbury

SMALL MAMMAL LIFE HISTORY PARAMETERS AND FIRE : A FRAMEWORK FOR A PREDICTIVE MODEL

Gordon Friend, CALM, Wildlife Research Centre, P.O. Box 51, Wanneroo W.A. 6065 and Matthew Williams, CALM, Research Centre, P.O. Box 104, Como W.A. 6152.

A review of small mammal species' post-fire response patterns throughout temperate Australia indicated that there is considerable consistency between a species' response to fire and its life history parameters. Small mammal species which survive fire and/or favour early post-fire successional stages generally shelter in burrows in relatively open areas with low ground vegetation and leaf litter cover. They have non-specialized omnivorous diets, and can vary their reproductive patterns in response to climatic or habitat cues. Mid-successional species require denser vegetation and shelter in more flammable refuges (eg. hollow logs and grass trees), are less general in their diets, and have a more rigid seasonal, though polyoestrous, breeding strategy. Finally, late-successional species show considerable specificity in diet, shelter in flammable refuges in relatively dense vegetation, and may have a seasonal and highly synchronized breeding season. There is thus a trend of increased specificity and reduced flexibility in small mammal species' life history parameters concomitant with increased impact of fire, and later post-fire recolonization.

These results point to the feasibility of developing a model to predict the impact of fire on small mammal species. Such a model is currently being developed. It is based on placing species into "life form categories" derived from a consideration of an individual's shelter and food requirements, the two essential (resource) criteria for existence. Loadings for an ordered series of shelter and food categories can be derived for various stages after fire from empirical data using multiple regression analysis. In the model, the predicted impact for a species is assumed to be the sum of an effect (loading) due to shelter requirements and an effect due to food requirements. Testing such model-derived impact scores against an empirical impact score [defined as -log (post-fire abundance/pre-fire abundance); Fox 1982] shows that the model can predict up to 80% of the variability in abundance of small mammals at various stages after fire.

The model could greatly assist land managers in decision making and in interpreting the post-fire species abundance and composition patterns which they observe. It should also aid the formulation of hypotheses regarding fire effects which can be tested and further refined through an experimental approach to research.

Reference

Fox, 1982 Ecology **63**: 1332

TO: GORDON FRIEND
CALM
WOODVALE

GOLDFIELDS REGION PRESENTATION

Session was divided into 3 sections

* spinifex Aircraft burning operations: History, burning programme, objectives, factors affecting ignition and spread, costs and planning
NEEDED: Further fire behaviour research in spinifex funds and production of fire behaviour tables.

* Unusual season - high rainfall and subsequent grass growth: Exceptional grass growth in fire sensitive vegetation. Prescribed burning not an option, suppression may not be possible, we will need to rely on strategic breaks or just monitoring the fires from the air in remote areas.

* Andy Chapmans - presentation - see notes

DAVID MCMILLAN
FORESTER
GOLDFIELDS

30 November 1992

TO: GORDON FRIEND

GOLDFIELDS REGION - FIRE RELATED ISSUES (OTHER THAN DAVE MCMILLANS AERO BURNING PRESENTATION)

3 ISSUES WERE IDENTIFIED:-

* Acquisition of further CALM managed lands:-
  Fire management strategies will be required for different vegetation types in particular chenopod shrublands of the Nullabor Plain and their associated woodlands which although infrequently burnt are fire sensitive. Additionally plant mammal and reptile rich sandplain heaths occurring NW of Bungalbin Hill will require new strategies.

* Rare Flora management:-
  of 13 species of DRF in Goldfields Region the fire sensitivity and life histories of 6 are practically unknown. Here is a case for further knowledge and/or research.

* Monitoring:-
  At present monitoring of fire effects is limited to landsat imagery and photoplots on Wanjarri Nature Reserve. There is a case to get more serious about monitoring.

ANDY CHAPMAN
ECOLOGIST
GOLDFIELDS

30 November 1992

South Coast Region

The topic I wish to discuss is "Fire Management Issues in the South Coast Region".

I intend to present this topic by addressing the following areas:

- the Conservation Estate
- the Application of Dept Fire Policy
  - in past
  - and present
- Direction the South Coast Region is currently following (provide some examples of how we are dealing with two major concepts
  - path burnings
  - ~~give~~ exclusion fire
- summarise the issues that are identified

Conservation
Estate

The current distribution and content of land managed by CALM is shown in the overhead.
The South Coast Region covers all major Botanical districts in the SW and includes in the southern half of the Region extensive areas of coastal heathlands/shrublands and Mallee heaths

These areas are included in a significantly scattered reserve system including National Parks and Nature Reserves including some of the states oldest (Stirling Range National Park) and most significant (Fitzgerald River National Park) and extensive Cape Arid, Nuyts land.

Fire is a national part of these ecosystems most of which are fragmented and to a greater or lesser extent are island in a sea of developed agricultural land. Although the role of fire is accepted the frequency, intensity and timings of fire is a much debated issue.

Policy

The key elements in implementation of the Department ~~of~~ Fire Policy are the protection of life and property and the use of fire as a management tool in accordance with designated land use priorities.

The components of fire policy that look at the use of fire have particular relevance to field operations.

Overhead 1 shows section 3.2 of the policy while outlines how the department will use fire.

This is further refined than Regional strategies outlined in overhead 2 which is taken from the South Coast Region Management Plan.

The conservative approach to the implementation of this policy has lead to give regimes which assist in occasional large and severe fires (this applies both to large and small reserves).

The provision for the greatest possible diversity does place a considerable burden on managers particularly where physical resources are limited and relevant data on material resources are minimal.

The practical implementation of our policy has produced a reliance on the establishment of boundary breaks and boundary buffer burning.

This approach has had a number of implications

emphasis on firebreak construction

disease implications which is also influenced not only by firebreak construction but also by unauthorised use of such breaks

high cost of prescribed burning programmes on a ha or any other measure utilised

risks associated with "losses" when burning narrow buffers

This emphasis on buffers addresses the components of policy which relate to protection of property and other assets.

I does not address the development of aging fuels within reserves nor the varying requirements of vegetation afl (habitat) which is needed by different species for various aspects of their life, ie feeding vs breeding, your vs old, etc.

As mentioned above, the continuation of this practice inevitably leads to a situation of a large fire, which in a single event may seriously affect the very values we are trying to protect.

The impact of FRNP in 1989 lead to a change in approach to the implementation of fire policy.

The fire plan included in the draft Management plan was seen to be ineffective in terms of the suppression of large fires and also incorporated aspects which are considered unacceptable.

As a result the final plan incorporates a strategy which includes the principle of broader area burning with an undertaking to pursue a more flexible wind-driven fire concept. Overhead 3.

This approach embraces the technique of aerial ignition as a means of achieving a broad mosaic over large areas of vegetation with a recognition of the needs of specific species in relation to habitat requirements.

An important component of this program is that the specific needs of special species needs to be understood to a reasonable extent, ie population size and distribution and distribution of habitat so that potential impacts as a result of this sort of burning can be predicted.

So there is a particular need for research to be conducted to support the programme.

It is hoped that our understanding and technical knowledge will improve with the implementation of the plan.

One burn (actually outside the Park) was achieved in late autumn 1992.

The overall result of the burn is closely related to vegetation types and the conditions under which the burn was undertaken.

Within two hours of the burn commencing an Extreme Fire Weather Warning was issued for the following day. This does illustrate some of the difficulties faced because of poor forecasting capabilities of the bureau in this general area.

The potential for the use of aerial ignition is important because it may provide opportunities not so readily available on the ground because of the difficulties of access once areas are affected by seasonal change, ie does open up the window though the problems of Phytophthora cannot be underestimated.

Aircraft - this has ramifications for cost.

The concept of mosaic burning is obviously attractive as a management strategy. However the implementation is more difficult to achieve and may need successive lightings, etc, Furthermore, in the Fitzgerald we have so far only addressed areas which have offered relatively safe edges.

Operations conducted without this safeguard obviously have the potential to be quite unpredictable - and therefore this aspect should be widely explored prior to any implementation.

Community Attitudes

The general concept is expressed by various sectors of the community in terms such as strip burning and patch burning, which are generally ill defined concepts modelled on perceived applications of aboriginal burning methods/regimes based on opportunistic burning to capitalise on weather changes at low risk periods of the year. They have no scientific basis in terms of specific species management. The key points to consider in this approach are:

unpredictability of outcome

an opportunistic (cavalier) approach

vulnerability under the Bush Fires Act

reliance on field staff capability (compromise safety)

compromise on access suitability

difficulty of implementation/compromising visitor safety

The recently released Draft Management Plan for West Cape Howe National Park includes a patch burning regime which relies on existing track systems to provide recognised "edges" and these will be edged to around 50m depth to provide a secure boundary for any burning. Overhead 4.

The prescription is for approximately 50% of the area to be burnt.

Again the implementation will be relying on a more opportunistic approach using minimal forces. Prescriptions will therefore be more 'general' than the norm and an acceptance of a larger percentage of burn must be clearly enunciated.

Stirling Range National Park

Discussion on the issue of fire has been hotly debated in the past and has maintained a high level of public interest during the initial stage of the planning process.

Once again there is a strong body of opinion in the community that some form of patch burning or wind driven burning should be utilised to reduce reliance on the Internal Buffer system thereby saving maintenance costs, disease infection etc.

Previous Park managers have used this sort of approach, ie Martin Lloyd during the late 70's and early 80's, with varying results (most of which look pretty good) but again incorporate the element of unpredictability once they go beyond nominated cadastral boundaries.

By approaching the lower end of the scale we may be able to achieve sequential lightings in differing vegetation types. Recent review of Cape Le Grand and Cape Arid National Parks have also looked at a regime which will provide not only a level of protection from very large scale fires by having a range of vegetation in the distribution of different age vegetation.

Again the requirements of special species need to be addressed and in the case of Ground Parrot this means full fire exclusion in the short-medium term.

Fire exclusion is the basis of fire regimes for two major areas

Two Peoples Bay
Mount Manypeaks

The Noisy Scrub Bird populations are found in very old vegetation to maximise cover and protection from predation and breeding opportunities.

The reliance on old vegetation to support particular species does have important consequences.

It does not mean for instance, that in 2PB in the fire exclusion areas, there is great difficulty with fire suppression activities. Under high to very high fire danger conditions the organisation of fire suppression will be very hard because of accessibility and potentially sever fire behaviour. Overhead 5.

This scenario applies equally to Mt Manypeaks where topography and access combine to produce very difficult suppression scenario without any breakup of existing fuel age. etc

To summarize, the key issues for the South Coast Region for fire research and major concerns in fire management area are:

specific requirements of key threatened species

- veg age (habitat requirements)
- area
- population size and distribution
- impact of disturbance

how to deal with small to medium sized reserves

costs associated with larger burns and more specific objectives

risks associated with fire exclusion zones

- to species
- to suppression operations

social research

being able to reliably predict condition under which fires will extinguish overnight