FORESTS DEPARTMENT OF WESTERN AUSTRALIA

LAND USE MANAGEMENT PLAN

FOR

DRYANDRA FOREST

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LAND USE MANAGEMENT PLAN FOR DRYANDRA FOREST

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INTRODUCTION

Hardwood forests in the Dryandra area have been protected and managed by the Forests Department since 1926. In the early development of Western Australia, tanbark from the several species of mallet was quite an important aspect. The principal species used was brown mallet (*Eucalyptus astringens*). Following widespread destruction of this species by the combined effects of tanbark stripping, farm clearing and uncontrolled fire, a classification of the remaining mallet forest led to areas of mallet being progressively gazetted as State forest or Mallet Reserves.

Mallet has a very restricted natural range, but it has been possible to extend the original area by planting some of the better wandoo sites.

Most of the 7 700 hectares of mallet plantation in Dryandra forest were established between 1926 and 1953 following utilisation of existing commercial timber. In 1950 the Forests Department established a small sawmill to utilise low quality wandoo logs for commercial purposes and also to provide mechanised facilities for bark chipping. This mill was subsequently closed in 1969. In 1952 the Forests Department also established its second commercial nursery at Dryandra to provide plants and to foster tree planting in the rural areas of the wheatbelt. This nursery was subsequently transferred to the present Narrogin headquarters site in 1967 to provide better social amenities for the workforce. The settlement at Dryandra then became redundant but was subsequently leased to Lions International in 1972 for the purposes of fostering forest education and recreation.

Though management objectives have changed over the past fifty years, we have been endowed with a forest situated in an otherwise rural landscape, which is considered a source of potentially

marketable timber, an excellent habitat for endemic flora and fauna and an asset for recreation, education and scientific study of inland forest systems. Recognition of these values led to the preparation of a Working Plan in 1970 setting out the strategy for multiple use management of this forest.

During the last decade the Forests Department has clarified and formalised multiple land use policy and tested ways in which the concept could be applied in the northern jarrah forest. The well established practice in that area is summarised in the following Forests Department publications :

Forest Policy Statement (1976)

General Working Plan No. 86 of 1977

A Perspective for Multiple Use Management in the Northern Jarrah Forest (1977)

Northern Jarrah Forest Management Priority Areas (1980)

A similar approach is taken in this plan for Dryandra forest. In developing management strategies, account is taken of the recommendations of the Conservation through Reserves Committee who, in 1974, recommended to the Environmental Protection Authority as follows :

> "The Committee emphasises the outstanding value of the Dryandra area as a wildlife habitat. This is due largely to the protection and management which the area has hitherto received from the Forests Department. In view of both the current specialised staff and the knowledge of forestry management possessed by the Forests Department, the Committee recommends :
>
> 1. that State forests 51 and 53 remain dedicated to that purpose;

2. that the following reserves be included in the State forest :

Reserve	Purpose	Vesting
16201	Water Supply	Minister for Water Supply
18856	Timber (Mallet)	not vested
25768	Timber (Mallet)	not vested
31670	Protection of Native Fauna	not vested
26643	Conservation of Flora & Fauna	W.A. Wildlife Authority
31378	Conservation of Flora & Fauna	not vested

3. that no further portions of Dryandra Forest be planted with pines or other exotic species;

4. that if any of the mallet plantations are felled they be regenerated to natural bush;

5. that the area be managed by the Forests Department as though it were a flora and fauna reserve and that if any time the area is relinquished by the Forests Department it be made a Class A reserve for the Conservation of Flora and Fauna, vested in the W.A. Wildlife Authority."

Against this background, the objective of this Plan is to examine environmental features, current land use and management constraints for Dryandra forest, and using this information, to allocate land use priorities for particular areas and develop strategies for ongoing management.

1. ENVIRONMENTAL FEATURES

1.1 Location

Dryandra Forest is located immediately to the north west of Narrogin. It is comprised of many separate areas of forest which collectively cover some 27 950 hectares. The main forest area is approximately 145 kilometres south east of Perth (Fig.1) and 25 kilometres north west of Narrogin townsite.

1.2 Climate

The area is characterised by a Mediterranean climate with a marked winter rainfall and hot dry summers. There is a marked excess of rainfall over evaporation in winter and a large deficit in summer.

The annual average rainfall for Narrogin is 507mm. Monthly averages and reliability data is shown in Table I. More limited records indicate the annual average rainfall for Dryandra to be 530mm.

TABLE I

NARROGIN AVERAGE MONTHLY AND ANNUAL RAINFALL(mm) AND WET DAYS

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
1968	10	16	22	30	62	92	94	72	48	34	14	13	507
Average (3yrs)													
Lowest	nil	nil	nil	nil	10	25	36	17	7	2	nil	nil	68
Highest	42	237	128	81	152	300	204	185	121	123	54	69	741
Wet days (av. no.)	2	3	4	5	11	13	15	14	11	9	4	3	94

Approximately 80% of the annual rainfall falls in the wettest six months (May - October). The growing season of 5.6 months usually opens in late April and 75% of seasons have been open by the 7th of May.

The mean isotherm for winter is 10°C and for summer 22°C. The mean maximum temperature for January is 31°C and minimum for July 5°C. Both the mean maximum for July and minimum for January are 14°C (± 1°C). The average number of frosts is 7 (2 in August and 1 in each of the other winter months.

1.3 Geomorphology and Soils

Dryandra forest is on the Yilgarn Block of the Western Shield which is underlain mainly by Precambrian granites of ages exceeding 2650 million years. Specifically the rocks in this area consist of migmatite banks and gneisses of Archaean origin. These basement rocks have been intruded by younger, highly magnetic, basic (mafic) dykes which are composed of altered quartz dolerite and gabbro. They are generally oriented in a NW-SE direction and vary from about 25cm to 150m wide and often up to 1 kilometre in length.

The geomorphology consists of the laterite mantled plateau, modified by erosion and deposition (McArthur, et al, 1977). This is the basis for subdivision into landform units. The units have a characteristic range of soils, which are described using the C.S.I.R.O. notation (Northcoate, et al, 1967). Delineation requires recognition of plateau, slope and valley floor. The units have been given local geographic names, the main ones defined for the Dryandra area are shown in Fig. 2 and are grouped as follows:

(i) Plateau type - the *Norrine*, laterite residuals and pediments of upper landscape.

(ii) Slope type - the *Noombling*, erosional areas (slopes), stripped of lateritic material.

(iii) Valley types - the *Biberkine*, depositional and alluvial valley fill.

The elevation of these land form units varies about 100m above and below Narrogin, which is 340m above sea level.

(i) Plateau Type

This *(Norrine unit)* occupies the upper landscape of the Dryandra area and comprises small, gently sloping laterite residuals, bounded in parts by duricrust, small escarpments and spurs which may reach the valley floor. The associated soils are gravelly sands, sand, duplex yellow soils, laterite boulders and duricrust.

(ii) Slope Type

This *(Noombling unit)* comprises gently sloping terrain, which may extend over local divides from one valley to the next (and includes the local interfluves). Yellow earths exist on slopes below scarps, with associated granite and dolerite outcrops.

(iii) Valley Type

This *(Biberkine unit)* consists of valley floors, major tributary streams and has an irregular outline because it extends into minor tributaries. The valley floor has gradients of about 1: 300 in the Dryandra area. It consists of alluvial material which generally forms a simple soil pattern whereby the upper terraces have a yellow duplex soil and the lower terrace adjacent to the stream consists of undifferentiated alluvium.

1.4 Vegetation

The indigenous vegetation also reflects the joint influence of climate and geomorphology, and hence of topography and soils. Detailed site vegetation mapping of the Dryandra system is continuing.

(i) Plateau Type *(Norrine unit)*

These high lateritic plateaux usually contain powderbark wandoo *(E. accidens)*, jarrah *(E. marginata)*, and marri *(E. calophylla)*. The latter two species are relatively common where sandy soils predominate. A mixed scrub layer is usual and is often dominated by *Dryandra nobilis* and occasionally the non-commercial sandalwood *(Santalum lanceolatum)*.

Low, dense *E. drummondii* mallee associations without tree overstorey development occur sporadically on the landform.

(ii) Slope Type *(Noombling unit)*

From the lip of the breakaways the land usually falls steeply for a short distance, then gradually becomes more gentle and eventually merges imperceptibly with the Valley Type. Brown mallet *(E. astringens)* is common in small pockets immediately below the breakaways but gives way to wandoo *(E. wandoo)* and powderbark wandoo *(E. accedens)* downslope.

The form and vigour of wandoo increases towards the gullies. The wandoo and powderbark wandoo woodlands on the slopes are usually associated with a sandplain poison *(Gastrolobium microcarpum)* understorey. In other areas *Casuarina huegeliana* thickets occur in association with granite outcrops.

(iii) Valley Type *(Biberkine unit)*

The main vegetation component on this landform unit is an open wandoo woodland with a ground cover of grasses and sedges. The form and vigour of wandoo is best developed in these areas. On heavier soils wandoo is replaced by thickets of Raspberry Jam *(Acacia acuminata)*. Where granite is exposed or overlain by shallow sands, these stands are replaced by *Casuarina huegeliana*.

Much of the Valley Type has been alienated because of the ease of access and high water retention properties of the soils.

The Dryandra forest area is the principal remaining habitat of brown mallet *(E. astringens)*, contains some specimens of blue mallet *(E. gardneri)* and also contains some 8 000 ha. of plantation brown mallet. The area also provides one of the eastern-most occurrences of species such as jarrah *(E. marginata)*, powderbark wandoo *(E. accedens)* and *E. decipiens*. The dwarf forms of both *E. wandoo* and powderbark wandoo are fine examples of adaptation to an environment.

Sandalwood is a small tree and root parasite and is found on plateaux, slopes and valley types. Although never occurring in large quantities at Dryandra, the commercial species *(Santalum spicatum)* has been harvested from nearby 14-mile Brook. The main part of this drainage system has now been alienated for sheep and wheat farming. Sandalwood has been grown to marketable size (127mm diameter at 150mm above ground) as part of research projects initiated in 1931 and 1956. Growth rates at Dryandra are twice those for sandalwood in the semi-arid pastoral regions. The most important natural host, the jam tree, is scattered throughout the residual wandoo woodlands, along lower slopes, as well as occurring in thickets in gentle valleys. Establishment techniques and protection needs for the species continue to be investigated.

The non-commercial sandalwood *(S. murrayanum)* is located on plateaux and slopes.

Brown mallet plantations were established on and near to original mallet sites. Although much of the planting was outside natural mallet sites, germination was generally good. However, in general, subsequent growth on non-mallet sites has been generally disappointing.

Natural mallet areas are characterised by lack of an understorey or ground flora. In the non-mallet areas, the reverse is true, especially in sandy soils and near the granite outcrops. The latter are believed to contain a number of very rare plant species (e.g. the red-flowering *Leschenaultia formosa*). Generally though, little intensive floral collection and identification has been undertaken and much more investigation is required. An example of the breadth of vegetation represented in Dryandra forest is given in Appendix I.

1.5 Fauna

The inland part of the south west of Western Australia between the 400 and 650mm rainfall isohyets was very rich in mammals before European settlement. Following agricultural development with its extensive clearing of bushland and the introduction of exotic animals, plants and disease, both the number of species and the area inhabited by them has been reduced. In the wheatbelt few pockets of bushland remain which are large and varied enough to provide an adequate habitat for the remaining extant species.

Of these areas, Dryandra Forest is the largest and most diverse and it therefore presents the best long term chance of continuing to provide for the species now present. For this reason, the proper management of the area, as well as its permanent retention as bushland, is of great importance.

A wide range of mammals, frogs, lizards, snakes and birds have been recorded in the area. These are listed in Appendix II. The range for many of these species has been greatly reduced in recent decades. Some species are now considered to be relatively rare, e.g. Woylie *(Bettongia penicillata)*, Numbat *(Myrmecobius fasciatus)*, ~~Quenda *(Isoodon obesulus)*~~. Research into habitat requirements (particularly th woylie) suggest that indigenous fauna rely heavily on the existence of a dense, well-developed shrub layer in the woodlands for both food and shelter. A major component of this layer should be *Gastrolobium* species. To achieve maximum benefit to fauna, management practices must provide for burning patterns which promote and allow full development of this shrub layer (i.e. long rotations, moderate intensities and firing after seed-set).

Though agricultural clearing directly contributed markedly to the reduction in natural range of many indigenous species, the presence of exotic animals is now the prime threat. Of these, the fox presents the greatest danger and any successful fauna management programme will require active measures to ~~reduce fox numbers~~.

1.6 Hydrology

The majority of areas comprising Dryandra forest lie within the Murray River drainage system and more particularly, between the main eastern branches, the Hotham and Williams Rivers. Some outlying blocks of State forest south of Narrogin are located within the Blackwood River drainage system.

Rainfall decreases from west to east in south west catchment areas and this is accompanied by decreasing run-off into streams and increasing salt accumulation in the subsoil of forested areas. Streamflow decreases from about 6½% of incoming rainfall on the Yarragill catchment near Dwellingup to only about 1% of incoming rainfall in the Williams and Hotham catchments.

Widespread clearing of forest for agriculture has resulted in mobilisation of salts stored in the soil profile with the result that all major streams east of Boddington are too saline for domestic or irrigation use (Appendix III). Consequently, domestic supplies are obtained by piping from the Wellington reservoir.

Salt accumulation in soils varies with rainfall topography, the presence and position of the groundwater table and soil types. In general there is a tendency for salt storage and concentration to increase from divide to valley flow and at any one point, to increase with depth in the soil.

More detail on this aspect of the Dryandra forest environment will be found in publications by Western Australian Public Works Department (1979); Peck et al 1973a, 1973b; Peck 1975,; Johnston & McArthur (1980); Shea et al 1975.

1.7 Pests & Disease

1.7.1 Fungal Disease

Although susceptible species occur in the area, there is no known infection of jarrah dieback disease *(Phytophthora cinnamomi)*. The small areas of jarrah that occur appear to be disease free.

1.7.2 Parasites

Mistletoe invasion is common, usually predominates on *Eucalyptus wandoo*, but has also been found attacking *E. astringens* along plantation boundaries. Mistletoe is a major factor in widespread tree decline on private property in the Upper Great Southern.

1.7.2 Leaf Miner

Mainly attacks *E. rudis* but when it reaches an advanced stage will often cause some damage to adjacent *E. wandoo*. Leaf miner attack has been more obvious with the recent spate of dry years.

1.7.4 Vermin

Foxes, feral cats and rabbits occur in Dryandra forest areas, but are concentrated mainly around the boundaries close to private property. An active and continuing control programme is being carried out by the Agricultural Protection Board which includes laying 1080 baits and ripping and gassing rabbit warrens. This programme is carried out around the margins of State forest and on adjacent private property.

I do not think this is still being carried out.

2. ECONOMIC & LEGAL CONSTRAINTS

2.1 Legal Tenure of Land

Most of the area known as Dryandra Forest is classified as State Forest No. 51, 52 and 53. These forests were dedicated in 1934 and 1935 for the purpose of preserving a source of mallet. There are also several small Timber and Mallet Reserves which are managed as part of the forest system. Within the main forest block there is a large area of 1 270 ha (Reserve 16201) which is held in trust by the Minister for Water Supply for the purposes of Water and Timber. This is virgin forest and is being managed in conjunction with adjacent State forest by the Forests Department.

Land tenure is illustrated in Fig. 1 and Appendix IV lists areas for each forest block comprising Dryandra forest.

2.2 Water Reserves & Catchments

The majority of Dryandra forest straddles a ridge which drains northward to the Hotham and southward into the Williams River systems (Fig.2). There are no gazetted catchments on State forest, but within the forest there is a Water and Timber Reserve (No. 16201). This is not harnessed for use and the area is managed in conjunction with adjacent State forest. Forest areas south of the Nangin-Williams Road drain into the Blackwood River system. There are no leases for private water supply on streams emanating from the forest.

2.3 Leases

2.3.1 Mining Leases

Although part of State Forest 51, Dryandra Forest, is covered by a Temporary Reserve for bauxite mining, it is not classed as Crown land for the purposes of the Worsley Agreement Act and it is unlikely that mining will be permitted on the forest reserve.

There are no other mineral claims or leases held for the Dryandra forest area.

2.3.2 Gravel Lease

A Gravel Lease is held by the Shire of Cuballing for nearby roadwork.

2.3.3 Lions Club of Western Australia

A lease has been issued to the Lions Club for the management of Dryandra Village and its surrounds for leisure and education purposes.

2.3.4 West Australian Police Force

An indenture is current for a Police Communications radio mast at the Forests Department Divisional Headquarters site at Narrogin.

2.4 Town Planning

The majority of Dryandra Forest is within the Cuballing Shire, but some areas are also within the Shires of Williams, Wandering and Narrogin. A town planning scheme to protect the perimeter of Narrogin Townsite is being promulgated but will not affect any land under the control of the Forests Department.

The Forests Department administration headquarters for the area is located within the Town of Narrogin.

Dryandra Village is being maintained by Lions Club under a forest lease. The settlement is now operated under a joint management committee comprising nominees from both Lions and the Forests Department.

A townsite reserve (No. 20846) exists on the York-Williams Road adjacent to State forest.

2.5 Timber Permits

In the mallet plantation areas there are two licenses which confer on the holders the right to harvest timber under the direction and supervision of the Forests Department, subject to a prescribed allowable cutting limit and the payment of royalties for timber removed. These licenses are held by :

(i) A.G. Hunter & Sons - licensed to remove 800 tonnes of mallet per annum which is used for tool handle production. This operation commenced in 1967 and is trading under the name of A.G.K. Quality Woodware.

(ii) Dryandra Wood Products - licenses to remove 60 000 pieces of fence post material per annum. This operation commenced in 1976 and the Company is trading under the name Dryandra Timber Products.

There are no current permits for cutting in the indigenous forest as timber in commercial quantities is no longer available. However small parcels may be available from time to time as a result of necessary silvicultural or regenerative operations. By letter of agreement, such timber will be first offered to the local sawmilling company, Wake & Beachem.

2.6 Apiary Sites

Apiary sites are issued over the forest area in accordance with Forests Department policy for site selection.

2.7 Communications

Roads - Apart from numerous forest roads and tracks constructed and maintained by the Forests Department, Dryandra Forest is surrounded and dissected by numerous high quality all weather roads constructed and maintained by the relevant Shires.

With few exceptions, forest tracks are navigable with conventional vehicles throughout the year.

Radio & Telephone - Telecom communications are available at Narrogin Headquarters and the Dryandra settlement. A Forests Department earth-return line exists between the Dryandra fire lookout and the Dryandra settlement.

Forests Department V.H.F. radio communication is maintained between Narrogin Headquarters, Dryandra Tower, Divisional mobiles and the local Bush Fire Board Liaison Officer. Narrogin Headquarters and Dryandra Tower also monitor Bush Fire Brigade frequencies.

Bush Fire Brigades have an extensive V.H.F. network, as have the Police Department, Road Traffic Authority, Main Roads Department and the Narrogin Town Council. Together with Telecom facilities, the region would appear to be well provided with communication facilities. In addition, C.R.E.S.T. is active in the area.

2.8 Other Organisations

Numerous organisations use forest land and these are shown in Appendix V.

3. CURRENT MANAGEMENT & LAND USE

3.1 Agriculture

The State forest blocks are encircled by agricultural land which is highly developed for wheat and sheep production. Near to the main forest area there are two large pig farms.

3.2 Water

Three dams have been constructed at Dryandra Village and are used for domestic water supply and fire protection purposes. A large dam exists in Reserve 16201 and is an asset for recreation as well as for fire protection.

Numerous small dams occur on adjacent private property and water from them is made available to the Forests Department for fire fighting purposes.

3.3 Mining

Gravel is obtained from surface horizons of lateritic profiles and has provided the foundation for many roads in the immediate vicinity. Gravel profiles are shallow and hence removal can result in a relatively large area of clearing compared with gravel deposits in the northern jarrah forest.

3.4 Timber Production

Wandoo has been commercially cut from Dryandra forest since the early part of the century. Cutting ceased in 1977 when available commercial timber was no longer able to sustain a continuing sawlogging operation. The sawmiller, Wake & Beachem of Narrogin, is now offered sawlog parcels intermittently which result from small and specific silvicultural or regenerative programmes.

Historically though, the utilisation of forest products at Dryandra mainly revolved around brown mallet. Tannin production from mallet bark was the reason for dedication of these forests and for the establishment of plantations. This was their major use until production was discontinued in 1969 because of a decline in world demand for natural tannins and competition from synthetic materials. The world tannin market was notorious for marked fluctuations caused by variations in supply from such countries as South Africa and South America. These factors also led to the closure of the Industrial Extracts plant at Toodyay about the same time. Nonetheless natural tannins from mallet bark were regarded as a quality product, suitable for high grade leather work.

About 1967 Mr. A.B. Hunter of Cuballing overcame substantial seasoning and finishing problems and pioneered the use of mallet timber for tool handles. Trading under the name of A.G.K. Quality Woodware, he is currently licensed to remove 800 tonnes of mallet per annum under Forests Department supervision.

Mallet is an extremely dense and strong timber, but it is subject to attack by termites and rot. Given proper preservative treatment though, its durability can be improved markedly. Looking to an alternative outlet for mallet, particularly for mallet thinnings, the Forests Department demonstrated that creosote preservative treatment at commercial level would be a feasible proposition.

In 1976 the company Dryandra Timber Products was formed and issued with a license with a permissible intake of 60 000 posts per annum.

Dryandra Timber Products takes only thinnings and present levels of production can be sustained for well into the future. The forest has become dense, the density restricting growth. After thinning the trees will be about 3 - 4 metres apart, allowing the remaining trees to maintain vigorous growth.

Commercial firewood is used for brick manufacture at Narrogin. Approximately 800 tonnes per annum is currently utilised from tree remnants following the cutting for fencing and tool handle manufacture.

It is anticipated that with the rising cost of energy brick manufacturers' requirements for firewood will rise in the future.

In accordance with Departmental policy, private individuals gather firewood in small quantities from mallet plantation areas for their own requirements. Demand for domestic firewood (measured by inquiries) is increasing.

3.5 Town Planning

Dryandra Village is the only area of closer settlement on, or adjacent to, Dryandra Forest, although gazetted townsite reserve (No. 20846) exists on the York-Williams Road adjacent to State forest.

Dryandra Village is now managed and under lease by the Lions Club for education and recreation purposes. The main access is by Tomingley or Kawana Roads. Increased use of the Village will influence adjacent forest management.

3.6 Communication Lines

Communication lines serve the other forms of land use, but in so doing are a land use in their own right. The control of these lines is under the relevant statutory authorities (e.g. Forests Department, Shires, State Energy Commission). The various public utility communication lines in or near Dryandra Forest are shown in Fig.3.

3.7 Flora and Fauna

Over the past decade forest management at Dryandra has given increasing emphasis to the conservation requirements of indigenous flora and fauna. The importance of this land use was endorsed in the Forests Department's General Working Plan No. 86 where Dryandra is classified as a buffer area for conservation of flora and fauna.

In the indigenous forest, commercial sawlogging has ceased and fire protection strategies have been developed to favour, in many areas, the full development of vegetation complexes necessary for the perpetuation of many rare animal populations (see Section 3.10).

In the mallet plantations logging continues on a small scale. In areas where mallet did not occur naturally (i.e. off-site areas) and has not been able to control the site, the long term plan is to encourage recolonisation of the original vegetation following full utilisation of the existing stands. Existing thinning treatments favour wandoo, powderbark wandoo and marri stems.

The area provides habitat for many species of native mammals and a very wide range of birds and reptiles. As long as the diverse range of vegetation ecotypes in their various stages of development is adequately conserved, the future of these species will be enhanced.

The reduction in numbers of many indigenous fauna species can be attributable to feral animals and vermin, particularly foxes. Because of the scattered nature of the reserve at Dryandra, the maintenance of an intensive vermin eradication programme is critical to ensuring the perseverance of some of the more "fragile" species.

The Water and Timber Reserve (No. 16201) provides the only area of virgin forest and because of its uniqueness in an otherwise disturbed environment, will continue to be preserved in this condition.

3.8 Recreation

Dryandra Forest is used for many forms of recreation, including picnicking, nature study, photography, art, camping, orienteering and bushwalking. It has also been used for navigational rallying (as opposed to speed rallying).

Formal surveys have not been conducted but local observations suggest that the majority of visitors are local, though many are from elsewhere in the State and interstate. Major use periods are spring and autumn.

The demand for recreation at Dryandra is increasing as it becomes more widely known. Advertising takes place through Lions International (Dryandra Village lessees), local Shires and the Lazaway Holiday Camp near Cuballing.

Other than the Dryandra Village, the area has little specific development to cater for destination oriented activities. Three circular walk trails emanate from the Village through adjacent forest.

There is an obvious need for planned and co-ordinated recreation development in the area, which should emphasise education into forestry matters as well as recreation per se.

3.9 Minor Forest Products

3.9.1 Apiculture

Apiary sites are issued where there is no conflict with land use. Forty four apiary sites are current in Dryandra forest and with existing spacing policy (minimum three kilometres apart), Dryandra Forest is almost saturated. In addition, many beekeepers place hives on private property adjacent to forest blocks.

The frequency of site use is usually low. Flowering cycles tend to be erratic and hence sites are used mainly as a reserve by beekeepers holding sites elsewhere.

3.9.2 Wildflowers

There are no commercial wildflower picking licenses issued. The Forests Department usually supplies wildflower specimens for the Kings Park and Royal Show wildflower displays. Administration of wildflower collection has now passed to the Department of Fisheries & Wildlife, but before picking, Forests Department approval is necessary. Commercial licenses will not be granted for Dryandra Forest.

3.9.3 Sandalwood

Sandalwood has been pulled in the area in the past. Trials are under way to test the viability of growing sandalwood on short rotations for export.

3.10 Fire Protection

Fire is a natural phenomenon of our environment and it is considered that, prior to European settlement much of the forest was frequently burnt by aboriginal hunters. Following settlement and subsequent development, fuel began to accumulate and fires became less frequent but more dangerous and damaging.

Dryandra Forest has been managed by the Forests Department since 1926. A policy of fire exclusion was practised until 1954 when the policy of fuel reduction by prescribed burning was introduced. However it was not until the devastating fires of 1961 that the application of this policy widened to cover all State forest on a frequent rotation. Until recently most areas in Dryandra were burnt manually on a 6 year rotation in Spring. Since 1979 rotation lengths have been extended following a change in land use objectives and increased knowledge of vegetation and fauna responses.

Two rotation lengths are now recognised in the average annual programme of about 2 600 ha.

(i) The inner core area of the main block is prescribed burnt in Autumn on a fourteen year cycle. This will provide for full development of the understorey species which in turn will more closely cater for indigenous fauna needs.

(ii) The outer fringes of the main block and the smaller outlying forest units are burnt in Spring on an 8 year rotation. This provides fuel reduced areas which, on the one hand, cater for protection of community values from fires originating within the reserve, and on the other, for protection of the forest from fires originating externally.

(iii) Brown mallet is sensitive to fire and plantation areas are protected from fire by a series of wide vegetation free breaks.

(iv) A number of fuel datum areas have been retained to study long term effects of fire exclusion on vegetation.

A number of alterations to fire protection policy have resulted from decades of fire research and practice, which gives greater emphasis to conservational, environmental and aesthetic values. These include :

a) Burning during the wildflower display period is discouraged along major roads for conservation and aesthetic reasons.

b) Burning roadsides over long distances simultaneously is to be avoided for aesthetic reasons.

c) Burning is discouraged where meteorological conditions indicate smoke pollution problems to Perth and south west townships.

d) Attempts are not made to burn a high proportion of any one area when burning under Spring conditions. Prescriptions are set at limits which will ensure unburnt pockets comprising about 20-40% of the area. This policy was adopted in the light of research into the ecology of many forest animals; particularly the swamp dwellers.

Research programmes are being undertaken in Dryandra to study more closely the ecological effects of fire on vegetation and fauna. These studies also include the effect of fire on mallet plantations which have been planted on areas other than natural mallet sites ("off-site").

Narrogin Division maintains a small fire suppression force (4 officers, 7 employees and two water tanker units). Dryandra Tower is manned over the summer period for wildfire detection with light aircraft (spotters) providing emergency back-up.

Continued good relations and mutual co-operation with neighbours is essential for good fire management in the district.

4. MANAGEMENT PRIORITY AREAS

4.1 Allocation of Management Priorities

Each part of Dryandra Forest has been allocated to a management priority based on criteria of site potential, economic viability, operational feasibility and protectability. The details of such considerations are outlined in the Forests Department publication "Northern Jarrah Forest Management Priority Areas" (1980).

In arriving at decisions on management priorities relevant data available within the Forests Department and published by other organisations were consulted.

The allocation of priorities to land resources will necessitate compromise between the various land users. Since demand, technology and constraints are subject to changes, periodic reappraisal is essential. As far as possible the planning has taken known requirements into account without eliminating options for future changes in land use.

The following management priorities have been recognised and are designated in Fig. 4.

a) Conservation of Flora and Fauna
b) Catchment Protection
c) Recreation
d) Scientific Study

In two cases allocation to a single use was considered undesirable and two primary uses were allocated. If conditions arise which lead to a transient or localised incompatibility between these uses, each case will be assessed on its merits.

The management priorities recognised and delineated in this Plan are described below. Their relative compatibility with each other and non-primary uses are outlined in Figs. 4a - 4f.

Conservation of Flora and Fauna MPAs

Conservation of flora and fauna is the management priority over most of Dryandra Forest. This is in keeping with current management practices and the Environmental Protection Authority recommendations for System 4. Management in these areas will generally be passive.

In Reserve No. 16201 conservation of flora and fauna is given equal priority with catchment protection (the reserve has been gazetted both for timber and water). Generally these two land uses are fully compatible.

Buffer areas have been allocated around the perimeter of the main forest block and over outlying blocks. These buffers have been allotted to provide for activities which are required to protect the core but which are not entirely in keeping with conservation objectives, e.g. frequent prescribed burning on areas adjacent to private property.

Within the Conservation MPA there are mallet plantations which contain a considerable and valuable resource which is suitable for fencing and tool handle manufacture. Other markets may be developed in the future. Efficient utilisation of this resource using sound silvicultural practices should continue using prescriptions which will not waste the existing and potential wood resource, but will favour the return of original vegetation where mallet has not dominated the site. In the long term off-site mallet areas should be returned to their original vegetation components.

In plantation areas where mallet occurred naturally, or where the species had demonstrated successful and permanent colonization of the site, silvicultural and regeneration systems will be designed to promote the continuance of a healthy resource of mallet forest.

Utilisation of native hardwood in all areas will be limited to salvage material resulting from required silvicultural regeneration treatments.

Fauna conservation in the area is largely dependent on the provision of an extensive cover of poisons (e.g. *Gastrolobium* species).

These species take some 12-15 years to complete their life cycle and are regenerated by moderate intensity fires.

The implementation of a fire management system which provides for full development of ground cover and their subsequent effective regeneration is an essential ingredient of conservation management at Dryandra.

The existence of the surrounding buffer system provides a border of fuel-reduced areas for mutual fire protection of the surrounding private property and the internal core system.

Catchment Protection MPA

The area covered by Reserve 16201 is vested in the Minister for Water Supply for the purpose of Timber and Water. The area should be managed jointly for catchment protection and conservation of flora and fauna. Both land uses are passive and generally compatible. The reserve may be required in the long term to contribute to local water supply and activities which have the potential to introduce disease or result in clearing of forest cover, are to be avoided.

The area contains virgin forest and is valuable as a scientific record of the natural bush character and structure. It is not intended that logging for timber production take place in this reserve.

Recreation MPAs

Recreation has been allocated as the management priority for the immediate surrounds of Dryandra Village. The area should be managed to maintain the aesthetics of the settlement surrounds and to provide demonstration forests, walk trails and other facilities for user recreation and education benefits.

Scientific MPAs

The scientific areas have been selected to satisfy known experimental study requirements.

Three areas are to be retained in an unburnt condition to study vegetation successional changes and fuel accumulation rates. Two other areas are retained to study the effect of fire on mallet and understorey regeneration.

In most cases the remainder of the forest is available for smaller experimental study areas (e.g. for regeneration and maintenance of sandalwood).

Once the purpose of each study has been satisfied, the priority use for each area will be reassessed.

4.2 Other Activities and Land Uses

4.2.1 Influence Zones

A number of natural and artificial features and some land uses exert an influence on the management of the surrounding forest. The area so affected has been named an influence zone and provides a transition between the feature and the surrounding area of forest. Examples include:

a) natural features - streams, areas with special aesthetic or geological significance, historic sites;

b) artificial features - power lines, roads, recreation sites;

c) land uses - townships, private property, dams, gravel operations.

4.2.2 Mining

Open cut mining (e.g. bauxite mining) is incompatible with all land use objectives for the area.

Gravel for road building is more restricted in its distribution and demand for it is now intermittent. Therefore generally the impact from gravel extraction is less than other forms of open cut mining. However it is incompatible with many land uses on a microscale and therefore should only be provided according to the following guidelines:

i) Where there is no reasonable alternative (e.g. private property).

ii) Where rehabilitation involving replacement of top soil, ripping and planting are agreed to by the local authority.

iii) Where gravel is to be supplied, it should be favoured from outlying forest blocks rather than the main central block.

iv) Gravel is not to be supplied from the core area for conservation of flora and fauna.

4.2.3 Agriculture

Agriculture has not been considered as a viable alternative for land use allocation on State forest.

4.2.4 Allocation of Secondary & Tertiary Uses

Having determined the primary land use, it is possible to allocate secondary uses to the same area, provided that the selected uses are largely compatible. An example is conservation of flora and fauna and catchment protection. As the degree of competition or unsuitability increases, possible tertiary uses emerge. These may be permitted but only as long as there is no permanent interference or significant harm to the primary use. This would normally involve restriction on tertiary uses, e.g. restrictions in space or time. Restriction on mallet timber production in the Recreation MPA would be an example.

There are other uses which are totally incompatible with the primary use (e.g. bauxite mining and conservation of flora and fauna) and these must also be considered.

Allocation of primary, secondary and tertiary land uses is summarised in Table 2. Degrees of incompatibility are illustrated for each area in Figs. 4a - 4f.

4.2.5 Temporal Flexibility

Management priorities are allocated according to considerations of site potential, demand of legal and economic constraints and operational feasibility. If any of these factors alter, so the management priorities must be reconsidered.

APPENDIX III

WATER QUALITY IN THE EASTERN SECTION OF THE DARLING RANGE CATCHMENT

CATCHMENT (*at Gauging Stn.)	CATCHMENT AREA (km^2)	MEAN CATCHMENT RAINFALL (mm)	AVERAGE RUNOFF ($m^3 \times 10^6$)	AVERAGE T.D.S. (mg/litre)	W/QUALITY CLASSIFICATION	CATCHMENT CHARACTERISTICS
BELL BROOK *	200	770	6.0	300	Fresh	Laterite plateau and incised valley. Wholly within State forest.
LONG GULLY	115	920	4.6	550	Marginal	Laterite plateau and incised valley. Wholly within State forest.
MARRADONG	212	730	11.7	3 000	Saline	Laterite plateau and dissected slopes. 20% forest and 70% cleared - pasture.
HOTHAM RIVER *	4 015	590	145	2 300	Saline	Laterite plateau and dissected slopes. 20% forest and 80% cleared.
34 MILE BROOK	145	860	5.8	2 600	Brackish	Laterite plateau and dissected slopes. 90% forest and 10% cleared.
BANNISTER RIVER	562	720	31	2 600	Brackish	Laterite plateau and dissected slope. 50% forest and 50% cleared.
WANDERING BROOK	192	590	5.8	5 000	Saline	Dissected lateritic slopes with wide valley floors. Mainly cleared.
CROSSMAN RIVER	389	640	13.6	3 600	Saline	Dissected lateritic slopes and wide valley floor. Mainly cleared - timbered divides.
14 MILE BROOK	502	560	12.5	6 000	Very Saline	Dissected lateritic slopes - wide valley floor. 30% dry forest and 70% cleared.
MID-HOTHAM	1 717	500	34	9 000	Very Saline	Dissected lateritic slopes and wide valley floors. Mainly cleared.
UPPER HOTHAM	1 053	480	21	10 000	Extremely Saline	Dissected lateritic slopes and wide valley floors. Mainly cleared.
WILLIAMS *	1 437	610	72	2 200	Brackish	Incised wide valleys - laterite divides. Mainly cleared.
OLD STOCKYARD BROOK	59.3	730	2.4	1 500	Brackish	Laterite plateau - incised valley. 70% forest and 30% cleared.
COOLAKIN BROOK	203	700	13.2	2 200	Brackish	Laterite plateau - incised valley. 50% forest and 50% cleared.
UPPER WILLIAMS	472	540	14.2	6 500	Very Saline	Dissected lateritic slopes - wide valley floor. Cleared for agriculture.

TABLE 2 ALLOCATION OF OTHER USES TO MANAGEMENT PRIORITY AREAS

MANAGEMENT PRIORITY	SECONDARY USES ø	TERTIARY USES *	INCOMPATIBLE USES
CONSERVATION OF FLORA AND FAUNA (core areas)	Catchment Protection Scientific Study	Recreation Honey Production Seed Collection Mallet Timber Production	Activities which alter the structure and composition of the vegetation or introduce disease.
CONSERVATION OF FLORA AND FAUNA (buffer areas)	Catchment Protection Scientific Study Mallet Timber Production	Seed Collection Wildflower Management Honey Production	Activities which will result in a change to the vegetation composition or structure of the core or which significantly reduce the ability of the buffer to protect the core
CATCHMENT PROTECTION	Conservation of Flora and Fauna Scientific Study	Honey Production Seed Collection	Activities which increase the risk of chemical or biological pollution, or which remove the native vegetation cover without provision for immediate and successful regeneration.
RECREATION	Conservation of Flora and Fauna Catchment Protection Scientific Study	Mallet Timber Production Honey Production Seed Collection	Activities which permanently destroy the aesthetic appeal of the landscape or require the cessation of recreational activities.
SCIENTIFIC STUDY	Catchment Protection	Recreation Conservation of Flora and Fauna Honey Production	Activities detrimental to the scientific objectives of the study.

ø Secondary uses are those which are largely compatible with the primary use.

* Tertiary uses may be permitted as long as there will be no significant harm to the primary use.

5. MANAGEMENT STRATEGY

5.1 Fire Management

5.1.1 Mallet Plantations

Fire will continue to be excluded from mallet plantations because of the fire sensitivity of the species. Protection will be afforded by prescribed burning in surrounding native hardwoods and by an extensive system of well maintained fuel-free firebreaks.

5.1.2 Conservation of Flora and Fauna - Core Areas

Fire management in these areas will aim to encourage a full range of all stages of succession of the important fauna dependent understorey species (particularly *Gastrolobium* species). Specifically this will entail:

i) Separation of area into prescribed burning units of 400-500 hectares.

ii) Adoption of a rotation length of 14 years and prescribed burn each unit at regulated intervals throughout the rotation.

iii) Prescribed burning under conditions which will generate heat into the soil profile yet cause minimum permanent damage to aerial components of tree species (e.g. autumn evenings).

5.1.3 Conservation of Flora and Fauna - Buffer Areas

These areas form a direct interface with adjacent private property. Here the fire management strategy is the maintenance of fuel reduced areas in order to protect both forest and community values.

More specifically this will include:

i) Separation of the areas into small prescribed burning units.

ii) Allocation of a balanced annual burning programme on an 8-year rotation.

iii) Provision for burning in either spring or autumn conditions.

5.1.4 Extension and Mutual Aid

Dryandra is isolated from the main area of State forest and hence from the bulk of Departmental equipment and manpower reserves for fire fighting. Particular attention must be given in this area to the maintenance of a good working relationship with neighbours, Bush Fire Brigades and Shires.

5.2 Disease Management

5.2.1 Monitoring of Disease Symptoms

Dieback disease has not been recorded in Dryandra Forest. Where symptoms are indicative of this, or other diseases, scientific investigation will take place under the direction of the Officer in Charge, Dwellingup Research Station.

5.2.2 Dieback Hygiene

The basic disease management aim will be to avoid introduction of *Phytophthora cinnamomi*. In order to do this, accepted dieback hygiene principles will be applied to all forest and nursery operations.

5.3 Flora and Fauna Management

5.3.1 Fire Management

Fire management strategies will be applied in core areas for conservation of flora and fauna, which will encourage a dense undergrowth of native understorey species for food and shelter, and allow the full range of successional stages to develop prior to regeneration (see Section 5.1.2).

5.3.2 Low Quality Mallet Plantations

In the long term these areas will be returned to their original vegetation composition. In the meantime, logging to maximise utilisation will take place, using cutting prescriptions which favour growth and development of original tree species scattered throughout the plantations.

5.3.3 Virgin Forest - Reserve 16201

No activities will be permitted which will alter the virgin structure or composition of these stands.

5.3.4 Native Hardwood Stands

Logging will not be permitted in the native hardwood stands except where necessary, regenerative and silvicultural treatments yield merchantable timber, which would otherwise be wasted. It is anticipated that such parcels of timber will be small and intermittent.

Silvicultural and regeneration treatments are likely to be required where stands have been damaged by wildfire, have become moribund, or have been degraded through disease.

5.3.5 Control of Vermin and Feral Animals

An intensive poisoning programme to minimise numbers of feral animals and vermin (particularly foxes) will be maintained with the co-operation of the Agricultural Protection Board. Is this in progress?

5.3.6 Research on Flora and Fauna

Research into all aspects of ecological requirements and management will be applied in these stands as soon as the results are elucidated.

5.4 Mallet Plantation Utilisation

5.4.1 Product Types

Mallet will continue to be made available for fencing materials and tool handle production under prescriptions which aim to minimise waste and which are compatible with the allocated land use objectives. Market expansion and new product proposals will be analysed in relation to resource availability and industrial stability.

5.4.2 Cutting Priorities

Under current marketing arrangements, fencing materials will generally be supplied from early thinnings, and tool handle production from later thinnings or clear fellings. Firewood for industrial or domestic use will be removed in the wake of these operations.

Priorities for cutting will be as follows:

i) Thinning of overstocked medium and high quality stands.

ii) Clear felling of low site quality areas.

iii) Regeneration cutting for high quality over-mature stands.

5.5 Recreation Management

5.5.1 Recreation Planning

Recreation management throughout Dryandra Forest will be planned and implemented using the methodology outlined in the Forests Department document "Framework Plan for Recreation Management in the Northern Region (1981)". This will entail assessment and monitoring of recreation demand data in conjunction with relevant specialist staff.

A detailed recreation plan for Dryandra Forest will be prepared in accordance with regional recreation strategies.

5.5.2 Lions' Lease of Dryandra Village

Close lisison will be maintained with Lions' administration to ensure:

i) Any development plans are consistent with forest management objectives.

ii) Co-ordination of recreation and educational development effort.

iii) Uniformity of story line on matters of forest and land use management.

5.6 Sandalwood

Research into sandalwood growth and development is considered desirable as the species was an original component of the vegetation. Should experimentation indicate potential for a viable commercial operation, management strategies will be developed to ensure primary land management objectives are not prejudiced.

5.7 Scientific Investigation

The main aspects for continual scientific investigation in the area should be those dealing with:

i) Fauna habitat requirements.

ii) Regeneration of understorey species.

iii) Vegetation succession in the various forest types. Particularly that associated with mallet plantation utilization and regeneration.

iv) Conversion of "off-site" mallet stands to original vegetation type.

v) Sandalwood growth and development.

vi) Artificial germination of understorey species in mallet plantations.

vii) Fuel accumulation rates.

6. PLAN CONTROL AND REVIEW

6.1 Hardwood Operation Control Systems

In mallet plantation areas the major operational control system is known as the Hardwood Operations Control System (H.O.C.S.).

The main feature of this Operations Control System are:

* Provision for using the forest block (H.O.C.S.). Planting year will also be shown for plantation areas.

* Provision of a complete, compact and convenient record and control system for both the operational and planning requirements to the Forests Department.

* Provision of data for yield control by continual testing of actual values against estimates.

Using the Hardwood Operational Control System and other long term "master" plans (e.g. prescribed burning, plantation establishment, utilisation master plans, etc.), all forest operations in an area are planned and suitable prescriptions prepared. Prescriptions are modified, as required, to account for the "influence" of other activities or features. The H.O.C.S. sheets are then used to record the implementation of those operations in the field.

This system has been used for several years on State forest and has been shown to cope with the more intensive aspects of multiple use forest management.

6.2 Other Control Systems

Many other control systems are used, covering other management activities, e.g. budgetary control, log quality controls, prescribed burning controls, etc.

6.3 Liaison with Other Organisations

Liaison will be maintained at all levels with organisations and authorities which affect, or in turn are affected by, management of Dryandra Forest. These include:

Shires of Narrogin, Cuballing, Williams and Wandering
Bush Fires Board
Public Works Department
Department of Conservation and Environment
Department of Fisheries and Wildlife
Lions International
Mallet Timber Industry companies
Department of Youth, Sport and Recreation
C.S.I.R.O.
Agricultural Protection Board

6.4 Plan Review

This plan will be reviewed should any change occur to the key considerations of:

- site suitability
- constraints to management
- demand for various land values
- protection requirements

A formal review will also be undertaken at each re-write of the Forests Department's General Working Plan.

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APPENDIX I

AN EXAMPLE OF THE RANGE OF PLANT SPECIES AT DRYANDRA

(i) Trees

(i) Tree Species

Acacia acuminata	Raspberry jam
Acacia microbotrya	Manna gum
Casuarina huegeliana	Granite sheoak
Eucalyptus accedens	Power bark
Eucalyptus astringens	Brown mallet
Eucalyptus calophylla	Marri
Eucalyptus drummondii	Drummond's gum
Eucalyptus falcata	White mallet
Eucalyptus gardneri	Blue mallet
Eucalyptus loxophleba	York gum
Eucalyptus marginata	Jarrah
Eucalyptus oleosa	Giant mallee
Eucalyptus rudis	Flooded gum
Eucalyptus salmonophloia	Salmon gum
Eucalyptus wandoo	Wandoo
Santalum murrayanum	Bitter quandong
Santalum spicatum	Sandalwood

(ii) Other Plants

Acacia dentifera Benth.
Acacia drummondii Lindl. ssp. drummondii
Acacia gilbertii Meisn.
Acacia lasiocarpa var. sedifolia (Meisn.) B.R. Maslin
Acacia ? myrtifolia Willd.
Adenanthos sp.
Astroloma epacridis (DC.) Druce
Baeckia crispiflora F. Muell.
Baeckia fumana (Schau.) F. Muell.
Banksia sphaerocarpa R.Br.
Beaufortia incana (Benth.) George
Bossiaea sp.
Conospermum amoenum R.Br.
Dampiera sp.

Other Plants continued

Diuris longifolia R.Br.
Dodonaea sp.
Dryandra fraseri R.Br.
Dryandra nivea (Labill.) R.Br.
Dryandra nobilis Lindl.
Dryandra subpinnatifida CA. Gardn.
Gastrolobium microcarpum Drumm.
Gastrolobium spathulatum Benth.
Grevillea acerosa F. Muell.
Grevillea tenuiflora (Lindl.) Meisn.
Hakea gilbertii Kippist ex Meisn.
Hakea lissocarpha R.Br.
Kibbertia exasperata (Steud.) Briq.
Hibbertia montana Steud.
Hibbertia rupicola (S.Moore) C.A. Gardn.
Hypocalymma angustifolium Endl.
Lambertia ilicifolia Hook.
Lasiopetalum microcardium E. Pritz.
Leschenaultia formosa R.Br.
Leptospermum erubescens Schau.
Leucopogon minutifolius W.V. Fitz.
Petrophile divaricata R.Br.
Petrophile ericifolia R.Br.
Petrophile heterophylla Lindl.
Petrophile squamata R.Br.
Petrophile striata R.Br.
Pimelea sauveolens (Endl.) Meisn.
Pultenaea sp.
Synaphea reticulata (Sm.) C.A. Gardn.
Trymalium ledifolium Fenzl.
Urocarpus squamuligerus (Hook.) P.G.Wils.

APPENDIX 2

ANIMALS OF DRYANDRA FOREST

MAMMALS

Echidna - *Techyglossus aculeatus*
Mardo - *Antechninus flavipes*
Red Tailed Phascogale - *Phascogale calura*
Dunnart - *Sminthopsis murina*
Native Cat - *Dasyurus geoffroii*
Numbat - *Myrmecobius fasciatus*
Short-nosed Bandicoot - *Isoodon obesulus*
Brush Tailed Possum - *Trichosurus vulpecula*
Pigmy Possum - *Cercartetus concinnus*
Honey Possum - *Tarsipes spencerae*
Ring Tailed Possum - *Pseudocheirus peregrinus*
Grey Kangaroo - *Macropus fuliginosus*
Western Brush Wallaby - *Macropus irma*
Tammar - *Macropus eugenii*
Woylie - *Bettongia penicillata*
Tasmanian Pipistrelle - *Pipistrellus tasmaniensis*
Little Bat - *Eptesicus pumilus*
Gould's Wattle Bat - *Chalinolobus gouldii*
Chocolate Bat - *Chalinolobus morio*
Long-eared Bat - *Nyctophilus timoriensis*
White Striped Bat - *Tadarida australis*
Little Flat Bat - *Tadarida planiceps*
Dingo - *Canis familiaris*

EXOTIC SPECIES

Cat - *Felis cattus*
Mouse - *Mus musculus*
Rabbit - *Oryctolagus cuniculus*
Fox - *Vulpes vulpes*

LIZARDS

GECKOS

Barking gecko - *Gymnodactylus milii (Phyllurus milii)*
Festooned gecko - *Diplodactylus vittatus (D. polyopathalmus)*

LEGLESS LIZARDS

Fraser's scale-footed lizard - *Delma fraseri*

DRAGON LIZARDS

Ornate dragon - *Amphibolusus ornatus*
Mountain Devil - *Moloch horridus*
Western jew lizard - *Amphibolurus barbatus minor (Amphibolurus minor minor)*

SKINK LIZARDS

Bobtail - *Trachysaurus rugosa (Tiliqua rugosa)*
Smith's skink - *Egernia carinata (Egernia napoleonis)*
King skink - *Egernia kingii*
Wood skink - *Ablepharus boutonii (Cryptoblepharus plagiocephalus)*
Ablepharus elegans (Lerista elegans)
Bungarra - *Varanus gouldii*

FROGS

Green and gold tree frog - *Hyla moorei*
Banjo frog - *Limnodynastes dorsalis*
Heleioporus albopunctatus
Crinea pseudinsignifera
Heleioporus barycragus

SNAKES

Death adder - *Acanthopis antarticus*
Carpet snake - *Morelia variegata*
Dugite - *Demansia nuchalis affinis*
Little whip snake - *Denisonia gouldii*

The list of reptiles would appear to be incomplete for the area.

BIRDS

Little grebe - *Podiceps novaehollandiae*
White-faced heron - *Ardea novaehollandiae*
Nankeen night heron - *Nycticorax caledonicus*
Black duck - *Anas superciliosa*
Grey teal - *Anas gibberifrons*
Maned goose or Wood duck - *Chenonetta jubata*
Whistling eagle - *Haliastur sphenurus*
Australian goshawk - *Accipiter fasciatus*
Collared sparrow hawk - *Accipiter cirrocephalus*
Wedge tailed eagle - *Aquila audax*
Brown hawk - *Falco peregrinus*
Nankeen kestrel - *Galco cenchroides*
Mallee fowl - *Leipoa ocellata*
Brown quail - *Synoicus ypsilophorus*
Painted quail - *Turnix varia*
Banded plover - *Zonifer tricolor*
Black-fronted dottered - *Charadrius melanops*
Common bronzewing - *Phaps chalcopters*
Purple crowned lorikeet - *Phaps elegans*
White tailed black cockatoo - *Calyptorhynchus baudini*
Western rosella - *Platycercus icterotis*
Red-capped parrot - *Purpureicephalus spurius*
Twenty-eight or Port Lincoln parrot - *Barnardius zonarius*
Elegant parrot - *Neophema elegans*
Pallid cuckoo - *Cuculus pallidus*
Boobook owl - *Ninox novaeseelandiae*
Tawny frogmouth - *Podargus strigoides*
Owlet-nightjar - *Aegotheles cristatus*
Laughing kookaburra - *Cacelo gigas*
Sacred kingfisher - *Halcyon sancta*
Rainbow bee-eater - *Merops orgatus*
Welcome swallow - *Hirundo neoxena*
Tree martin - *Petrochelidon nigricans*
Blackfaced cuckoo-shrike - *Coracina novaehollandiae*
White-winged triller - *Lalage suerii*
Brush bronzewing - *Phaps elegans*
Purple crowned lorikeet - *Glossopsitta porphyrocephala*
Golden bronze cuckoo - *Chrysococcyx lucidus*

BIRDS continued

Chestnut quail-thrush - *Cinclosoma castanotum*
White-browed babbler - *Pomatostomus superciliosus*
Splendid blue wren - *Malurus splendens*
Blue-breasted wren - *Malurus pulcharrimus*
Western warbler - *Gerygone fusca*
Western thornbill - *Acanthiza inornata*
Yellow-rumped thornbill - *Acanthiza chrysorrhoa*
Spotted scrub-wren - *Sericornis maculatus*
Weebill - *Smicrornis brevirostris*
Scarlet robin - *Petroica multicolor*
Red-capped robin - *Petroica goodenovii*
Hooded robin - *Petroica cucullata*
Western yellow robin - *Eopsaltria griseogularis*
Grey fantail - *Rhipidura fuliginosa*
Willy wagtail - *Rhipidura leucophrys*
Restless flycatcher - *Seisura unquieta*
Golden whistler - *Pachycephala pectoralis*
Rufous whistler - *Pachycephala rufiventris*
Western shrike-thrush - *Colluricincla rufiventris*
Western shrike-tit - *Falcunculus frontatus*
Crested bellbird - *Oreoica gutturalis*
Rufous tree-creeper - *Climacteris rufa*
Striated paradalote - *Pardalotus substriatus*
Silvereye - *Zosterops gouldi*
Brown honeyeater - *Lichmera indistincta*
Singing honeyeater - *Meliphaga virescens*
Yellow-plumed honeyeater - *Meliphaga ornata*
White-naped honeyeater - *Melithreptus lunatus*
Spinebill - *Acanthorhynchus superciliosus*
Tawny crowned honeyeater - *Gliciphila melanops*
New Holland honeyeater - *Phylidonyris novaehollandiae*
White-checked honeyeater - *Phylidonyris niger*
Red wattle-bird - *Anthochaera carunculata*
Little wattle-bird - *Anthochaera chrysoptera*

BIRDS continued

White-eared honeyeater - *Lichenostomus leucotis*
Magpie lark - *Grallina cyanoleuca*
Black-faced wood-swallow - *Artamus cinereus*
Dusky wood-swallow - *Artamus cyanopterus*
Squeaker or grey currawong - *Strepera versicolor*
Western magpie - *Gymnorhina dorsalis*
Raven - *Corvus coronoides*
Hoary headed grebe - *Poliocephalus poliocephalus*
Australian little eagle - *Hieraaetus morpnoides*
Peregrine falcon - *Falco peregrinus*
Little falcon - *Falco longipennis*
Little quail - *Turnix velox*
Southern stone curlew - *Burhinus magnitostris*
Regent parrot - *Polytelis anthopeplus*
Fan-tailed cuckoo - *Cacomantis pyrrhophanus*
Narrow-billed bronze cuckoo - *Chrysococcyx basalis*
Spotted nightjar - *Eurostopoclus guttatus*
Fairy martin - *Petrochelidon ariel*
White-fronted chat - *Apithianura albifrons*
Black-capped sitella - *Neositta pileata*
Spotted pardalote - *Pardalotus punctatus*
Brown headed honeyeater - *Melithreptus brevirostris*
Grey butcher bird - *Cracticus torquatus*
Little pied cormorant - *Phalacrocorax melanoleucos*
White-fronted honeyeater - *Phylidonyris albifrons*
Gilbert whistler - *Pachycephala incornata*

APPENDIX IV

LAND TENURE AND AREA STATEMENT

(A) Area Managed by the Forests Department

Forest Block Name	Area (ha)	Remarks
BALD ROCK	3 049	
BORGEY	2 057	Includes 813 ha proposed S.F.
CONTINE	3 025	
DRYANDRA	6 615	Includes 1 150 ha Reserve 16201
DWARDA	1 146	
HIGHBURY	2 151	Includes 435 ha proposed S.F.
LOL GRAY	2 444	
PENNY	1 769	
SKELTON	3 253	Includes 120 ha Reserve 16201
STOKES	2 438	
	27 947	

(B) Other Small Reserves (not managed by Forests Department)

Reserve No.	Area (ha)	Remarks
24791	186	Timber for Settlers Requirements
20182	281	Timber for Settlers Requirements
30394	74	Timber Reserve (Land Act)
19107	98	Timber Reserve (Land Act)
20985	63	Timber Reserve (Land Act)
19794	236	Timber Reserve (Land Act)

APPENDIX V

THE EXTENT OF USE OF DRYANDRA FOREST

Apart from numerous individuals, many organisations use the northern jarrah forest. Below is a list of known groups and organisations, classified according to their legal authority:

A. WITH STATUTORY AUTHORITY

Public Works Department
Mines Department
Department of Agriculture
Agricultural Protection Board
Department of Conservation and Environment
Department of Fisheries and Wildlife
Forests Department
Geological Survey
Lands & Surveys Department
Local Authorities
(Shires of Williams, Narrogin, Cuballing and Wandering, Town of Narrogin)
Town Planning Department
Police Department
Telecom Australia
State Energy Commission
State Emergency Service
Department of Defence
Alwest (Worsley)
Department of Services and Property
Main Roads Department
Department of Science and Meteorology
Environmental Protection Authority
Soil Conservation Advisory Committee
Conservation Through Reserves Committee
Public Health Department
Road Traffic Authority
Department of Industrial Development

B. LIMITED STATORY POWERS

Bush Fires Board
C.S.I.R.O.
National Parks Board
Community Recreation Council
Department of Tourism
Forest Produce License holders
Apiary Site lessees
Forest Lease holders
Meteorological Bureau
Bureau of Mineral Resources
W.A. Wildlife Authority

C. WITHOUT STATUTORY AUTHORITY

Hunt Inter-Departmental Committee
Water Purity Committee
Recreation and sporting bodies (motorised and non-motorised)
University of Western Australia
Western Australian Institute of Technology
Murdoch University
W.A. Museum
Charter Tours Companies
Education Department
Kings Park Board (seed collection)
Various conservation bodies (Wildflower Society, Naturalist Club)
Scouts/Guides
Darling Range Advisory Committee
Forest Products Association
Farmers' Union