Fitzgerald River National Park

Fire Protection Plan

as amended by

Fitzgerald River National Park

Association

March 1987

Based on original, October 1986, courtesy of Dept. of Conservation and Land Management.

PREFACE

This Fire Protection Plan has been drawn up by the Fitzgerald River National Park Association (FRNPA) as an outline of their approach to fire management in the Fitzgerald River National Park (FRNP). It uses CALM's Fire Protection Management Plan as its base.

The FRNPA Plan is specifically designed to give greater cosideration to the nature conservation and wilderness values of the FRNP than has previously been the case.

The FRNP is the most significant unspoilt landscape within one day's drive of Perth, and has very high conservation values, particularly of rare flora and fauna species.

The Plan lists a series of guidelines which are intended to provide managers with a basis for the protection of these values, whilst allowing for appropriate minimisation of risk to FRNP neighbours and users.

This is a first attempt to place the management of FRNP fire regimes on an ecological basis. As such, ignition and control techniques, logistical arrangements and minitoring proceedures will need constant review.

The FRNPA welcomes any comments relevent to this Plan, or to existing fire protection proceedures.

MANAGEMENT OBJECTIVES

Definition of specific management objectives must await the preparation of a detailed management plan, which will include this Fire Protection Plan.

1.0 FIRE PROTECTION

1.1 Introduction

Historical records suggest that the FRNP area was little burnt in pre-European times.

More recent records show that large areas of the FRNP have been burnt by wildfires in the past 40 years. These have apparently been the result of a variety of causes including lightning strikes within the FRNP. A wildfire burnt about 14000 hectares in January 1985.

This Plan aims to provide ecologically appropriate fire regimes, and to provide a level of protection to neighbours and visitors.

1.2 Fire Management Objectives

To protect flora, fauna and landscape values from severe damage by inappropriate fire regimes and suppression techniques.

To develop appropriate fire regimes for maintaining suitable habitats for fauna, with particular emphasis on rare species.

To reduce the risk of wildfires starting within or near the FRNP resulting from human activities.

To confine fires to less than ten percent of total FRNP area in any one event, recognizing that this figure may be overridden on specific sites by ecological factors.

To protect property of neighbouring landholders and FRNP facilities from damage by wildfires.

To protect human lives (visitors, neighbours and Departmental staff) from wildfire entering or burning within the FRNP.

2.0 FIRE MANAGEMENT STRATEGIES

Maintenance of low fuel perimeter buffers.

Development and maintenance of internal buffers.

Maintenance of roads and firebreaks.

Prescribed burning operations.

Fire suppression in the boundary zone.

Local liason.

Public Education.

Visitor protection and safety.

3.0 FIRE PROTECTION ACTIONS

3.1 Maintenance of Low Fuel Perimeter Buffers

The existing system of double firebreaks (six metres wide and 50 to 400 metres apart) on the FRNP's boundaries is to be maintained free of vegetation. All work to be carried out under strict hygiene conditions.

Buffers between double firebreaks, or a significant edging strip, to be burnt as required to maintain fuel levels below eight tonnes per hectare. Burn rotation will depend on the rate of vegetation regeneration.

3.2 Development and Maintenance of Internal Buffers

The entire FRNP to be compartmentalised into blocks approximately 25000 hectares in area, by ecologically sited narrow strip burn buffers and by linking low fuel features such as past wildfires, estuaries, river pools, breakaways etc.

Low fuel buffers created by wind driven burning will be developed during the life of this plan.

Internal buffers are to be maintained by wind driven buffer strips and by limited edge burning from established roads to a width of 50 to 200 metres, where this is ecologically sound. Burn frequency to be programmed to maintain fuel levels at less than eight tonnes per hectare.

High value and high risk sites such as rangers' residences and other FRNP facilities will be protected by maintenance of low fuel buffers to a width of approximately 50 to 200 metres. .This work will be done with minimal effect on the environmental and aesthetic values of these sites.

ntenance of Roads and Firebreaks

No new roads or fire breaks are to be constructed.

Firebreaks are to be maintained as in 3.1 above.

3.4 Prescribed Burning Operations

All burns must comply with a written prescription approved by the Regional Operations Officer. These must include the Departmental Pre-Burn Checklist (CLM 32) to take into consideration the impacts on ecological and property values.

Those areas from which planned burning is to be excluded are to be indicated on the map held at the Albany Regional Office and at the Head Ranger's Office.

Areas proposed for burning are to be surveyed for rare flora and fauna. Rare flora is to include those already gazetted and those under consideration. (Check with local botanist). The surveys will take the form of a field inspection by qualified CALM officers with local experience, following consultation with local biologists. If the area under consideration is poorly or not known biologically, more detailed field surveys will be required. If any rare species are located within proposed burn areas, details and prescriptions must be submitted to the Director of National Parks for approval.

3.5 Fire Suppression

Active fire suppression will only be undertaken in the following circumstances.

Where wildfires are approaching the FRNP perimeter.

Where wildfires can be contained to an area below 100 hectares.

Where night or cool weather burning from existing buffers will enhance the existing buffer's effectiveness.

Because of its documented severe effects on fauna, "hot" backburning will be kept to a minimum.

Bulldozers or other machines are only to be used after due consideration of the immediate threat of the fire to the range of FRNP values, and the impact of this activity on disease spread, soil and landscape conservation and other environmental damages.

Proceedures and arrangements for actions in case of wildfires are to be listed in the District Fire Control Working Plan. This must

include an inventory of firefighting resources available in the district.

On days of Very High and Extreme fire danger, maximum preparedness will be maintained by FRNP staff including detection patrols and surveillance.

3.6 Local Liason

District staff will maintain close liason with the Ravensthorpe and Jerramungup shires, local Bushfire Brigades and FRNP neighbours to encourage mutual aid in fire prevention, detection and suppression activities in and near the FRNP.

3.7 Visitor Protection and Safety

Signposting of all roads will be maintained to enable safe evacuation in case of wildfire emergency.

Gas barbeques will be encouraged instead of open fireplaces.

Public education and awareness of fire risks and the use of fire will be promoted through pamphlets, information signs and personal contact by FRNP Staff.

3.8 Public Education

Interpretive material on the role of fire in the FRNP's ecosystems and in FRNP management will be produced and made freely available.

ATTACHMENT TO THE FIRE MANAGEMENT PLAN

FOR

FITZGERALD RIVER NATIONAL PARK

Fitzgerald River National Park Association
(Prepared by the Fire Sub-committee and compiled by Ken Newbey)

April 1987

INTRODUCTION

Almost since its re-formation in 1981, the Fitzgerald River National Park Association has felt that the fire policy for the park was both ad hoc and some aspects inappropriate. A sub-committee was formed during late 1986 to investigate fire policy for the park and to suggest improvments. Membership of the sub-committee included expertise on landscapes*, soils, flora and fauna. Local experience included management of natural areas and experience of fire behaviour in natural areas by farmers. Other members of the association also contibuted experiences and discussion.

This paper has been written for land managers in CALM, Shire Councils, Bush Fire Brigades, local residents and members of the association. Many of the terms used in this paper are explained in a glossary (Appendix II). These terms are indicated by an asterisk where they first appear in the text.

This paper is one of three documents on fire management in FRNP prepared by the association. The first is a Fire Protection Plan. The present paper provides background information to this plan. The third paper (in preparation) will discuss in more detail the scientific and technical aspects of fire management.

FIRE HISTORY

At present, management of fire in the park is based almost enirely on prevention. A plan is agreed to each year by the Ravensthorpe and Jerramungup Shires, and the Department of Conservation and Land Management (CALM). The aim of this document is to present an alternative approach based primarily on the conservation of landscapes, flora and fauna. Conservation of these aspects are the main purposes of national parks. Legal and ethical fire requirements will still be given high priority.

FIRE IN NATURAL AREAS

Pre-Aboriginal man, fire would only have occurred from lightning strikes. Recolonisation of plants occurred by suckering and from the seed bank. Fauna recolonised from surrounding unburnt areas, and from larger unburnt patches within the area burnt by the wildfire. No information is available on the frequency of fire in the park. Aboriginal man increased the rate of burning but this degree of increase is unknown.

European man added another factor to the fire ecology by clearing large areas for farmland. This had two effects. First, populations of most fauna species declined; some became extinct. Second, recolonisation areas were progressively reduced to a few corridors. For many species, the park has become an "island" and requires very careful management to maintain viable populations of these species. Some are very rare e.g. Ground Parrot, Heath Rat.

A preliminary assessment of the flora presents a different situation. Many species regenerate after fire by suckering; the remainder from seed. Factors to be considered for both flora and fauna, when planning fire management, will be discussed later.

DEFINITION OF A NATIONAL PARK
Planning and management of national parks requires a sound understanding of the definition of national parks, and their purposes in order of priority. A national park is:

"a relatively large area, barely altered by European man, that contains outstanding landscapes, flora and fauna."

PURPOSES OF NATIONAL PARKS
The following definition is that of the Fitzgerald River National Park Association, and agrees in principle with that of CALM:

"(a) The primary objective is to allow and encourage the continuation of previously more widespread natural processes in as natural a form as possible.
"This includes allowing and encouraging the conservation of species naturally occurring in the Park and the preservation of landscapes and landforms.
"(b) Secondary to (a) is allowing and encouraging the enrichment of human life through experience of natural surroundings without placing the primary objective at risk."

The emphasis and obligation is on the conservation of landscapes, flora and fauna.

LEGAL REQUIREMENTS
Land managers are required to contain* any fire on their land to within its boundaries. People suffering damage and loss from an escaped wildfire* may sue for damages. Ethically, land managers do not burn out their neighbour(s) deliberately or through neglect of fire control measures.

Land managers are also required to undertake fire protection of buildings on their land, staff, and the public in some cases.

PRESENT APPROACH TO FIRE
At present, fire management is based largely on the experiences and philosophies of CALM and Bush Fire Brigades. CALM's background is provided largely by foresters. They have been responsible for managing trees as a crop and their experiences are almost entirely with forests in high rainfall areas. Their main tool of fire control is periodic burning during cool and safe weather to reduce the amount fuel in the forest. Part of this approach is gridding the forest into sections for burning rotation and attempting to confine a wildfire to a single section. Grid tracks provide firebreaks for back-burning* in some cases. Once a wildfire has occurred, the emphasis is on control and suppression* by machinery. Because a crop (timber) is being destroyed, there is strong economic pressure to confine the fire to as small an area as possible. However, some research into control burning* for the preservation of rare fauna has been undertaken e.g Christensen (1980).

Bush Fire Brigades evolved mainly for the controlled burning of logged natural areas as part of their development into farmland. Nowadays, they are mainly concerned with burning stubble and pasture. Economics and the loss of stock and property are important considerations. The emphasis has been on wildfire prevention by installing good firebreaks etc. Fire suppression needed to be rapid to contain wildfires to as small an area as

possible. Mechanical means provided a rapid and effective method, particularly in farm paddocks. Wildfires in natural areas represent a different type of threat. The vegetation and rough country often meant that fire trucks were not, or only poorly suited, to fire suppression. Fire trucks are usually only farm trucks fitted with a tank of water and water pump. They are not designed for rough conditions. Even specially designed fire trucks are only slightly more suitable. Consequently, fire suppression has frequently depended on a bulldozed track close to the wildfire edge. The track acts as a narrow firebreak and the area becomes accessible to fire trucks. Existing tracks need to be in reasonable condition to reduce travelling time, as well as access to numerous water points to refill tanks. A wildfire in a natural area near farmland is of great concern to the locals.

In summary, the approaches by both CALM and Bush Fire Brigades are based on:

* prevention by a system of firebreaks and some fuel reduction possibly, on a grid pattern.
* control by mechanical means (bulldozers, fire trucks etc), that requires reasonable tracks and numerous watering points.

The above approaches are based heavily on prevention* and mechanical suppression. They only take limited account of aesthetic and biological values of national parks. CALM aims to divide the FRNP into a number of areas by back-burning low fuel buffer zones* from existing tracks. CALM is also required under their Act to search for gazetted rare flora and fauna*. The search generally consists of contacting a biologist with detailed knowledge of the area, followed by a field inspection. Field surveys have rarely been undertaken by CALM. Any rare flora and fauna located are to be taken into account when planning the burn. Within FRNP, a trial is underway into wind-driven, low fuel buffer zones* ignited by incendaries dropped from a plane.

The Association is attempting to formulate a philosophy and techniques more appropriate to the park with its high landscape and ecological* values. The park is one of the best in Western Australia south of the Kimberley. It is one of two International Biosphere Reserves in W.A. It is anticipated that the philosophies and techniques of a National Park Fire Plan (NPFP), outlined below, will have a much wider application than just the Fitzgerald River National Park. Practical experience of the NPFP should result in finer tuning of both the philosophy and the techniques.

PARK MANAGEMENT

"Sound and effective resource management including fire management can not be based on limited data, biased information and planning. Managers must be self critical and the only way to achieve this is through an understanding of the basic ecological principles that underlie effective resource management and planning." (Good 1985).

Management includes a wide range of purposes and techniques that are continually being refined. Of great importance for planning and management are the facts that:

* a national park can not be managed in isolation as it is part of a total landscape that includes other land uses on its boundary.
* fire is only one of many aspects that must be considered.

some park developments for one purpose will be incompatible for another. A recent example is the reconstruction of sections of the Quoin Head Track for Dieback prevention. Steep slopes have necessitated numerous cross-drains to prevent severe erosion and to keep the track as dry as possible. These drains are 15-30 cm deep and can only be crossed by a 4WD vehicle in low gear in low range. Firetrucks would require 4WD to travel this track and then very slowly in low range. Repeated crossing of cross drains would undoubtedly result in structural damage to trucks with water (e.g. broken springs). The only suitable vehicles would be small 4WD flat-tops carring up to one tonne of water.

NATIONAL PARK FIRE PLAN

DEFINITION

"A National Park Fire Plan is based primarily on maintaining landforms, soils, flora, fauna, aesthetic values and the legal requirements and ethical obligations of containing wildfires within the park".

Presented below is a general outline of the plan with some aspects discussed in varying detail. A more detailed document is being prepared at present.

Three major aspects of the plan are involved: (a) establishment of a low fuel buffer zone as close to the park boundary as practical, (b) dividing the park into fire ecology sections, and (b) the methods of installing low fuel buffer zones between the sections. Literature on (b) is unknown so assessment techiques will need to be developed as the project progresses.

FIREBREAKS* AND LOW FUEL BUFFERS ZONES

The bare soil surface of firebreaks has the potential risk of water erosion on slopes, and wind erosion of loose sands. Water erosion on slopes can be largely controlled by cut-off drains. Wind erosion could be controlled by sheeting with gravel etc. Apart from the erosion potential, firebreaks are aesthetically poor. They are tempting to be used by the public without authorisation.

One problem of low fuel buffers is that not all vegetation types present will burn under cool conditions. If burnt under warmer conditions, then the chances increase of controlled burns escaping. Another problem is that low fuel buffers are not always in the direction range of the best winds for burning.

Another method of installing low fuel buffers is edge burning off a track or firebreak during cool weather.

WIND-DRIVEN LOW FUEL BUFFERS

They can be lit manually on the ground, or ignited by incendiaries dropped from an aeroplane. The latter method has been under trial in Marningerup section of the FRNP with one attempt each in winter 1985 and spring 1986. The success rate has been low - mainly due to inexperience. A major problem is having the specially adapted aeroplane over the park at the right time. The plane is used for aerial "bombing" over the whole of W.A. Each planned event is given a priority rating. Only one to three hours may have the desired weather conditons for igniting the vegetation.

.lso, a decision has to be made the previous afternoon if coming to the park. Weather predictions by the Bureau of Meteorology do not have a high success rate in the park area. To overcome this problem, consideration should be given to using a local plane that can be operational in less than an hour. This would mean devising a "bombing" mechanism suited to a single engine plane.

The second problem is igniting some vegetation types. They are mallee types whose canopies cover more than 10% of an area. Mallees are more difficult to ignite than low shrubs with small leaves and fine branches. The denser stands of mallee have less low shrubs and more bare ground - decreasing the chances of a "bomb" landing in a suitable place to ignite the vegetation. Some consideration is being given to larger "bombs" and possibly materials that burn with more heat.

WEATHER CONDITIONS FOR WIND-DRIVEN LOW FUEL BUFFERS

The technique is based on burning during warm days in winter, followed by a cold night. An important requirement is a wind of moderate speed blowing from one direction for a few hours during the hottest period of the day. Ideally, such a wind will burn a strip about 400 m wide and a few km long. The potential of the vegetation to burn will depend on vegetation type, period since last fire, previous rainfall, temperature and wind strength. An approaching cold front has the best potential to provided suitable temperature and wind conditions. Some cold fronts bring small falls of rain. In most cases, either the rain or the cold night temperatures would extinguish the fire.

FIRE AND THE PUBLIC

The public using a national park are expected to use common sense in relation to fire. Burning low fuel buffers around the main camping areas destroys the aesthetic values and is not necessary.

However, some protective measures are practical. Barbeques need to be sited in safe places. Some thought should be given to gas barbecues because of their fire safety compared to wood barbeques. (Also, wood barbecues generally mean that surrounding vegetation is slowly used as fuel.) Open fires should be banned during the summer.

During a wildfire, it may be helpful to erect temporary signs on tracks directing park visitors to safety.

FIRE SUPPRESSION

Only very small wildfires would be suppressed provided that suitable machinery (bulldozer, fire truck) was nearby. Larger wildfires would be left to burn themselves out within their section. This would be a major advance in reducing the cost and inconvenience of wildfires.

Local Bush Fire Brigade(s) would not be needed at wildfires within the park. This would represent a major saving in farmers' travelling costs and time. Fires in natural areas usually result in some vehicle damage; this would be eliminated. However, brigades would need to be involved if a major wildfire was approaching the park boundary where the low fuel buffer zone had been poorly burnt.

A wildfire burning itself out within a section would not require a bulldozed firebreak - a major saving in cost and ecological damage.

Other benefits would occur. Tracks would not need to be upgraded only for fire control purposes. Possibly, some rarely used tracks could be eliminated - depending on the park management plan. Water points would not be needed as water would only be required for very limited back-burning in a few areas.

The fire suppression methods outlined above are a major change from the present approach of mechanical methods. They may be difficult to accept by people who have had a long history of suppressing fires as quickly and efficiently as possible. However, the advantages are major in the saving of time, vehicles and ecological damage.

FIRE PLAN

Following are the basic requirements in order of priority:

(1) Foremost is that this NPFP be part of the management plan* for the park. The NPFP can not be drafted and implemented on its own. (A management plan should be commenced June 1987.)

(2) A suitable low fuel buffer to be installed around the park boundary. Any natural firebreak should be part of the boundary buffer e.g. permanent water in Phillips River. The present buffer is between two firebreaks 50-300 m apart. Rough terrain in some places influences both the position and width of the low fuel buffer.

(3) The park is to be divided into a number of fire ecology sections by low fuel buffer zones so that a major wildfire would be restricted to one section and could not burn the whole park. Such a wildfire would be disastrous by eliminating some species of fauna - some rare.

(4) CALM buildings and facilities are to be protected against wildfire - especially ranger's houses and associated buildings.

(5) Education of the public on the dangers of wildfires and the promotion fire safety measures.

FIRE ECOLOGY SECTION

Each section consists of a number of vegetation types*. Sections are to be separated by low fuel buffer zones of sufficient width to control a wildfire under extreme conditions of heat and wind e.g 300-400 m.

Where practical, each fire ecolgy section is to be viewed as largely self-sustaining with regards to flora and fauna. However, the burn age* of surrounding sections should be such that some will be a source for recolonisation.

Determining the size range of sections will depend on the survival requirements of the flora and fauna. Also, the sections need to be within a practical range that allows for species survival as well as requiring a realistic length of separating low fuel buffer zones. Each section will have its own unique set of values. Rarely will boundaries of sections co-incide with existing roads and tracks.

The composition of each section will be based on:

(a) mosaics of vegetation types;
(b) vegetation types (structure and species composition);
(c) individual species - with special attention to rare species.

RARE FLORA AND FAUNA

Special attention is required for areas with rare flora and fauna. The distribution and biology of both need to be known before burning is planned. Areas of known distribution should not be burnt until both are known in moderate detail.

DATA BASE

A sound data base is fundamental to mapping the fire ecology sections and developing the appropriate techniques. At least the following are required for a sound data base:

(a) Species present and their distribution within the park; wider distribution and conservation potential (given present art of natural area management);
(b) Species ecological requirements influenced by fire;
(c) Description of vegetation types;
(d) Vegetation mapping;
(e) Fire age map (including natural firebreaks);
(f) Fire regime* of each vegetation type (including computer modelling);
(g) Fire behaviour on different landforms under a range of weather conditions (including computer modelling);
(h) Mapped access.

FIRE ECOLOGY DATA

Little is known about re-colonisation and re-vegetation following a fire. Most sites recorded during the above biological survey were in mature vegetation; few were in immature vegetation. Two sites, 4 years post-fire, were recorded in the Marningerup study (Chapman 1984, Newbey 1984). During the present biological survey, a number of sites have been established in the area of the January 1985 wildfire, and monitored one year later. Existing data needs to be assessed for the major vegetation types, to highlight missing recordings for a basic understanding of fire regimes.

COMPUTER MODELLING

PREPLAN, a fire behaviour model, has been developed for the Tutanning Nature Reserve in the Narrogin district (Good and others 1984). The reserve has some vegetation types with similar structure to the FRNP. As yet the model has not been tested in the reserve but will soon be trialled in the northern Jarrah forest. PREPLAN should be investigated further, particularly as a major data base has been recorded by the present biological survey (to be completed end of June 1987).

DIFFERENCES BETWEEN NPFP AND PRESENT FIRE PROTECTION PLAN

(1) Where and how the park is divided into areas is the first major difference between the two plans.
(2) Fire ecology sections would be mainly separated by wind-driven low fuel buffer zones ignited either by areoplane or manually, as against back-burning off roads and tracks.

(3) Apart from the boundary low fuel buffer (and protection for CALM buildings), no firebeaks would be installed. Fire access tracks would not be required.

(4) Fire suppression would be limited to very small wildfires provided that suitable machinery was nearby. Larger wildfires would be left to burn themselves out within their section.

CHANGE-OVER PERIOD

This period (3-4 years) will be a worrying time. The park does need to be divided into smaller sections than the present situation of two large sections with a north-south burn roughly along Drummond Track. The largest section is west of Drummond Track. Trial aerial burns are planned for the winter of 1987. Edge-burning from tracks should be minimal unless they co-incide with boundaries of ecological sections.

ADVISORY GROUP

An important factor in the development of improved understanding of fire management is the turn-over of CALM personnel. Much of the experience gained by the Head Ranger etc. will be lost when they move to another position. The new person will have to re-develop this experience. A suggestion is a small, local advisory group consisting of people who have been in the area for many years and have wide fire experience. They would assist the Head Ranger until he became competent at understanding the local climate and fire behaviour of different vegetation types.

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APPENDIX I

FLORA and FAUNA CONSIDERATIONS

FLORA (K.R. Newbey)

The FRNP's flora is of international importance. Southwestern Australia (west of a line from Sharks Bay to Israelite Bay) has over 4,500 species. At least 75-80% of these occur nowhere else in the world. New species are

still being found there frequently. About 1,700 species have been recorded in the FRNP or about 19% of known WA species (9,000). Some have only been recorded in the park. By comparison, the Stirling Range National Park has about 1,000 recorded species.

Based on incomplete assessment, it appears that all flora taxa will tolerate a single wildfire. Many taxa regenerate freely by suckering after fire. Others germinate freely from seed. Problems will begin when fires occur at intervals too short to allow a suitable seed bank to have accumulated since the last fire. Some species will decline in numbers while those that seed both freely and soon after a fire, will become more dominant. Both species composition and vegetation structure will change. Weeds are present along most creeks and rivers and will increase greatly in some vegetation types with frequent burning. Areas ajoining farmland are high risk for weed infestation.

FAUNA (A. Chapman)

1) Excluding some offshore islands FRNP is one of the most important fauna reserves in southern WA. This applies particularly because of the presence of Tammar Wallaby, Red-tailed Wambenger, Western Mouse, Heath Rat, Dibbler, Ground Parrot, Western Bristlebird and Western Whipbird.

2) In the north of FRNP there is a strong correlation between long unburnt vegetation and presence of rare fauna (see enclosed map). There can be little doubt that these are causally related. Long unburnt vegetation in this case is in excess of 30 years post fire. Note however that there is also a range of species "the common ones", which are more tolerant to more frequent burning.

3) All long unburnt areas must be considered potential repositories of rare and endangered fauna possibly, including as yet undetected species. Therefore a fire management plan must be directed towards protecting these areas.

4) HOWEVER beyond a certain age, which is at present unknown, long unburnt bush may become incompetent to support rare fauna. This is hardly understood at all but probably relates to nutrient and energy cycling between soil --> plants --> vegetation --> animals --> soil.

5) THEREFORE fire management or survival of rare fauna must be directed at both protecting and re-juvenating long unburnt bush. In practice this is achieved by maintaining a mosaic of areas of different fire age which adjoin a large patch of unburnt bush. THIS IS THE CRUCIAL FACTOR. The commonly held view to take out all long unburnt bush would be disastrous for conservation of rare fauna in FRNP. Long unburnt patches should be edge burnt rather than bisected by a control burn to avoid:

a) their becoming too insular, and
b) their size being reduced beyond a point where they can sustain rare and endangered populations.

Diagrams at the end of text illustrate approaches to burning areas containing rare fauna.