

**DRAFT  
MANAGEMENT  
PLAN**

**number 1**

**'Avon Valley'  
Nature Reserve  
No. 30191**

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DEPARTMENT OF  
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PERTH

1980



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DRAFT MANAGEMENT PLAN  
No. 1,

"AVON VALLEY" NATURE RESERVE  
(CLASS A RESERVE No. 30191)

BY

IAN G. CROOK AND TREVOR EVANS

1980

## PREFACE

The "Avon Valley" Nature Reserve is one of a system of over one thousand Nature Reserves set aside to perpetuate areas of the natural and semi-natural vegetation and wildlife of Western Australia.

The "Avon Valley" Nature Reserve has two features which single it out for special attention. It is one of the major Nature Reserves of northern Jarrah forest and it is one of a select few within easy reach of the Perth Metropolitan area.

These "Metropolitan" Nature Reserves are used by many people, and their use is increasing with the popular interest in wildlife conservation. The ability of the Metropolitan Reserves to meet this demand without cost to their natural values will depend on management. This draft management plan is the first of a series for the Nature Reserves of the Perth Metropolitan Area and environs which will take account of this need and begin to draw them together: a system within a system dedicated to providing as many people as possible with places to study, learn about or just contemplate the intricate patterns of nature.

This plan is now open for comment from all interested people and organisations. It is only through the participation of the community in their management that Nature Reserves can best serve the interests of the people for whom they were set aside.

*B.K. Bowen.*

B.K. BOWEN

Director  
Department of Fisheries and Wildlife,  
March 1980.

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## ACKNOWLEDGEMENTS

Comments and assistance of the Conservator of Forests, the Director of the National Parks Authority and the Superintendent of the Bush Fires Board in the preparation of this management plan are gratefully acknowledged. We also wish to thank Mr N.G. Ashcroft (Forests Department); Mr R. Anderson (National Parks Authority); Mr J. Dival (Deputy Chief Bushfire Control Officer Toodyay Shire); Messrs. B.W. Harris and R. Jones (Bush Fires Board); Dr S.D. Hopper (Wildlife Research Centre, Department of Fisheries and Wildlife); Mr C. Kendall (Fire Control Officer, Toodyay Volunteer Bushfire Brigade); Messrs. R. May and B. Muir (National Parks Authority); Mr T. McLoughlin (Captain, Bullsbrook Volunteer Bushfire Brigade) and Mr G.H. Park (Co-ordinator Avon Region 2 Fire Protection Plan) for their many helpful ideas and suggestions.

## THE RESERVE

Class A\* Reserve no. 30191 (1991 ha) is the principal Nature Reserve in the central, higher rainfall (800-1400 mm/yr) area of the Darling Range between Chittering in the north and Mt. Cooke in the south (Fig. 1).

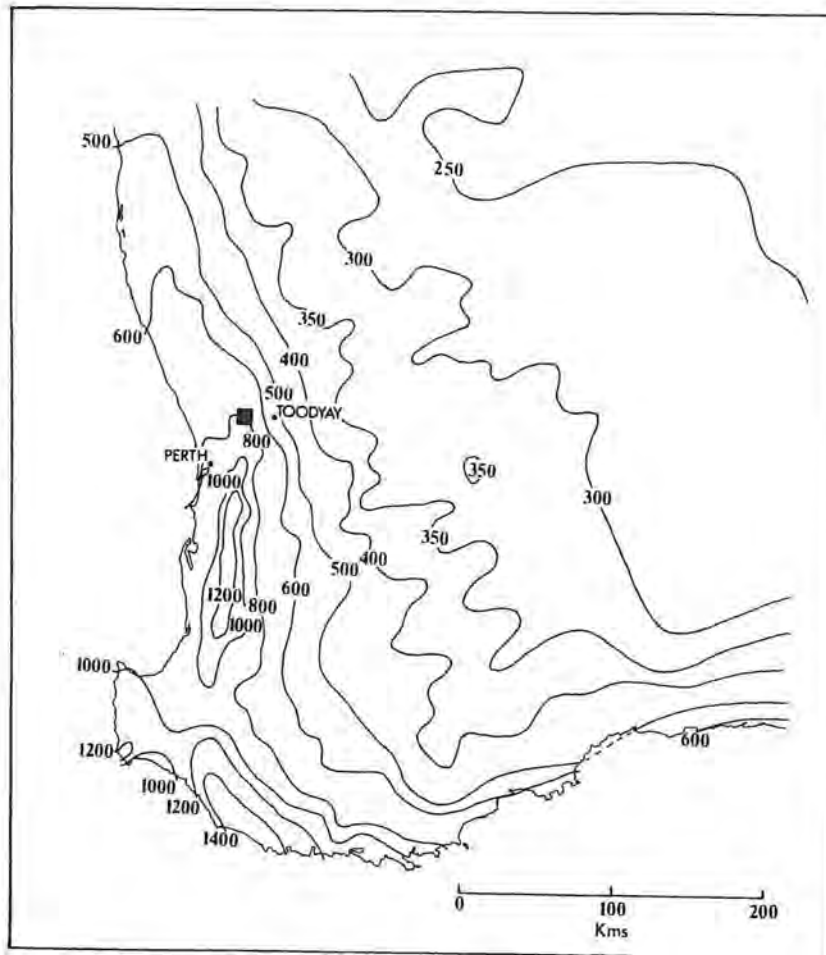


Figure 1. Rainfall map of southwestern Australia (after the Average Annual Rainfall Map of W.A. Based on complete Records to 1979. Department of Science, Bureau of Meteorology 1980) showing location of Nature Reserve A30191 (■).

\* Class "A" in terms of the Land Act 1933.

The Reserve lies about the junction of Plunkett and Sapper Roads ( $31^{\circ}35'S$ ,  $113^{\circ}16'W$ ) north of the Avon River and Bald Hill and about 13 km east of Lower Chittering. It is bounded to the north and east by freehold farmlands mainly under cereal crops, pasture and some citrus orchards, to the south by the Avon Valley National Park (A30192) and to the west by Crown land covering mineral tenements held by Pacminex Ltd., representing a bauxite resource for a proposed smelter in the Perth area (Fig. 2).

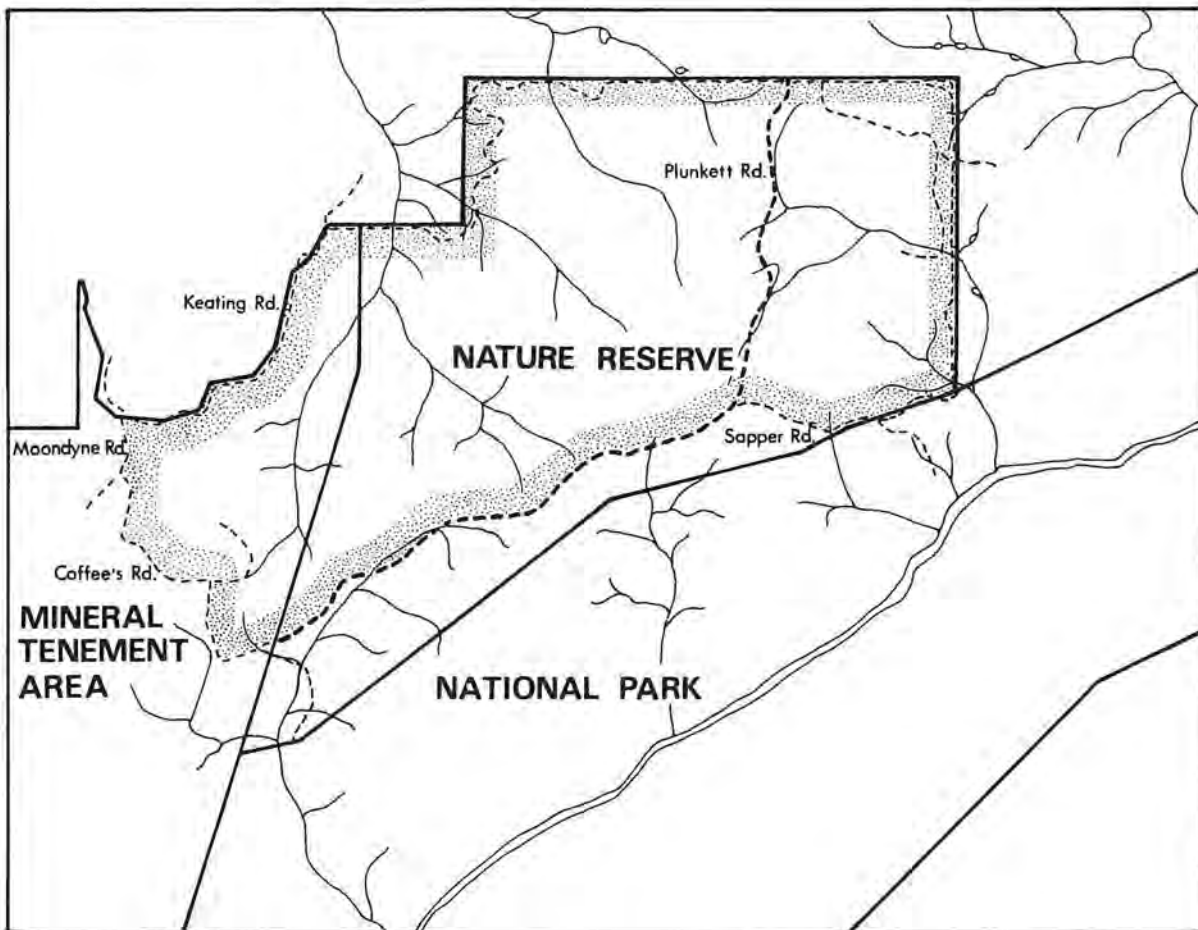


Figure 2. The "Avon Valley" Nature Reserve (solid black lines) and the "Nature Reserve Management Unit" of the Avon Region 2 Fire Protection Plan (stippled border) showing tracks and roads (dashed lines).

The Reserve lies on a gently sloping plateau 275 m - 300 m a.s.l. immediately north of the Avon River Valley, the sides of which here are steeply sloping, falling some 200 m in about 3 km, almost entirely within the bounds of the National Park.

The Reserve is thus representative of the uplands of the Darling Range in this region, the soils being principally lateritic gravels and loams with some sandy loams, particularly in the east, and the vegetation is predominantly open forest with Jarrah (*Eucalyptus marginata*), Marri (*E. calophylla*), Powderbark Wandoo (*E. accedens*) and Wandoo (*E. wandoo*) being the main tree species represented.



## 1. INTRODUCTION AND HISTORY OF THE RESERVE

The land now occupied by the Reserve, the Avon Valley National Park, Reserve A30193 (a timber reserve vested in the Conservator of Forests) and the mineral tenement area west of the Reserve (totalling 34 526 acres (13 970 ha) was previously a single block of Commonwealth land\*, once a military training area.

In 1965 representations were made by the then Chief Secretary and MLA for Toodyay to the Minister of Lands suggesting that the military training area, which was then disused, be acquired from the Commonwealth for the purpose of establishing a National Park and Fauna Reserve (J.F. Craig (1965) *in litt.*).

During subsequent negotiations further representations were made by members of the public, some to the Department of Fisheries and Wildlife, pointing out the values of the area as a potential reserve for flora and fauna.

One of these representations contained a list of wildlife, which included the dalgyte (*Macrotis lagotis*), a marsupial once common throughout the agricultural areas of the State but now very rare and possibly extinct in the south-west.\*\* As a consequence the Director expressed the Department's interest in the area to the Under Secretary for Lands.

It was mooted that the area then proposed as National Park could be extended to take in all the Crown land that would be available by declaring that part north of the proposed National Park a Nature Reserve.

Acquisition of the land and its subdivision was completed in 1970 with the gazetting of the National Park and Timber and Nature Reserves; and this Department later co-operated with the Forests Department, the National Parks Authority and Bush Fires Board in the production of a joint Fire Protection Scheme for the area as a whole (Avon Region 2 Fire Protection Plan).

This called for new construction and upgrading of roads and tracks throughout the Reserve complex and a programme of prescribed burning. The extended six year interval covered by the plan ended at the end of the Financial Year 1978-79.

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\*The present Reserve complex also includes an earlier water reserve (no.2154) adjacent to the original block of Commonwealth land.

\*\*The report of dalgytes from this area has never been confirmed. They were quite common around Northam in 1926 but suffered a massive decline throughout the Agricultural areas shortly thereafter (Jenkins, C.F.H. 1974. W.A. Naturalist 12 : 169-172.

The present management plan is intended to supplement the revised Avon Region 2 Fire Protection Plan which came into operation on July 1, 1979. It also extends the principle of integrated management established in the Avon Region 2 Fire Protection Plan to facets of National Park and Nature Reserve Management other than fire protection and aims to ensure that nature conservation values of the Reserve are maintained and enhanced in the future.

## 2. TOPOGRAPHY SOILS AND VEGETATION

The Nature Reserve is part of a south-west leading ridge of the Darling Range separating the Avon and Brockman River Valleys. The Reserve is mainly a series of gently sloping ridges and gullies covering the heads of two catchments - one draining north and west into the Brockman River Valley and the other south and east into the Avon, the watershed lying north and west of Plunkett Road (Fig. 2). The southern part of the Reserve also contains limited areas of more steeply sloping land, being the upper slopes of the Avon River Valley.

The soils are predominantly exposed lateritic gravels and loams with some sandy loams. In the south-eastern corner, on the more steeply sloping edge of the Avon River Valley, outcrops of granite are partly covered by red loams.

The main vegetation formations found on the Reserve (Fig. 3) are open Jarrah/Marri forests (Fig. 4) and open forests of Powderbark Wandoo with varying amounts of Jarrah and Marri (Fig. 5). The predominantly Jarrah forest covers most of the main ridge system and the south-facing slopes, Powderbark Wandoo being mostly on the north and north-west slopes. Less extensive are areas of open Wandoo forest (Fig. 6) and *Acacia acuminata/Casuarina huegliana* woodland (Fig. 7) in the eastern part of the Reserve. In all cases the forests have been cut-over for Jarrah and Wandoo sawlogs.

The understoreys of the forest associations are generally of low shrubs, averaging 0.5-1.0 m in height, and sparse in density, consisting of species such as *Grevillea bipinnatifida*, *Leptospermum erebescens*, *Dryandra nivea*, *Adenanthos barbiger*, *Petrophyle* sp and *Hibbertia* spp. with varying amounts of eucalypt regeneration, *Xanthorrhoea* and *Macrozamia* palms (Figs. 4-7).

Of particular interest, also, are a number of populations of *Conostylis* species : *C. androstemma*, *C. caricina* and *C. setosa*. Those of the first two species are especially large and dense and ideally suited for research purposes. The third is endemic to the Darling Range and contributes substantially to the biological values of the Reserve.

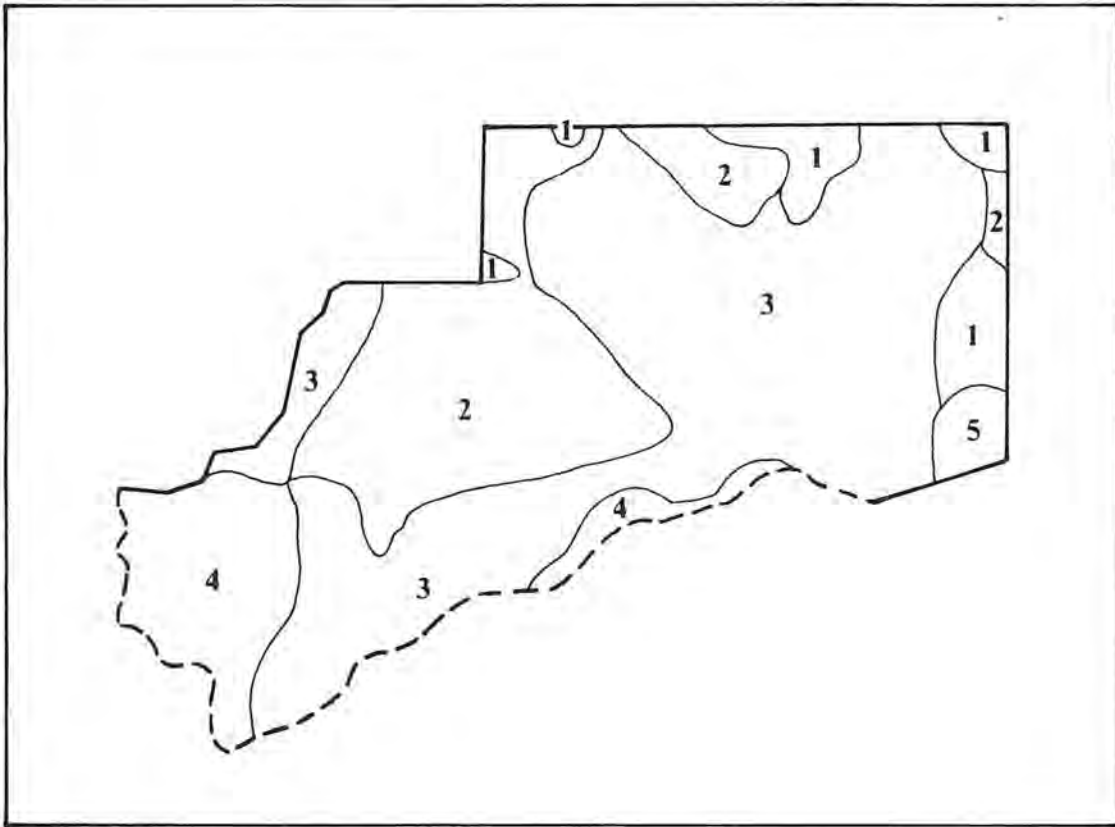


Figure 3. Vegetation of the "Nature Reserve" management unit. 1. Wandoo forest; 2. Predominantly Powderbark Wandoo forest; 3. Jarrah/Marri forest with dwarf shrub understorey; 4. Jarrah/Marri forest with *Dryandra/Banksia* understorey; 5. *Acacia acuminata/Casuarina huegiana* woodland.



Figure 4. Open forest of Jarrah and Marri with dwarf shrub understory.



Figure 5. Open forest of Powderbark Wandoo.



Figure 6. Open Wandoo forest.



Figure 7. *Acacia acuminata*/*Casuarina huegliana* woodland.



Figure 8. Open forest of Jarrah and Marri with denser understorey of *Dryandra sessilis* and *Banksia grandis*.



Figure 9. Open forest of river gums - (*Eucalyptus camaldulensis*/*E. rudis* hybrids).

### 3. NATURE CONSERVATION VALUES

The landforms and vegetation of the Nature Reserve are partially representative of the mid-northern part of the Darling scarp, and the presence of plants such as *Conostylis setosa* indicates that the Reserve may be a significant refuge for some of the large number of species endemic to the region. Being situated near the northern limit of the forested part of the Range the Reserve is also likely to support species more characteristic of the northern sand-heaths and woodlands. The population of probable *Eucalyptus camaldulensis/rudis* hybrids is a subject of further study, and, as closer examination continues, there seems little doubt that such a relatively large area of northern Jarrah forest will be found to contain other similarly valuable features.

Mainly covering the upland area, however, all the landforms, soils and vegetation present in the Avon reserve complex as a whole are not well represented in the Nature Reserve. It may also lack a permanent water supply. It should therefore continue to be considered as part of a larger unit and management of the Nature Reserve should continue to recognise the integrity of the area as a whole.

Being close to Perth and adjacent to the Avon Valley National Park the Nature Reserve has considerable potential for public use. There is no focus for purely recreational activity in the Reserve to match the Avon River which winds its way through the National Park. However, the wildflowers and rich birdlife of the Reserve are centres of interest to naturalists and enhance the potential of such a large area of diverse forest and woodland vegetation so near to Perth for development for environmental education purposes. These potential values neatly complement recreational opportunities offered in the National Park. The Reserve also provides an area in which to study the effects of fire control measures involving prescribed burning rotations possibly longer than those practiced in forests managed for timber production. Populations of *Conostylis* and hybrid *Eucalyptus* species also have substantial research interest.

### 4. PAST MANAGEMENT AND FIRE HISTORY

The main management impetus for the Reserve during the past six years has been provided by the Avon Region Fire Protection Plan 1973-78. This divided the Crown land area of which the Reserve is a part into five management units for fire protection purposes. These are partly independent of statutory boundaries. It also allowed for improvements to access, completion of further roading of the management units, and it established cycles of prescription burning of three to seven years length in all areas covered by the Plan. Figure 2 shows how a management unit under the Plan covers most of

the Reserve plus part of the Crown land to the west of the lines of Moondyne and Coffee's Road. This will be referred to as the "Nature Reserve" management unit.

#### 4.1. TRACKS AND ROADS ON THE NATURE RESERVE

During the currency of the 1973-78 plan new roads were built around the northern and eastern boundaries, joining with existing roads (Sapper, Plunkett, Coffee's and Moondyne Roads) to complete a system of peripheral roads for the "Nature Reserve" management unit (Fig. 2).

In addition to the peripheral roads one north-south access route (Plunkett Road) has been maintained.

All these roads have been built and maintained to a very high standard.

#### 4.2. FIRE HISTORY

In February 1972 a serious wildfire burnt some of the northern slopes of the Avon River Valley and the Crown land under mineral tenements to the west of the Reserve. The fire was moving in a north-west direction and a fire team from the Department prevented it from seriously damaging the Reserve by back-burning from Sapper/Plunkett Roads. The fire spread westward, through the Crown land area and affected some private holdings. It was directly as a result of this fire that the first Avon Region Fire Protection Plan was formulated and put into effect.

Since 1972 several smaller fires, the latest one in 1977, have started near the River or the railway line at the bottom of the Avon Valley and have burned up the same northern slope under prevailing wind conditions. All these fires have been stopped on the scarp itself.

During the late summer of 1978, during Cyclone "Alby", a fire entered Crown land and the extreme north-western corner of the Nature Reserve from the north-west. This fire was extinguished after having burnt over some 60 ha of Jarrah/Marri forest, an area including two spot fires which started ahead of the main fire front on the north-west slopes of the main ridge system.

Fire units from the Department attended each of these fires.

In addition, the whole "Nature Reserve" management unit set up under the Fire Protection Plan was burned during the Spring of 1975 as part of the prescribed burning programme.



## 5. MANAGEMENT OBJECTIVES

### 5.1. FIRE PROTECTION

Consistent with the need to protect the assets of adjacent landholders and the nature conservation values of the Reserve, to prevent, control and suppress such fires as may occur on the Reserve.

### 5.2. PUBLIC USE

To encourage use of the Reserve for environmental education and passive recreation at an intensity consistent with the perpetuation of the biological values of the Reserve.

### 5.3. RESEARCH

To encourage research of a non-destructive nature which may increase knowledge of the Reserve, its flora and fauna and forest ecosystems generally and which can be executed without affecting use of the Reserve for recreation and education purposes.

## 6. MANAGEMENT - FIRE PROTECTION

Fire protection measures for the Reserve will include programmes of prescribed burning and maintenance of access to the Nature Reserve, these programmes to complement or replace provisions of the Avon Region 2 Fire Protection Plan.

### 6.1. PRESCRIBED BURNING

The "Nature Reserve" management unit delineated in the Avon Region 2 Fire Protection Plan will be maintained as a single unit for prescribed burning purposes. Prescribed burning will be carried out under the supervision of the Department of Fisheries and Wildlife in consultation with officers of the Bush Fires Board. The remaining part of the Nature Reserve outside the management unit will continue to be managed under the Avon Region 2 Fire Protection Plan.

#### 6.1.1. Prescribed Burning Intervals

Estimates of fuel loadings on the Nature Reserve using the method of Sneeuwjagt, R.J. (1973) ("Measuring Forest fuels" : Forests Department Research Paper No. 9) show that rates of fuel

accumulation on the Nature Reserve are less than projected in the Avon Region 2 Fire Protection Plan.

Nine fuel assessment transects made in July 1979 in Jarrah/Marri, Powderbark /Jarrah/Marri and Wandoo forest types with typical understoreys gave a mean fuel loading of  $4.5 \pm 2.1$  (SD) tonnes/ha for an all-foliage consuming burn (Table 1). The last prescribed burn of the area was in Spring 1975 and we estimate that fuel loadings will not reach the safe ceiling of 8-10 tonnes/ha prescribed by Forests Department and Bush Fires Board in less than ten years.

TABLE 1. FOREST FUEL QUANTITY

SITE NO.	FOREST TYPE	TOTAL FUEL* (Tonnes/ha)
1	Wandoo over dwarf shrubs	3.3
2	Wandoo over dwarf shrubs	3.2
3	Wandoo over dwarf shrubs	2.9
4	Jarrah/Marri over dwarf shrubs	2.8
5	Jarrah/Marri over dwarf shrubs	3.9
6	Jarrah/Marri over dwarf shrubs	3.3
7	Jarrah/Marri - <i>Dryandra sessilis</i>	6.7
8	Jarrah/Marri - <i>Banksia/Dryandra</i>	5.5
9	Jarrah/Marri - <i>Banksia/Dryandra</i>	8.8

\* Total litter weight plus total scrub weight.

The estimates further show that fuel accumulation is higher in areas of Jarrah/Marri forest with *Banksia grandis* and *Dryandra sessilis* understoreys. This is a minor vegetation type in the "Nature Reserve" Management Unit (Fig. 3), the largest area being in the mineral reserve near the western boundary. This area will probably require burning at more frequent intervals than the remainder of the management unit to maintain fuel loadings below 8-10 tonnes/ha. The burning prescription will therefore make provision for the isolation and separate treatment of this area.

#### 6.1.2. The Burning Prescription

In all areas of the Nature Reserve Management Unit fuel levels will be maintained below 8-10 tonnes/ha.

The area of Jarrah/Marri forest with *Banksia/Dryandra* understorey previously mentioned (Area 1 of Fig. 10) will be isolated from the remainder of the Management Unit by a 3m wide firebreak and hand burned by the Department of Fisheries and Wildlife during the spring of the year or autumn of the year following accumulation of 8-10 tonnes/ha of litter and shrub layer fuel.

The main part of the management unit (Area 2 of Fig. 10) will be burnt by aerial techniques by the Department of Fisheries and Wildlife in co-operation with officers of the Bush Fires Board as part of the Avon Region 2 Fire Protection Plan. This burning will be programmed for the spring of the year or the autumn of the year following accumulation of 8-10 tonnes/ha of litter and shrub layer fuel.

The narrow strip of the Reserve between the northern access track and the northern boundary will be burnt by hand during the spring of 1980 or the autumn of 1981. This northern fringe was apparently not burnt during the 1975 prescribed burn.

Volunteer Bushfire Brigades in the region will be invited to assist in hand-burning operations on the Reserve on an ex gratia basis.

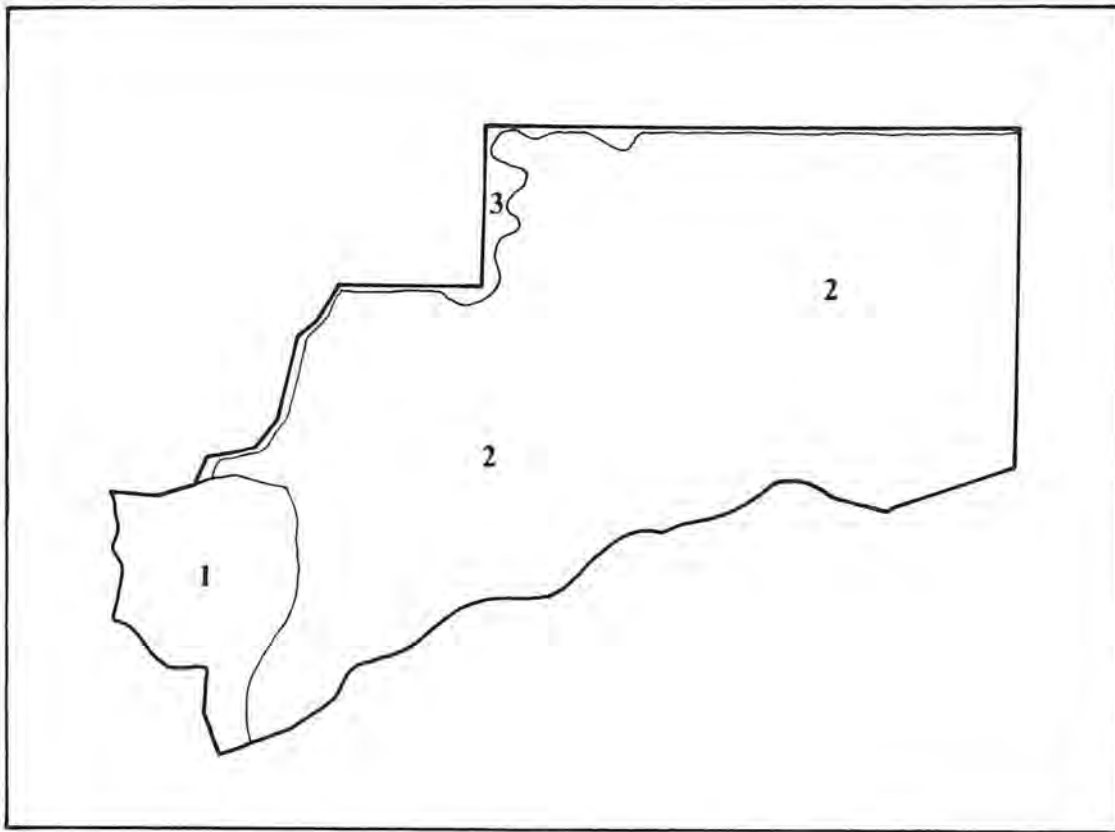


Figure 10. Prescribed burning areas for the Nature Reserve Management Unit of the Avon Region 2 Fire Protection Plan. Area 1 : "High fuel" area with dense *Dryandra/Banksia* understoreys. Area 2 : "Low fuel" area with dwarf shrub understoreys. Area 3 : Northern fringe.

## 6.2. TRACKS AND ROADS

The Avon Region 2 Fire Protection Plan allows two levels of access on the "Nature Reserve" Management Unit on roads built or upgraded for the purpose (Fig. 2), viz:

- A main access along Plunkett Road adequate to carry heavy earthmoving equipment transporters, and
- Secondary tracks to provide access for fire fighting units.

Under this management plan the Department of Fisheries and Wildlife will maintain the roads on the Nature Reserve to standards adequate for these purposes.

### 6.3. FIRE SUPPRESSION

The Department of Fisheries and Wildlife maintains two medium (1100 - 2000 l capacity) and two light (650 l capacity) fire fighting units at the Wildlife Research Centre, Wanneroo.

These units form part of the fire-suppression strength of the Avon Region 2 Fire Protection Plan and will attend all fires on the "Avon Valley" Nature Reserve. If available units will also attend fires in the vicinity of the Nature Reserve.

Fire notification will be through the provisions of the Avon Region 2 Fire Protection Plan and through fire notification contacts established for the Nature Reserve to supplement the Avon Region 2 Fire Protection Plan.

## 7. MANAGEMENT - PUBLIC USE

Public use of the Nature Reserve will be managed as provided by Regulation 46 of the Wildlife Conservation Regulations. The Reserve will not be classified under Section 12A of the Wildlife Conservation Act in the meantime, but parts of it may be classified as limited access areas during the currency of this Plan if vehicular use begins to prejudice conservation values.

It is intended that development for public use should complement developments in the adjacent National Park, the Nature Reserve providing opportunities for passive recreational activity and environmental education. During the currency of this plan the Department of Fisheries and Wildlife may publish maps and guides to the Nature Reserve as sources of public information and resource material for education purposes.

## 8. MANAGEMENT - RESEARCH

The Department of Fisheries and Wildlife may let contracts for research on the flora and fauna of the Reserve and the ecology of the forest in relation to fire protection management.

As a preliminary step provision will be made for a further survey of the vegetation and a study of the distribution of plants on the Reserve, particularly of those restricted to the region and which are found only on the Darling Scarp and Plateau.

## 9. MANAGEMENT - GENERAL

During the currency of this plan the Department of Fisheries and Wildlife may, with the approval of the Chairman of the Wildlife Authority, undertake such other work and research which may become necessary to properly promote the stated objectives of management of the Nature Reserve.