JARRAH Reserve

A Proposal for a major reserve in the Northern Jarrah Forest of Western Australia

Conservation Council of Western Australia (Inc.)

1980

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With a foreward by the Rt. Hon. Sir Paul Hasluck, K.G., G.C.M.G., G.C.V.O., K.St.J.

The Conservation Council of Western Australia (Inc.) is an organisation whose prime aim and object is to promote the cause of conservation in Western Australia.

This proposal has been compiled for the Council by a group of conservationists and involves input from botanists, consultant wildlife ecologists, a research scientist, graduates and students in the arts, environmental science and anthropology, and others dedicated to the urgent need to preserve at least a part of Western Australia's unique jarrah forest.

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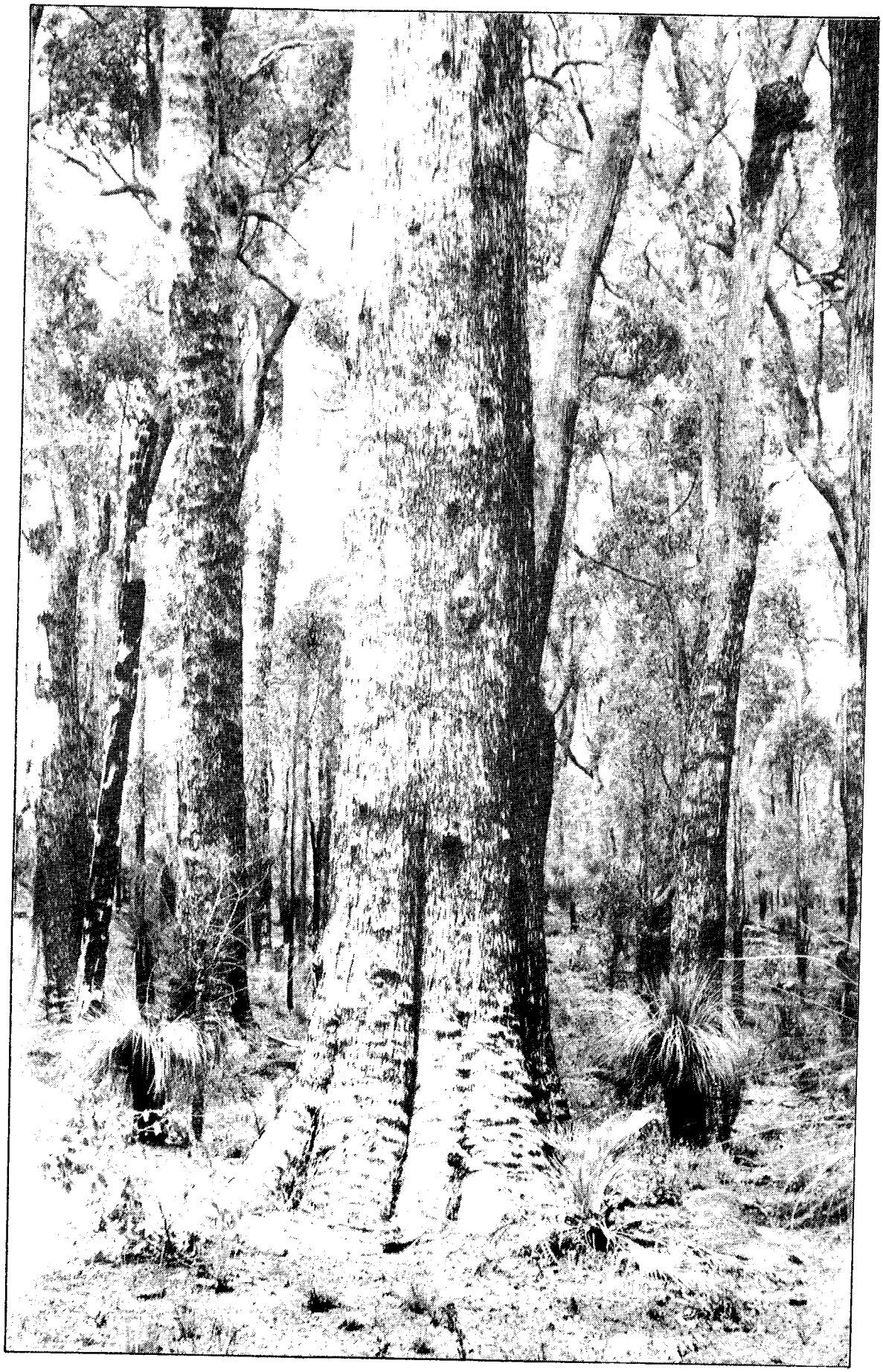

Plate 1. Virgin jarrah forest.

FOREWORD

RT HON. SIR PAUL HASLUCK

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This booklet presents a proposal which deserves attention by everyone who loves the land in which we live and cares about its treasures. It also calls for fundamental reconsideration of the impact of development on the environment.

There may be some persons in our community who would set out deliberately to smash and lay waste and destroy the world about them and make a mess just for the fun of it or simply to gain some brief and petty advantage. My own experience is that there are very few vandals of that kind. Most damage is caused, not because people have a wicked purpose but because they have no purpose at all, or are careless or thoughtless, or in a few cases because they are caught up by slogans about progress and have an illusion that exploitation is the only form of achievement. They do not intend to spoil but they act without thinking about all the consequences of their actions and without weighing one value against another.

What the authors of this booklet seek to do is to start more people thinking about one of the irreplaceable treasures of our land and to clear their minds about the best way to take care of it. The jarrah forest of the South-West of Western Australia is unique. We did not create it or construct it. We did not purchase it in the way in which a rich nation may purchase a work of art. It was part of the original endowment of this land. No other country has been so endowed. If it is destroyed it cannot be restored. At best what is unique may be replaced by what is commonplace. At worst, we may see the desolation of a deteriorating environment.

In the course of a century and a half the jarrah forest has been reduced in size and the remnant has been damaged. Happily some part of the forest is still in a condition that allows us to consider measures for its preservation and to discuss realistically whether we can ensure it has continuing life and whether we should preserve it instead of exploiting it.

When I myself think about the jarrah forest I think about the whole of the complex and inter-related life of the forest and not only of the jarrah tree. The protection needed is for the forest as a living entity and as a balanced natural region. There are more than trees in a forest. In the forest are creatures great and small; tiny wisps of plant life as well as a prolific undergrowth and the forest giants; the lichens on the rocks and the insects underneath them; the birds and the reptiles. Their life is inter-related.

The effects of man's intrusion cannot be calculated only in terms of the valuable timber he has gained or the pleasures of his camping holidays but require some study of other results of the disturbance of the life of the forest.

There are many different aspects of the work of conservationists and perhaps at times the campaigners themselves do not distinguish between them but agitate about protecting the environment or preserving old buildings or checking pollution or conserving resources or facing an ecological crisis as though there were a single set of facts and a single solution for all these problems. This tendency means that, on both sides of the argument, too many persons are fully confident that they know all the facts and all the answers. I trust that those who study this booklet will appreciate from the start the distinctive nature of the proposal and the ways in which it goes beyond any proposal for creating another national park or making plans for forest management or protecting our heritage. Basically the concept is that as well as occupying the land, developing its resources for our own advantage, and managing our environment in the way most congenial to our human society, we also face broader problems of the relationship between man and nature and see some value in the life of the forest as a whole apart from and superior to the value that accrues to us by exploiting it for our own immediate gain or for human recreation. We seek a concept of the environment broader than man's technological domination of it or his commercial and industrial exploitation of natural resources.

When we examine the proposals made in this booklet, I suggest that we have to keep in mind that the objective in this case is higher than that of forest management; or protection of the environment, or the creation of national parks for public enjoyment. The forestry officers, the national parks authorities and the conservationists all do their part but over and above the particular purpose which each of them serves is the further purpose of maintaining the whole balanced life of part of the Darling Range jarrah forest - a rare possession. All of those who care about such things need to think of this particular problem in a comprehensive way. This is not a matter of minimising or regulating the deterioration of the environment. The question is whether we do not mind losing the natural forest so long as we gain the timber, the minerals, and the farm produce yielded by development.

The concept of preserving the forest as a whole is put forward clearly and imaginatively for thoughtful consideration. It deserves close study and I trust that from that study all those who are concerned with one aspect or another of the problem will be able to join in a constructive effort. There are many familiar arguments in support of conservation. Self-interest and practical convenience point to the need to act. I would add the further suggestion that mankind has to justify his self-classification as homo sapiens by accepting a moral obligation to enter into a relationship with his environment different from that of the white ant and the weevil, who devour their environment and reduce it to rubbish. The fully civilised man restrains his greed and looks for some other guide than his own appetites or his own material advantage.

Paul Hasluck.

Paul Hasluck

16 April 1980.

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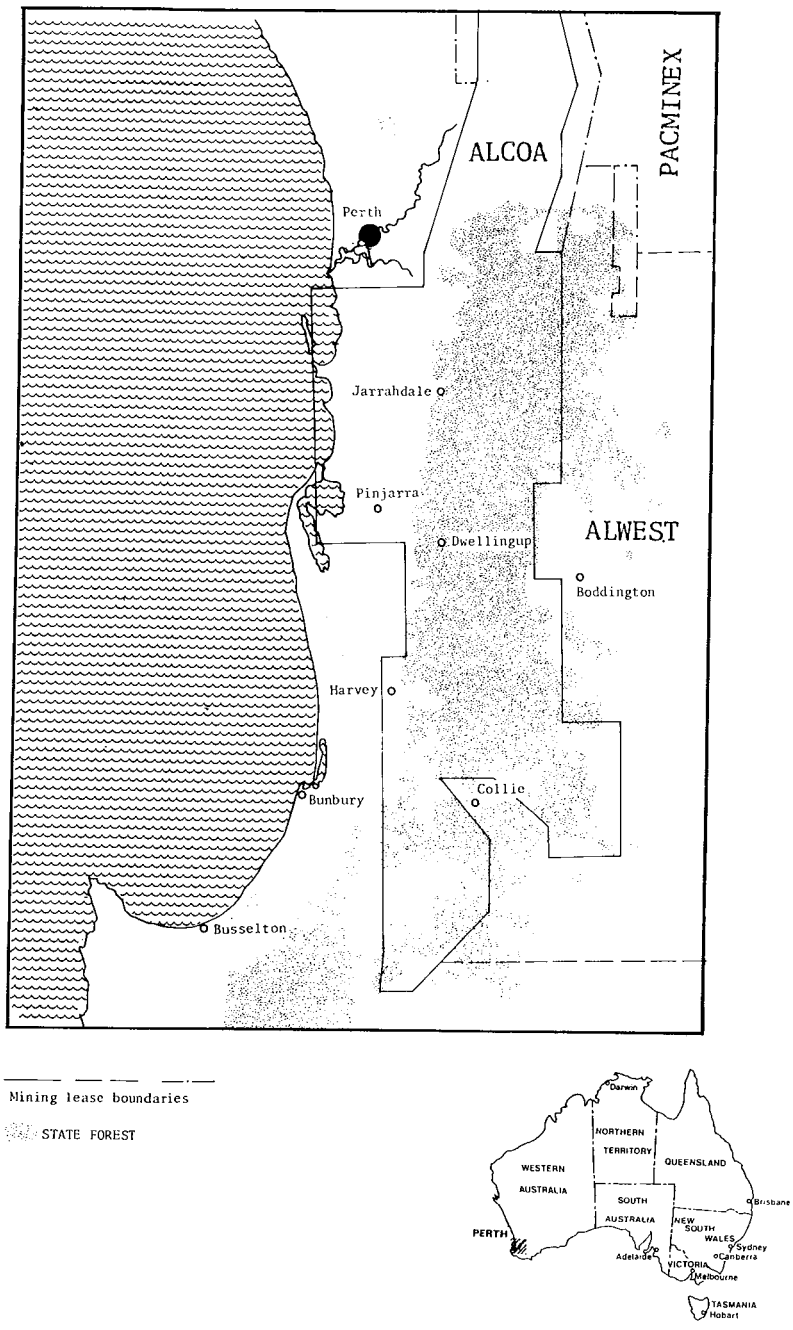


Figure 1. Most of the northern jarrah forest is included in State Forests. All of the State Forests north of Collie are held under mineral lease for bauxite. Mining is not the only threat to the jarrah forest.

SUMMARY

The forested area of Western Australia is very limited. The major remaining high forest is the jarrah forest. This unique ecosystem is fragile despite its adaptation to a harsh environment. Rapidly increasing technological change in the State is placing this limited but precious resource at risk. There is an urgent need to conserve adequately a major representative segment of the remaining jarrah forest.

A reserve of sufficient area to afford it long-term viability should be established to provide for the increasing need of people to experience natural surroundings, but more importantly, to preserve a representative portion of the total ecosystem. This preservation would serve not only to acknowledge our responsibility to future West Australians but would allow for education, scientific investigation and research, and would serve as a retreat and sanctuary for fauna and flora that are elsewhere universally sacrificed to our material needs.

An area exists in the northern jarrah forest which is not only relatively close to the State capital, but which contains most representative vegetation types of the jarrah forest, including several significant segments of virgin forest. This proposal suggests that a consolidation of existing reservation areas could provide a reserve of some 77 000 ha. It suggests further that in a matter of such extreme importance nothing less than A class reserve status with adequate vesting and management is required.

PROPOSAL
General

The northern jarrah forest, located on part of the south-western margin of the Great Plateau of Western Australia commonly called the Darling Range, is the last significant area of original biota remaining within reasonable driving time of the capital, Perth. Its overall area of some 1 050 000 ha is almost half of the 2 398 000 ha of high forest remaining under public ownership in the state, all of which is restricted to the south-west region. While these areas may seem large, when considered as a proportion of the total area of the State (2 525 000 sq km) they can be seen to be relatively tiny and to have value purely in terms of scarcity as a State resource.

This northern jarrah forest, overlooking the coastal plain from the escarpment, gives to the people of Perth enviable proximity to natural conditions and horizons. Traditionally they have enjoyed access to the adjacent forest areas for picnicking, enjoyment of the seasonal wildflower display and just for "drives in the hills". The National Parks Authority and the Forests Department provide facilities for recreation and tourism within the areas under their control. There is also increasing demand for ownership of pockets of land in the segments of forest held in private hands in the general Perth area, and the values required are reflected in increasing use of the term "natural bush" in real estate advertisements.

The Perth metropolitan area has the fastest population growth rate of any capital city in Australia. If present trends continue, its population will double in the next thirty years. When this is considered in conjunction with projected use of available forest areas, examined in a later segment of this proposal, there is no doubt that the future impacts and demands on these areas will be very great. This reflects a world-wide trend. For example, in 1970 the national park system of the United States was visited by 172 million people and this demand is expected to treble by the year 2000; in Japan, also in 1970, the number of visitors was 300 million, and the demand is continuing to rise at an annual rate of about 10 per cent. As the most urbanised society in the world, it is likely that Australia will go beyond these general trends. Current forecasts for Western Australia suggest that increases in demand of between seven to ten times are likely to the year 2000.

This is a time of increasingly intensive exploitation of natural resources. This can take the form of use and overuse of natural areas, as

indicated by the above figures, because of urban man's apparent occasional need to experience the natural surroundings and conditions from which he sprang. However, more significant impacts, both in extent and in terms of lasting change, result from the massive commercial exploitation and ever-expanding infrastructure required by growing populations and the currently universal growth economy. Stated more simply, all natural areas are under threat as never before.

The northern jarrah forest is especially a case in point. Most of it is State Forest, managed by the Forests Department of Western Australia. Traditionally, since the Forests Act was proclaimed in 1918, the area has been managed as a renewable timber resource. Another responsibility of the Department has been the management of the forests as water supply catchments. Mining for coal has occurred in the Collie area for many years with only local major impact. However, transmission lines from Muja Power Station cut significant swathes through the forest. Mining for gravel has also been traditional and has caused considerable degradation, generally in pockets close to any roadway in the forest but also over large areas in the lower Helena River catchment area and in nearly all areas close to the edge of the escarpment.

Plate 2. Dieback-affected jarrah forest. The sheoaks in the middle ground have not yet been affected.

Most of the major streams of the area have now been dammed to supply water to the Perth area with a consequent loss of river ecosystems, and the remaining minor streams and the Murray River or its tributaries will be dammed in the future. The process of construction involves quarries for earth fill, blue-metal or laterite and gravel, and the necessity for access and reticulation involves roadways, powerlines and pipelines. Only recently have environmental considerations been included in the design criteria.

However, the land use which has the greatest potential for destruction of the natural ecosystems of the Darling Range is bauxite mining. All of the State Forests north of Collie are currently held under mineral lease for bauxite by the Alcoa, Alwest and Pacminex companies. The main competition for the land is between jarrah production forestry and bauxite mining.

All of these land uses have in the past contributed to the spread of the jarrah dieback fungus *Phytophthora cinnamomi*. This pathogen has the capacity to kill jarrah and many of the component species of the forest.

Consequently, there is intense competition for use of the northern jarrah forest. It is subject to continuous diminution and can be changed in the most fundamental way by mining and by the spread of jarrah dieback. The

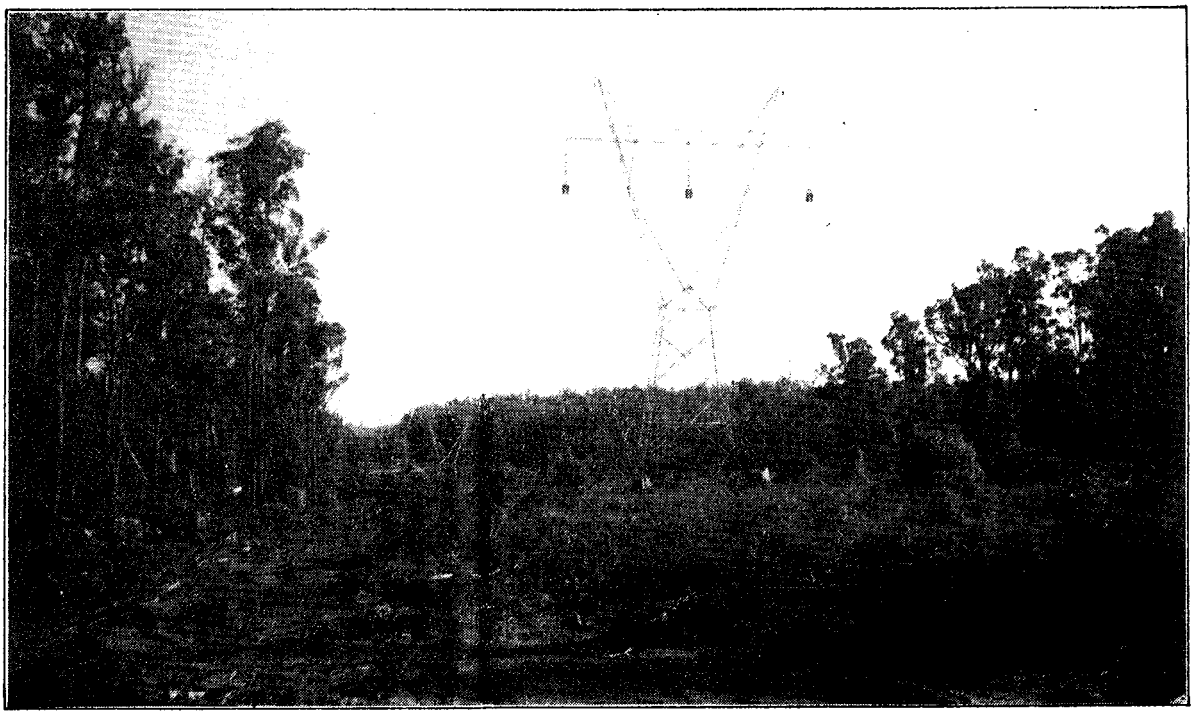


Plate 3. A powerline through the forest in the area of the proposed reserve.

Forests Department has admirably attempted to prevent the spread of dieback by the establishment of "Quarantine" areas and has instituted an intensive programme of research. It has also attempted to tackle the problems of competition for the area by its policy of multiple-use management. Unfortunately it is restricted in following this policy in that Acts governing other aspects of forest use do not always provide it with ultimate control.

Dr S.R. Shea, of the Western Australian Forests Department, has described the jarrah forest as one of the world's most unique forest ecosystems. He notes further that the ecosystem is finely balanced and specialised and that its uniqueness results from its adaption to a harsh environment. These facts have not been contested. And yet this delicate and unique ecosystem is subject to all the pressures and impacts delineated above. Plainly there is an urgent need for reservation.

The Western Australian Sub-committee of the Australian Academy of Science Committee on National Parks and Nature Reserves said in its report of 1962: "In spite of the fact that the Jarrah Forest and its fauna (as seen so close to Perth) is a major feature of the fauna and flora of Western Australia, there are no extensive biological reserves of it set aside as areas of natural bushland. However, much of the finest Jarrah country is at present within State Forests and catchment areas." The Sub-committee was of the opinion that a major catchment area should be selected, be relinquished by the Forests Department and be gazetted as a Class A Reserve for the preservation of fauna and flora and be vested in a Statutory Body as a National Nature-Reserve.

The position has worsened since 1962, with the advent of extensive bauxite mining, so that today a CSIRO scientist can state that on present indications the combination of bauxite mining and jarrah dieback will eventually change the vegetation of most of the jarrah forest of the Darling Range.

Existing reservation of jarrah forest outside the State Forests is not adequate for present or future needs. There are various small Flora Reserves of doubtful viability. There are three substantial reserves totalling 3 332 ha, vested in the Department of Fisheries and Wildlife but these are well to the east of the main jarrah areas. There are three National Parks totalling 8 580 ha containing jarrah forest. Two of these, John Forrest National Park and Serpentine National Park, are already suffering from heavy recreational use and the effects of overburning. John Forrest

National Park is clearly badly infected by jarrah dieback. The Avon Valley National Park and the adjacent Flora and Fauna and Timber reserves, have suffered in the past from grazing and from uncontrolled burning. Significant portions of this National Park are also made up of the river valley landform with its wandoo-marri association.

The Australian Conservation Foundation has suggested that because of the values and very limited extent of native forests in Australia (as shown above, the area of State Forest in Western Australia represents less than one per cent of the State's total area), the greater part of them should be devoted either to national parks or extensive forms of forest management. The Forests Department has set aside Management Priority Areas within the State Forest for the conservation of landscape, flora and fauna. These are located in various places throughout the forest and are managed under the core-buffer concept where it is envisaged that future logging operations will occur in the buffer zones.

The Forests Department, while attempting to accommodate the many demands on the forest in its multiple-use policy - and forest reservation is only one of these uses - has a primary duty to ensure a supply of timber. The Australian Conservation Foundation espouses an ideal situation that is unlikely to prevail against the requirements of commercial and developmental exploitation. Their respective positions may be regarded as the minimum and maximum possibilities. There is obviously a need for a practicable mid-way position.

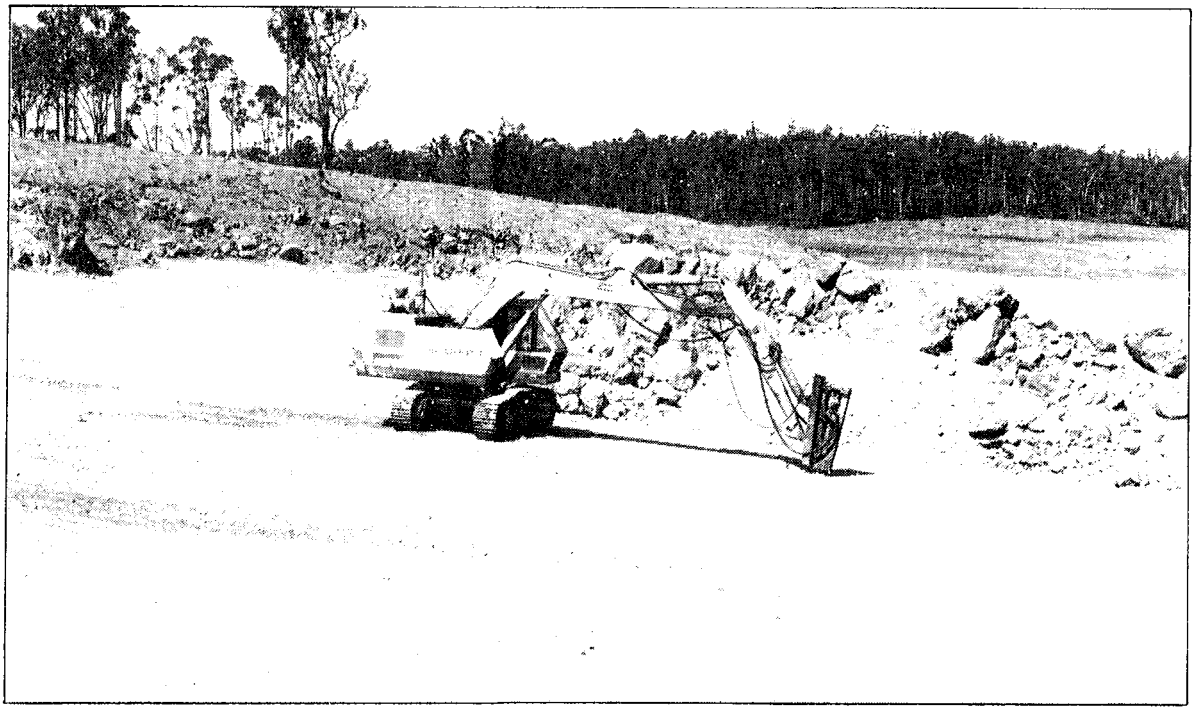


Plate 4. Bauxite mining in the northern jarrah forest.

This proposal reiterates the need for a representative, adequate and viable reserve within the northern jarrah forest. It suggests a location to suit these criteria, and makes proposals, taking full account of experience in other states of Australia and elsewhere in the world, concerning definitions, controls, management and legislation. It is an appeal for courage (this word is chosen advisedly), honesty and farsightedness in those who will be in a position to implement it.

Terms & Functions

1979 marked the centenary of Australia's first national park. The Australian Conservation Foundation as a result declared 1979 National Parks Year. 1979 was also Western Australia's sesquicentennial year, internationally it was the Year of the Child. It would certainly be fitting if this fortunate conjunction was to continue in spirit and inspire the creation of a major reserve in Western Australia's unique jarrah forest as a mark of the State's maturity, and as a token of commitment to all its future generations of children.

The word reserve is used here rather than national park because it will be suggested in a later segment that the special conditions applying to the area in question, because of its location and current and future management, might preclude its vesting under the National Parks Authority of Western Australia. It will be proposed that a more suitable vesting may require a separate and specific Act, such as the one covering Kings Park, rather than under the National Parks Authority Act. Thus a separate term may be required such as special status reserve, or a specific name such as the Lane Poole* Park. However, the reserve should in general be considered as being covered by the concept of "national park".

This concept, in its most general form, is related to the original role given to national parks in the United States of America over 100 years ago, that is, "the preservation of natural landscape of national importance and its utilization for recreation purposes". The key words here are preservation, natural and national importance. Inevitably, there is now a more sophisticated view of what should be preserved so that emphasis is on the preservation of not only landscape, but of the total ecosystem. Thus more modern definitions are much broader.

* *Mr. Lane-Poole was a former Conservator of Forests and a keen conservationist.*

Most Australian State organizations responsible for national parks and for wildlife conservation are members of the International Union for the Conservation of Nature and Natural Resources. IUCN has defined a National Park as:

"... a relatively large area

1. where one or more ecosystems are not materially altered by human exploitation and occupation, where plant and animal species, geomorphological sites and habitats are of special scientific, educative and recreative interest or which contains a natural landscape of great beauty; and
2. where the highest competent authority of the country has taken steps to prevent or to eliminate as soon as possible exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphological or aesthetic features which have led to its establishment; and
3. where visitors are allowed to enter, under special conditions, for inspirational, educative, cultural and recreative purposes."

The IUCN describes similar areas from which the public is excluded as National Nature Reserves.

There is considerable confusion and variation in the terms used in the designation of areas of public land set aside for reservation where function and purpose may overlap. Thus categories of protected natural areas world-wide include: national parks, landscape regions, state parks, forest reserves, strict (or special) native reserves (or parks), natural (or national) monuments and wilderness areas. In Australia there are national parks, state parks, forest reserves, regional parks, multi-purpose parks, and wilderness zones. In Western Australia there are national parks (which sometimes do not meet all the criteria listed in the above definition, especially in terms of size) vested in the National Parks Authority, nature reserves vested in the Department of Fisheries and Wildlife, other reserves under various statutory authorities, and Management Priority Areas established within State Forests by the Forests Department, in which the conservation of landscape, flora and fauna is the overriding priority.

Thus, because of this plethora of terms related to often overlapping functions and where some terms locally have connotations of specific vesting and control, it is considered that the actual term used for the reservation sought in this proposal should be chosen with care, but is less important than

the specific purposes to which that reservation should be devoted, its vesting and management and its legal status.

Because, as indicated previously, there is no adequate reservation currently in the northern jarrah forest, this proposed reserve will perforce

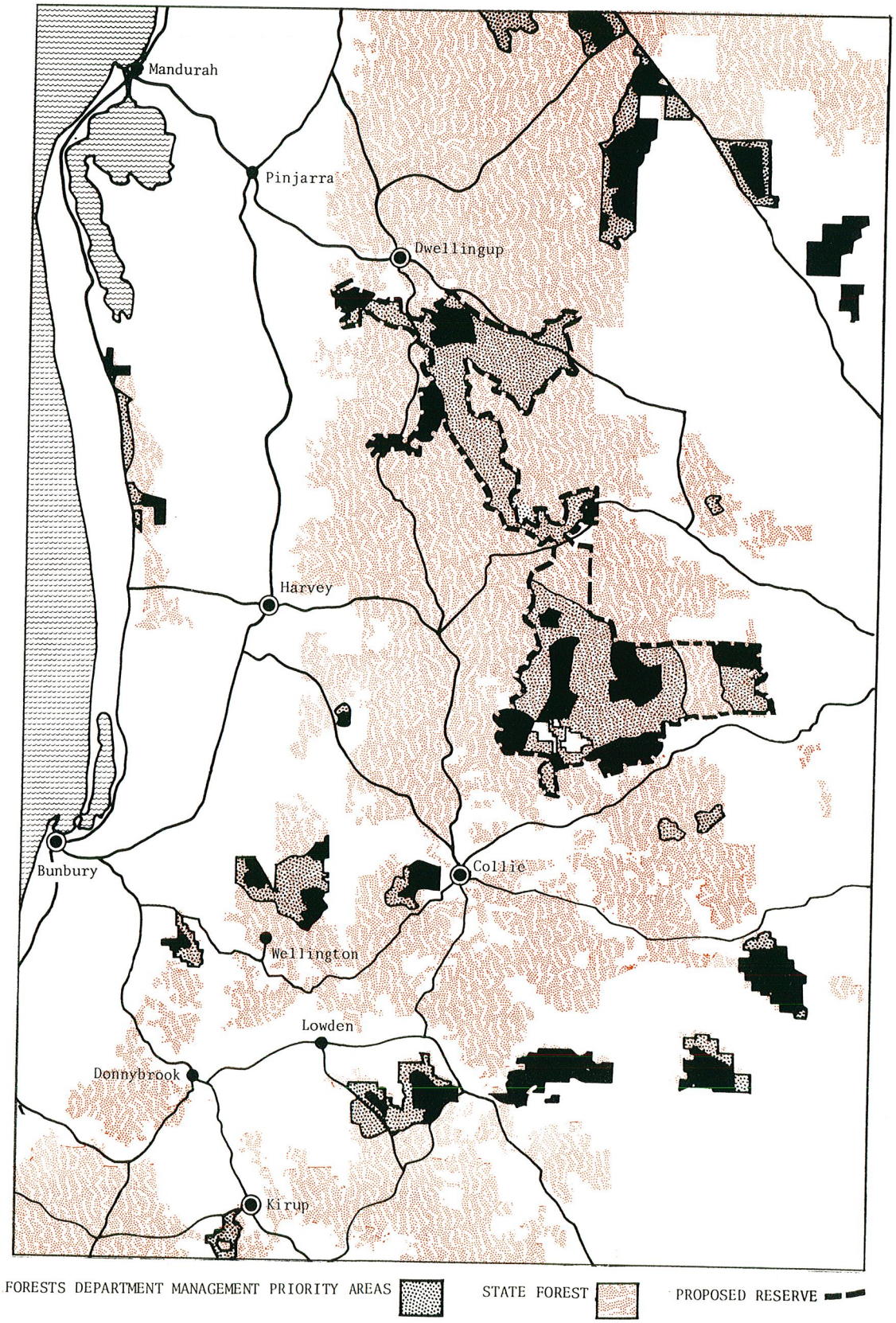


Figure 2. General location of the proposed reserve.

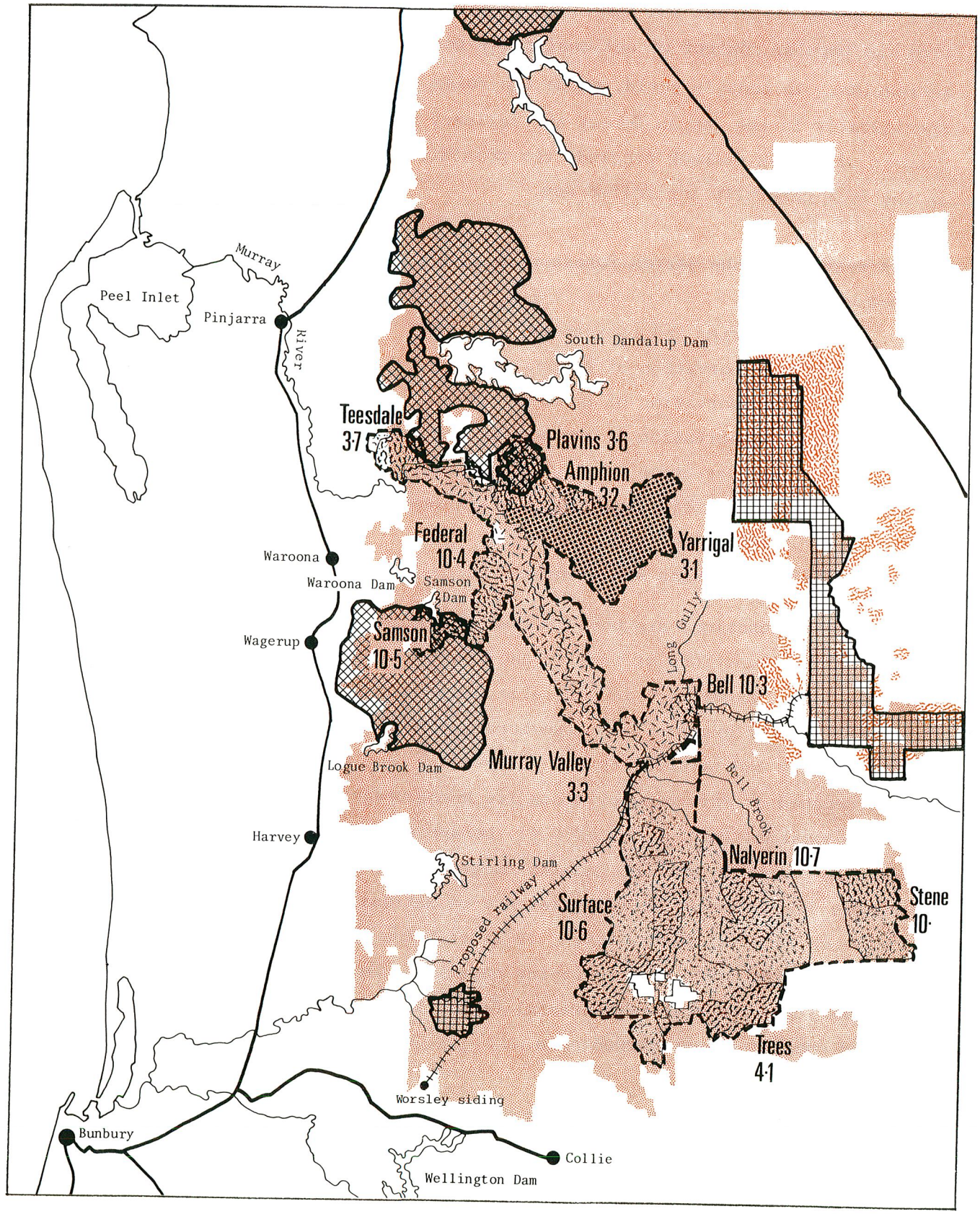
have to serve different and sometimes conflicting uses. This conflict results from the popular concept of national parks being for both preservation and recreation. In today's world, these two roles are no longer always compatible. Specifically in the jarrah forest the delicacy of the ecosystem and the dangers of jarrah dieback preclude the possibility of conjunct usage except in the most carefully controlled way.

A reserve in the jarrah forest will have to provide for the following purposes:

tourism and recreation,
preservation of fauna,
preservation of specific flora,
preservation of representative samples of a unique ecosystem,
preservation of Aboriginal sites,
scientific investigation and research,
education,
wilderness experience.

Some of these functions are more or less compatible, and others are not; in general the functions of tourism and recreation are not compatible with the remainder. Experience in Australia, in the Uluru (Ayer's Rock, Mt. Olga) National Park for example, and elsewhere in the world shows that the values, both aesthetic and natural, that a reserve has been established to maintain can be damaged or destroyed by excessive human usage. Thus the air of Yosemite National Park, in the U.S.A., became so polluted that it was considered to be worse than Los Angeles smog. It was suggested by various delegates at the Second World Conference on National Parks (Yellowstone and Grand Teton National Parks, U.S.A. 1972) that concessions and accommodation be excluded from parks, that carrying capacities be scientifically determined and controlled, and that recreational facilities should preferably be provided outside the preserved area.

This proposal suggests that the one reserve with all the advantages of large area, adequate tenure and suitable control could incorporate all these purposes by careful use of contiguous areas, and by separation of function by careful management practice. Where the future dynamics of recreational requirements threaten to affect the prime function of the reserve, that is the preservation of a scarce and vulnerable resource held in trust for future generations, then suitable adjustments to secure that prime function would have to be made.



Worsley alumina project

Alcoa alumina project
(25 year mining outline)

0 15 30
km

State Forest

Forested areas

FORESTS DEPARTMENT MANAGEMENT PRIORITY AREAS:

Core

Recreational

Buffer

Experimental

Proposed reserve

Figure 3. Current and proposed land-use in the area. Forests Department Management Priority Areas.

Location & Area

The proposed reserve lies between Dwellingup and Collie as shown on the plan on page eighteen. It stretches some 59 km from north to south and some 32 km from east to west at its widest point. In general it is made up of Forests Department Management Priority Areas, some connecting sections of State Forest and some included areas of private land.

The areas of the individual parts and brief descriptions of features and usage are as follows:

MPA No.	MPA Name	Area (ha)	Features and Usage
3.7	Teesdale	1 728	Contains three Land Act Reserves. Contains part of the Murray River. Contains virgin jarrah-marri stand. Conservation.
3.6	Plavins	3 495	Contains river banksia and blackbutt in the gullies. Conservation.
3.2	Amphion	1 005	Contains unburnt re-growth jarrah. Fire studies, proposed conservation.
3.1	Yarrigal	7 686	Experimental catchment. Forests Department purposes, recreational use and timber production.
3.3	Murray Valley and extension	12 000 (A)	Contains a long length of the Murray River. Connects MPAs Teesdale, Plavins, Federal and Bell. Proposed recreational use.
10.4	Federal	1 412	Contains high quality blackbutt forest. Conservation.
10.5	Samson	1 035	Best available open bullich. Extensive kingia groves. Is cut by powerline. Conservation.
	State Forest	200 (A)	Corridor connecting MPAs Samson and Federal. State Forest.

10.3	Bell	2 590	Contains part of the Murray River. Contains virgin upland jarrah forest. Conservation.
	State Forest	2 880 (A)	Corridor connecting MPAs Bell and Surface. State Forest.
10.6	Surface	15 125	Contains the largest area of virgin jarrah remaining in the northern jarrah forest. Conservation.
10.7	Nalyerin	10 375	Contains a large freshwater seasonal lake. Contains swamp complex vegetation. Conservation.
	Private land	1 100 (A)	Private land surrounded by MPAs Surface and Trees. Contains Lake Yourdamung.
4.1	Trees	7 837	Contains virgin jarrah forest. Is cut by powerline. Conservation.
	State Forest	3 720 (A)	Forests Department block Stockyard between MPAs Nalyerin and Stene.
10.8	Stene	4 487	Contains a considerable area of virgin wandoo and jarrah open forest. Conservation.
Key: (A) = Approximate		76 775	Total Area

The total area of approximately 77 000 ha provides a substantial reservation encompassing virtually the whole range of the jarrah forest, from prime high virgin jarrah in the west to open jarrah forest and virgin wandoo woodland in the east. It includes quality stands of river banksia (*Banksia littoralis seminuda*), blackbutt (*E. patens*), bullich (*E. megacarpa*) and mixed jarrah-marri (*E. marginata - E. calophylla*). All the site-vegetation types in the Northern Jarrah Region designated by Havel are represented except one, thirteen types being represented strongly and the remainder less extensively.

To put this area in perspective, the Victorian National Parks Association has recently proposed that the Grampians area be managed as a National Park. The part of this area managed by the Forests Commission as the Grampians State

Forest has an area of 260 000 ha and is 258 km from Melbourne. Other national park recommendations in Victoria (a state totalling only 228 000 sq km) are Wonnangatta-Moraka National Park, 104 000 ha, Begong National Park, 79 000 ha, and Cobberas-Tingaringy National Park, 94 700 ha.

New South Wales has marked the centenary of Australia's first national park by declaring the Wollemi National Park of 502 000 ha on Sydney's doorstep. This represents an area over six times as large as that contained in this proposal, and this in a state that is less than a third the size of our own.

It is also comparable in size with the reserve established late last century (gazetted 14th February, 1894) in the northern jarrah forest as a result of a petition and proposal by the West Australian Natural History Society under its President, Sir John Forrest. That reserve was eventually gazetted out of existence and the land now forms State Forest No. 14. This points out the need for adequate tenure and also for constant vigilance on the part of those with vision enough to see the need for preservation. We now have a second chance, but may not have a third.

Vesting & Tenure

Some 90% of the area proposed is already set aside by the Forests Department of Western Australia as Management Priority Areas. Thus there should be essentially no conflict with the Department that is the main administrator of public land in this area as regards the particular location to be set aside as reserve.

The Department has indicated that it is fully cognizant of its responsibilities and sees part of these as the preservation in perpetuity of a full range of natural ecosystems characteristic of the region, and the providing of recreational opportunities within State Forest. It attempts to implement these within the framework of its multiple-use policy. Unfortunately, it can be seen that despite these admirable intentions, the tenure of the area under legislation covering State Forest might be inadequate to secure preservation in perpetuity.

Thus early fears expressed by foresters concerning the proposals for open-cut mining for bauxite, and the resulting objections that were raised, were insufficient to prevent large areas of State Forest from being devoted to this

land use. Significant sections of forest that was managed to conserve it for perpetual hardwood production were then changed to areas where, in the miners' words, it is only "possible" that "some form" of timber production could be carried out in the future. The requirement for preservation in perpetuity is, of course, fundamental to any serious proposal for reservation.

While the Forests Department claims that its Management Priority Areas are seen as the equivalent of A class reserves, in fact they are not A class reserves, so that, with the best will in the world, they do not have adequate long-term protection.

These MPAs are set out in Forests Department Working Plans covering a set number of years. Once again, whatever the good intentions of current foresters, there is nothing to prevent a re-allocation of priorities in the future as occurred with the reserve set up in the jarrah forest before the turn of the century. Forests Departments in Australia have historically directed their efforts to production, and this must still remain a prime impetus despite newly-declared policies.

The MPAs are established on the core-buffer concept. It is envisaged by the Forests Department that selective logging will be carried out in the future in the buffer areas and in the recreation areas. Modern logging techniques are highly mechanised and result in considerable damage to the visual and physical aspects of an area of forest. It cannot be seriously contemplated that any part of a region conforming to the concepts of a national park should be regarded as a logging resource.

The Technical Advisory Group, in its report to the Environmental Protection Authority (Department of Conservation & Environment Bulletin No. 44), expressed concern about Conservation MPAs regarding their tenure, their size as individual units in the forest, and the fact that the buffer zones can be managed in ways inimical to a nature reserve. Their report said:

> "Although the Conservation MPAs, as proposed in the 1978 Forests Department Working Plan (Forests Department, 1978) have been accepted by Government, at this stage these areas are only afforded the protection of a C class reserve. This is of great concern to us because confidential documents indicate that the MPA buffer zones are not being regarded as part of the conservation area, but merely as a negotiable area around the core.
>
> If we regard only the core area of the Conservation MPA as the

true nature reserve then we are left with no Conservation MPAs which may be considered large enough as conservation reserves. Further we consider that the MPAs may well be far too small should they become isolated by large scale physiognomic and floristic changes to the forest outside their boundaries attendant upon bauxite mining and jarrah dieback infection."

The report also said:

"Further, Forests Department burning practices may be inimical to fauna and flora in MPAs."

It is thus not possible for the proposed reserve to be administered as part of the State Forests under the Forests Department's present management policy. It is certainly not the intention of this proposal to impugn the good intentions of foresters or to seek to deny them a part in the future management of the reservation. There is essentially a compatibility of ideals related to the creation of national parks and item four of the Statement of National Forest Policy of the Institute of Foresters of Australia Incorporated, and to the items relating to the conservation of Flora, Fauna, and Special Scientific Values in the Forest Policy of the Forests Department of Western Australia.

Another possible vesting is under the National Parks Authority of Western Australia. The National Parks Authority Act, 1976, which establishes the Authority, provides "for the vesting and management of certain areas as National Parks or reserves, for the conservation of the natural environment, the preservation and enhancement of natural beauty, and the provision of access and facilities for public recreation, and for incidental and other purposes."

This brief and very general statement does not allow specifically for many of the purposes envisaged for the reserve proposed here, nor does it seek to differentiate between functions. Thus in the National Parks adjacent to Perth the emphasis has been on the recreational aspects almost exclusively, and management has been geared to the provision of access, to the setting up and maintenance of tourist facilities, and to the eradication of any fire risk even at the expense of preservation values. In this context, the Technical Advisory Group observes: "that National Parks have a multi-purpose vesting and they are all downgraded through too-frequent burning and other activities."

The National Parks Authority, of course, comes under considerable

pressure from landowners adjacent to reserves, and from local bush-fire brigades. It also is limited because of funding in its professional and specialist staffing.

Because of the situation of the proposed reserve almost entirely within the State Forests, and because of the nature of the specific purposes to which parts of the reserve should be allocated, it is suggested that the make-up of the Authority as presently constituted would make it unsuitable as the administrative body. In a Board or Authority that might be set up to manage the reserve there would be no requirement for persons knowledgeable and experienced in matters relating to primary industry.

Management

General.

The main purpose of the proposed reserve is to preserve, in perpetuity, representative segments of the jarrah forest ecosystems, and management would be directed to implementation of this aim. Additionally, management would provide for the purposes of the reserve previously enunciated in such a way as to keep them compatible with the main purpose.

Modern practice calls for a master or working plan for a reserve. Ideally, this should be prepared and developed concurrently with plans for the adjacent areas. Planning for national parks is primarily concerned with the fact that natural environments can be modified, or even changed completely, by the impact of visitors. The degree of change is largely a function of the numbers and mode of transport of the visitors. Management, therefore, is concerned in part with the level of impact in various areas of the reserve and means of effectively controlling it.

Current practice is for this control to be achieved by means of zoning and by thoughtful road development. Thus, bearing in mind that in future this reserve could be the last segment of the original jarrah forest remaining, access would be strictly limited in some areas and relatively unrestricted elsewhere. Some areas would not be visited at all except for scientific research, others would be visited by hikers in restricted numbers, another zone would have tracks and roads, and a fourth other levels of facilities. Such zoning may be flexible, in the interests of the preservation function, for example, by restricting vehicular traffic during times of high dieback infection risk, or by changing of zonation where levels of impact move beyond the sustainable level.

In the United States' national parks, six classes of zones have been recommended:

Class I	-	high density recreation areas
Class II	-	general outdoor recreation areas
Class III	-	natural environment areas
Class IV	-	outstanding natural areas
Class V	-	primitive areas
Class VI	-	historic and cultural areas.

These classes are listed to indicate the direction of thinking elsewhere, though, for various reasons, not all are directly applicable to the proposed reserve. The W.A. Division of the Institute of Foresters recommended three "use-zones" in their proposal for a South Coast National Park. It is suggested that, because of the special conditions relating to the proposed jarrah reserve, four zones should be defined.

Factors influencing choice of zones.

The special conditions are that the proposed reserve is almost entirely surrounded by State Forest, that much of the adjacent area is eventually to be mined for bauxite, and that the area is susceptible to dieback infection. Fire control will be a major management consideration, but is not directly related to zonation.

The surrounding forests can provide an effective buffer zone so long as they remain in a similar biological state to the reserve. Sympathetic management of these areas, as currently exists in the quarantine areas, can help in protection of the proposed reserve. Such management would prevent the reserve from becoming an island, at least in the short term, in a sea of alien and exotic species as occurs with many small national parks and reserves. Hopefully, in the long term, further public education and greater environmental awareness will have the effect of securing the values that this protection in the forest will have preserved.

Bauxite mining has the potential to destroy much of the existing northern jarrah forest. Barry Carbon, a Senior Research Scientist with the CSIRO Division of Land Resources Management, said in a recent paper: "It is probable that the combination of bauxite mining and jarrah dieback will irrevocably destroy the jarrah forest."

The north-west areas of the proposed reserve will either abut onto, or be nearly surrounded by, the medium-term mining areas for Alcoa's Pinjarra and Wagerup refineries, and any management plan will have to make allowance for this. These areas will, in fact, approach the status of "island" reserves. The Technical Advisory Group disagreed with the view that the impact of mining on native species is reversible, and was not convinced that vegetation in rehabilitated areas will be self-perpetuating. There is also the danger that introduced tree species will become weeds competing with native species, and indeed that grasses and introduced weeds actually used in rehabilitation will spread to adjacent areas. Consideration is given to these concerns in the suggestions relating to zoning below.

The scientists who contributed to the TAG report considered that bauxite mining will result in a reduction in the area physically available for recreation. While this is true for those people interested in areas of minimal development, it appears that a significant number of forest visitors (some 60%) are happy with limited areas developed specifically for tourists. This is readily verified by noting the proportion of visitors who congregate at barbecue sites in the national parks close to Perth and at sites set aside by the Forests Department and the water supply authorities elsewhere. The picnic area created by Alcoa at Langford Park is also popular.

This proposal suggests, therefore, that this significant group of forest visitors (corresponding to the group using Class I of the zones listed above) can be readily catered for elsewhere, even in rehabilitated mining areas. This group is also the most vehicle-oriented and has the potential to cause most damage to natural environments. Thus it is proposed that the management plan, without detriment to this segment of the public, could exclude the facilities and ready access relating to a Class I zone.

The dangers of dieback infection and wildfire are readily apparent and will obviously require specific management prescriptions. Road access is again a crucial factor in that vehicles are the most important means of spreading dieback, and it is apparent that there is a positive correlation between the number of intentionally-lit fires, and the ease of vehicular access. The availability of emergency access for fire control must be considered. Research will be necessary to determine the appropriate prescriptions and techniques relating to burning to secure optimum protection of the specific flora and fauna communities.

Zonation.

The following zones are suggested:

Zone 1. Areas where specified access roads would be available and where there would be facilities for day visitors. This zone would lie somewhere between Class II and Class III, as listed above.

Zone 2. Areas where there would be no unofficial vehicular access but ready access along easy paths. This would correspond to Class III.

Zone 3. An area where only a few rough tracks would be available. This would constitute a wilderness area and correspond to Class V.

Zone 4. Areas where, because of the importance of the communities to be preserved and the potential dangers to those communities, the public would be excluded. Specific permission would be required for the visits of scientists or of those whose visit was considered necessary.

While it is hoped that specific zones would be demarcated by relevant experts and authorities, and that they be incorporated in a master plan, certain general recommendations are made as follows:

Zone 1 : Limited Development Areas.

Areas where sub-arterial roads are located and where limited facilities for picnickers and day-visitors are available. Sub-arterial roads can be defined as roads capable of carrying all-year traffic, but not necessarily sealed.

The area suggested for this zone corresponds to Forests Department recreation MPA 3.3 and its extension to MPAs Bell and Surface. The reserve management plan would have to consider what restrictions would have to be placed on access to areas on the east side of the Murray River and other sections which are currently within the quarantine zone. Perhaps access could be restricted during times

of high risk of dieback spread, i.e., where relatively high soil temperatures and moist soil conditions exist coincidentally.

MPA 3.3 straddles the Murray River and is already used extensively for recreation purposes. Considerable degradation of existing popular sites is already occurring (Technical Advisory Group report). There is thus already a demonstrable requirement for direct management here.

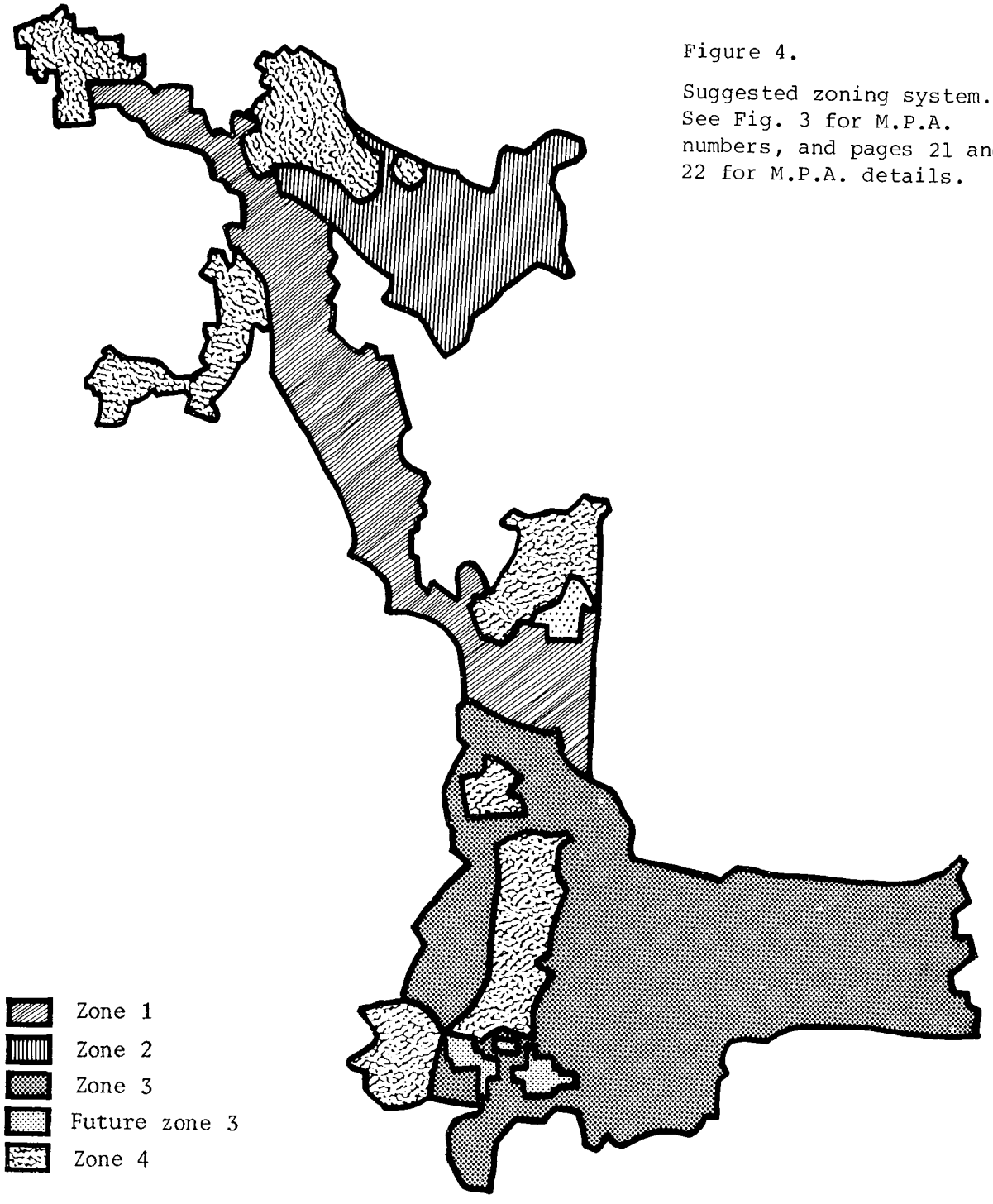


Figure 4.

Suggested zoning system. See Fig. 3 for M.P.A. numbers, and pages 21 and 22 for M.P.A. details.

Attitudes towards park road development are a crucial part of visitor impact control. Overseas authorities with knowledge of intense national park usage, that we in Western Australia have yet to experience, are agreed as to the dangers of road development. Thus E.M. Nicholson, U.K., International Convenor IBP/CT, says: "Using hindsight, we can now see that more road space generates more traffic to overfill it is as true within parks as within cities." Also Tetsumaro Senge, Chairman, National Parks Association of Japan, says: "Roads are prone to destroy nature, transplant culture and urban environments, metamorphose the quality of recreation, and occasion park overuse as a result of easy access."
George B. Hartog, Jnr., former Director of National Park Service, U.S.A., has this to say: "Over the years, there is one rule of development that has proved irrefutable - that every increase in capacity, whether of roads, trails or campgrounds, is followed by an increase in use. We have learned, often to our sorrow, that this is particularly true of park roads. Once constructed, they constitute all too permanent access into park areas that can be damaged by constant accessibility and use. Always challenge the 'bigger, faster road' philosophy. A well-designed park road is one that lies lightly on the land."

In our own context, therefore, we should take these lessons to heart and consider the road system for the recreation areas of the proposed reserve accordingly. In general, unsurfaced, low impact roads of limited length and width would provide adequate access. High speed, hard surface roads could be provided within sight of the periphery of the reserve to cater for the apparently significant group whose aesthetic requirements can be satisfied from a vehicle. Similar roads could be available to provide access to the high-intensity recreation sites available elsewhere, as discussed above, and to selected monadnocks in the area where extensive views are available that would not be available in the reserve. Thus pressure could be removed from the reserve without the level of satisfaction available to a considerable number of potential reserve users being in any way diminished.

Consideration also has to be given to providing transport corridors for Forests Department use, because the proposed reserve stretches across the width of the State Forests.

The whole question of existing made roads through the area of the proposed reserve, as opposed to roads that will be part of the reserve, is a complex one. Thus it would be difficult to make alternative arrangements for the Pinjarra Williams Road and the Quindanning Road. However, many of the roads in the quarantine area are already 'Restricted Access Roads' and there would be no nett loss of access if they remained so. The 'Unrestricted Access Roads' giving access to the pockets of private property would necessarily remain although some form of limited restriction might be required. Also, while it might not be possible to re-route Nanga Road outside the Samson MPA area, it would certainly be in the interests of long-term preservation if the road was elsewhere. It might also be necessary to retain the section of Scarp Road giving access to Scarp Pool in the Teesdale MPA area.

These suggestions, therefore, will not attempt to examine each of these important details but will suggest overall arrangements that are regarded as the best possible in the long-term interests of the reserve.

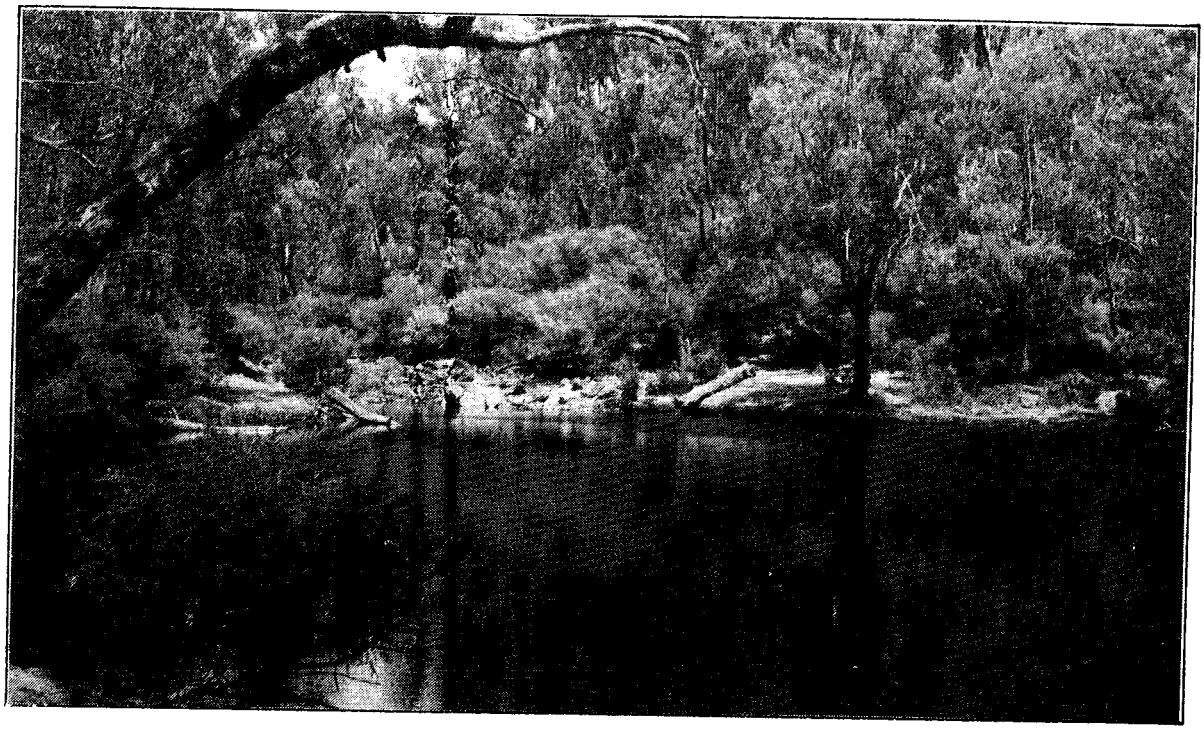


Plate 5. The Murray River. It is most important that this last undeveloped major river in the forest north of Collie be preserved.

Zone 2 : Limited Access Areas.

Areas where visitors would move on foot on defined tracks. There is scope here to cater for public interest enhancement and education in tree and plant tagging for identification, and for specially-defined walks with descriptive leaflets being made available. The Forests Department of Western Australia, the National Parks Authority and the Forests Commission, Victoria, already provide this service.

This zone has not been specifically demarcated in total but would probably incorporate MPA 3.1 Yarrigal, where quarantine restrictions should certainly remain, and possibly selected peripheral areas elsewhere.

In general no made roads would be constructed in this area. One of the features of the jarrah forest is that it is largely surfaced by lateritic gravels so that if emergency vehicular access is required, it would be available along existing tracks made by earlier logging trucks and other vehicles. The fragility of the environment is demonstrated by the fact that these remain obvious for some decades after their creation. Selected tracks could be kept relatively clear of fallen trunks and yet effectively closed off to general use as part of the general management programme.

Zone 3 : Wilderness Area.

An area with few rough walking tracks and no developed facilities.

The idea of formally demarcated wilderness areas is fairly new to Western Australia. Wilderness areas are not defined by the West Australian Sub-Committee of the Australian Academy of Science Committee on National Parks in their publication *National Parks and Nature Reserves in Western Australia*, published in 1965, but the classification is categorized and defined by the National Parks Authority, W.A., in its *Management Policies*, published in 1977.

In its proposal for a South Coast National Park, the W.A. Division of the Institute of Foresters defined the wilderness experience and

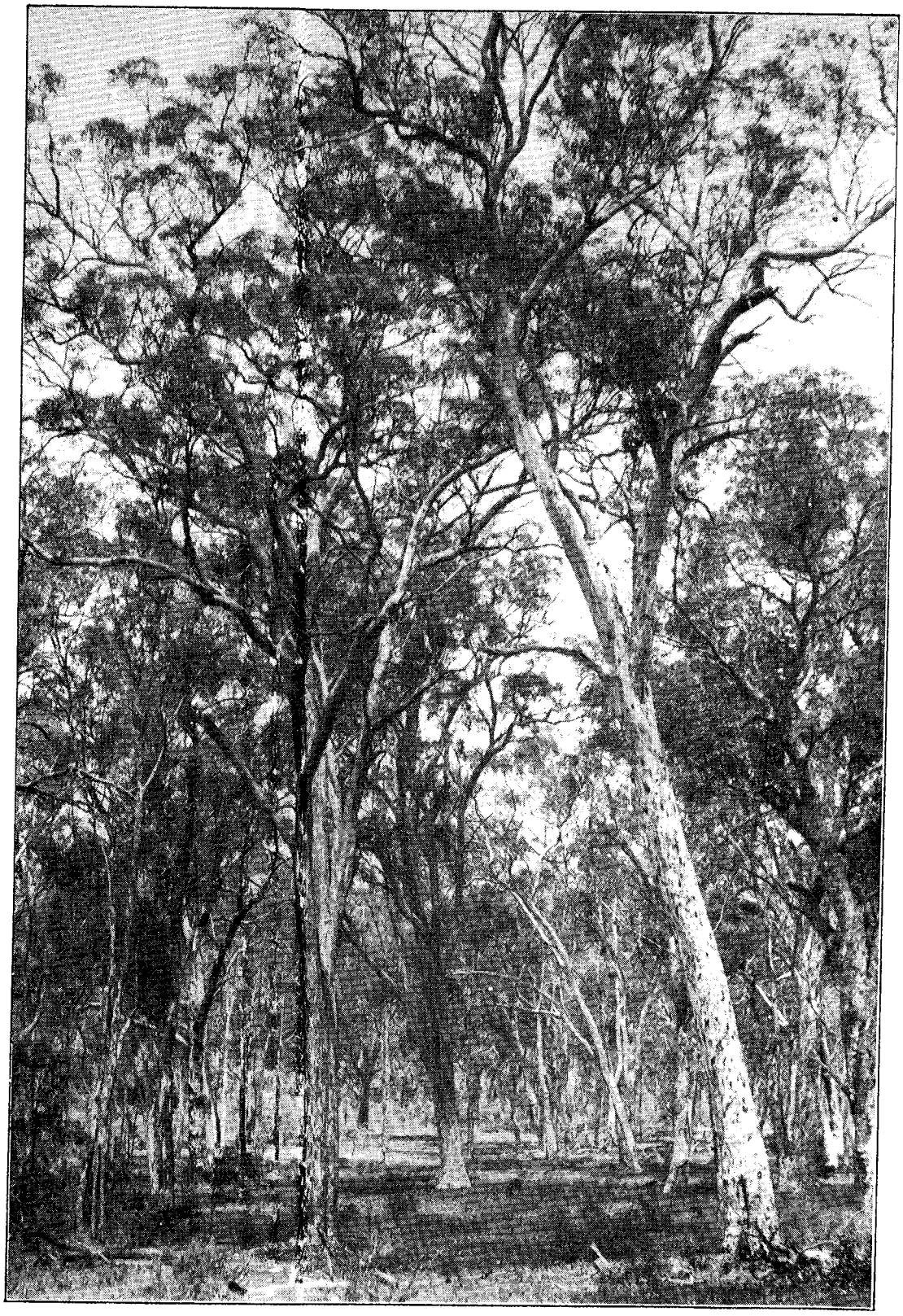


Plate 6. Virgin open wandoo forest in the eastern area of the proposed reserve.

proposed three wilderness areas in the area of its concern. Elsewhere in Australia the concept is accepted and wilderness areas have been proposed and set aside. In the United States of America, the Wilderness Act was signed into law on September, 1964, and some millions of hectares of land have been designated as wilderness areas.

The wilderness philosophy is discussed elsewhere in this proposal. Its implementation calls for two basic requirements: space and an area kept in as close to a natural state as possible. The section of the proposed reserve composed of Conservation NPAs Surface, Nalyerin, Trees and Stene, along with the enclosed private land (see later segment) and Forests Department block Stockyard, fulfils both criteria. The shape of the area tends towards the ideal for a wilderness area and a conservation reserve in that the ratio of boundary length to enclosed area is small.

This area would provide additionally for all the purposes previously enunciated (Terms and Functions), except for tourism, and even tourism would be accommodated around the margins of the wilderness areas and with views into them. Selected peripheral areas of the larger wilderness area could be included in zone 2.

Once again it must be recognised that overseas experience shows that overuse can destroy the thing preserved, and this also applies to the effect of hikers in the wilderness area, as well as to vehicles elsewhere in the reserve. A wilderness area will also cease to be a wilderness if too many people are visiting at the same time. Management, here as elsewhere in the reserve, will be concerned with a necessary degree of control, especially if in the future, as in Japan today, the desire to explore national parks becomes a mass movement. An expert in ecology and conservation in Africa has this to say on this subject:

> "Since each wilderness area differs from another, it must be the special values, functions, accessibility, and degree of fragility characterizing each area that determine the number of visitors during different seasons of the year. Many areas can probably absorb more visitors in autumn than in spring. A flexible system synchronized with the seasonally variable environmental capacity to receive visitors without habitat disturbances should be

worked out, guided by research. Thus a zoning system, both in space and time, may avoid damage."

Kai Curry-Lindahl. UNESCO Field Science Office for Africa. (Second World Conference on National Parks).

While the idea of reserve overuse may seem far-fetched in a current West Australian scene, it is essential that any management plan recognises that ecosystems have optimum carrying capacities. The theme of damage resulting from overuse is a constant one in papers presented by authorities on national parks in other parts of the world.

Special provision would have to be made for the existing powerline on the boundaries of MPAs Surface and Nalyerin and dividing MPA Trees. Access for power authority maintenance teams would require strict control.

Plate 7. An interesting *Melaleuca preissiana* in Nalyerin. Lake Nalyerin is a seasonal freshwater lake. Open jarrah forest in the area gives way to treeless sedgelands near the lake.

Zone 4 : Areas of Public Exclusion.

If the reserve is truly to fulfil its functions of conservation in the context of the potential destruction of the remaining jarrah forest, then this general exclusion of people from a part of the proposed reserve is essential.

The National Parks Authority W.A., in its *Management Policies* document, categorizes a Special Area as: "An area possessing indigenous plant or animal life or geological or archaeological features of such importance that it should, as far as possible, be preserved intact with the minimum of human interference and to which, therefore, access must be by permit and only if circumstances warrant."

This idea is generally recognized elsewhere and such areas may be categorized as strict nature reserves. These have been described as areas "aimed at preserving valuable natural complexes capable of self-regulation. The natural complexes of wildlife reserves are examples of pristine nature landscapes, they are repositories of the genetic stock of animal and plant species in their natural environment." Other definitions stress that they are important sources of ecological information. It has been argued that such areas, as part of a global network of preserved ecosystems, may one day assist man in the understanding of his environment and may give clues to help solve ecological problems which might otherwise lead mankind to disaster.

It can certainly be reasonably argued that large segments of the jarrah forest ecosystems should be preserved purely to this end, but in the context of this proposal it is suggested that the conservation MPAs situated towards the north-west of the proposed reserve should come within this zone. These MPAs are: Teesdale, Samson, Federal, Plavins, Amphion and Bell.

These areas are dispersed and it is possible that each individual area is barely viable as a separate conservation entity. Long-term viability can be related to size and certainly the number of species of organisms in a natural or near-natural ecosystem increase substantially with area.

It is this very doubt as to long-term viability that makes

Plate 8. River banksia in the proposed reserve area. Plavins M.P.A. is of particular importance as it provides the only significant area of *Banksia littoralis* var *seminuda* in the State Forest.

it essential that these areas fall within zone 4. At least the dangers represented by public usage can be minimized. Also the dangers of wildfire and of dieback spread can be greatly reduced.

The need for preservation of these areas is very great. It is entirely possible that they will eventually contain the last representative stands of blackbutt, bullich, river banksia and tall western jarrah-marri. While virgin jarrah and jarrah-marri stands exist elsewhere in the reserve, it may not be possible to provide for replication of reserves for the other species elsewhere.

In the future, the MPAs Teesdale, Samson, Federal and possibly Bell, may be nearly surrounded by bauxite mining areas. They will

thus potentially suffer all the disabilities of being relatively small isolated reserves. Most of MPA Plavins is also bordered by the 25 year mining area of Alcoa's Pinjarra operation. Consideration, of course, must be given to the future well beyond 25 years, and it is highly probable that land uses in the northern jarrah forest will differ radically from today's.

For all these reasons, it is suggested that the strongest measures for conservation of these areas should be implemented at the earliest possible time and that, as part of these measures, these areas should be removed from public use by inclusion in zone 4.

Other areas that should be considered for immediate inclusion in this zone are the core areas of MPA Surface. MPA Surface contains the largest remaining area of virgin jarrah forest north of the Blackwood River and has a wide range of vegetation types. The Forests Department regards the area as important enough to warrant the following recommendations in its submission to *System 6*:

> "Quarantine measures should be maintained in this proposed Management Priority Area even after they have been lifted elsewhere.
>
> Recreation should not be allowed in this area in view of its vulnerability to dieback, and its importance as an ecological benchmark."

The submission makes broadly similar recommendations in relation to MPA Trees.

The National Trust of Australia(W.A.) has proposed to the Australian Heritage Commission that MPA Surface be given Heritage status.

It is probable that eventually other areas of the reserve will have to be included in Zone 4. Among these areas could be the existing core areas of MPAs Trees, Nalyerin, and Stene. A dynamic on-going management plan should allow for this. A suitably qualified management team with adequate terms of reference will be in a position to determine and implement such changes.

Provision for maintenance of the existing powerline through MPA Samson needs to be made. However, in view of the values involved, this short length of powerline would be better diverted outside the reserve area. The clearing for this powerline took place only recently in this very important MPA and this itself points out the need for adequate protective legislation for these areas.

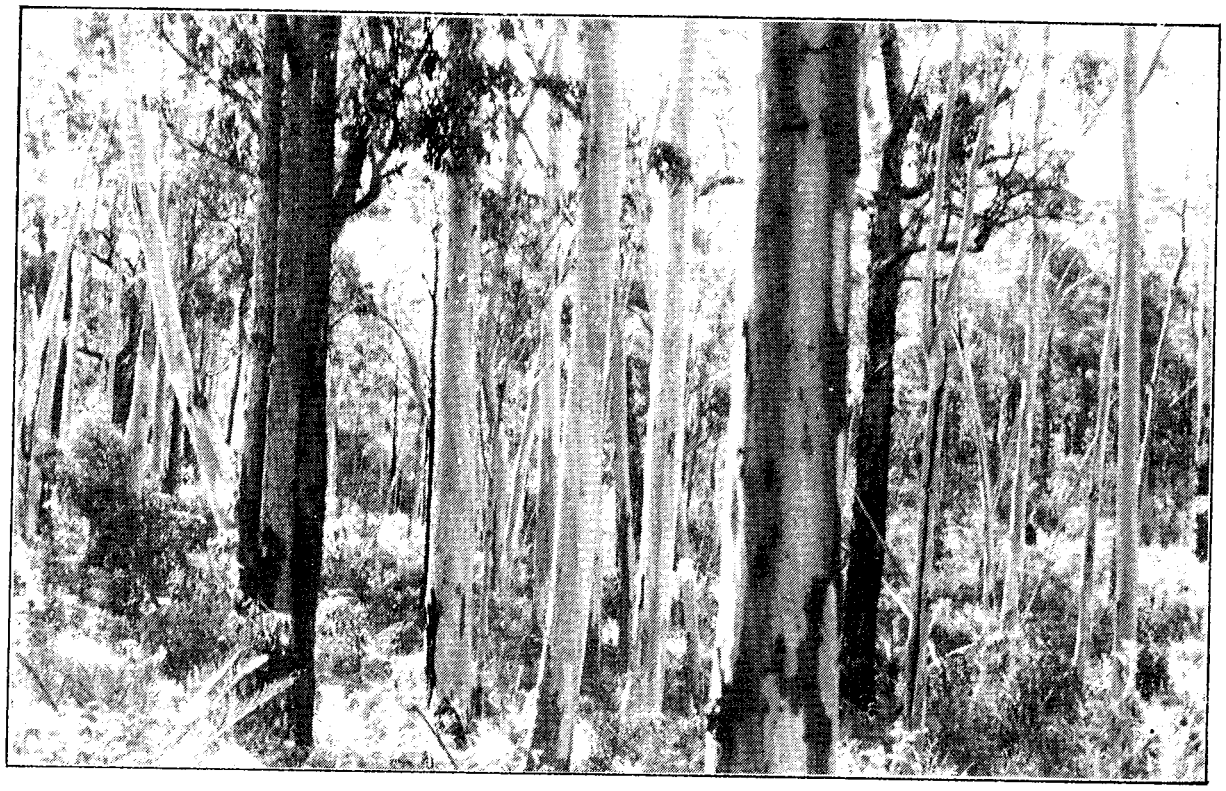


Plate 9. Bullich *(Eucalyptus megacarpa)*. The main purpose of Samson M.P.A. is to preserve the best stands of bullich in the Darling Ranges. A powerline was recently cut through this M.P.A.

Other considerations

Transport Corridor For The Worsley Alumina Project.

Transport of bauxite ore from the Alwest lease to the proposed refinery site near Worsley siding is projected to be along a transport corridor using either a rail or conveyor option. The proposed conveyor route is in two straight legs while the railway route follows river and ground contours. Both corridors would pass through the proposed reserve, the conveyor route being aligned to the south of conservation MPA Bell while the rail route passes right through the core area of Bell and continues along the southern side of the Murray River.

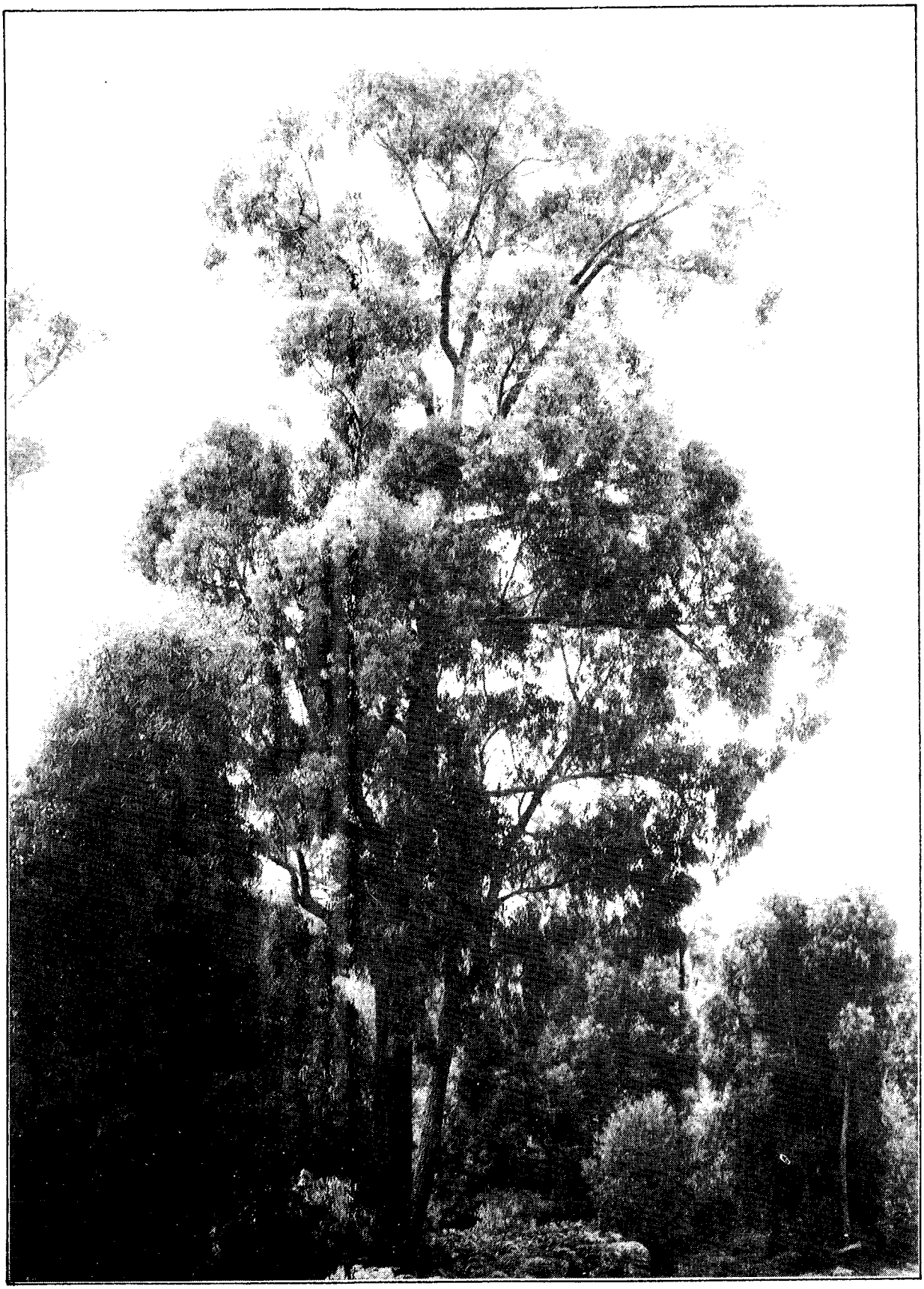


Plate 10. Young blackbutt in the proposed reserve area. Federal M.P.A. is unique in that it provides the only extensive area of high quality *Eucalyptus patens* in the Special M.P.A's.

While consideration should be given to previously allocated land uses, the proposal would obviously have a detrimental effect on reserve values. Both routes pass through the quarantine area with construction works having the potential to spread jarrah dieback. The conveyor route, because it would traverse hill and valley in a straight line would tend to reach more susceptible zones. However, the conveyor route is through an area not previously allocated towards reservation.

The railway route would be constructed through the core zone of MPA Bell. In conjunction with the existing Quindanning Road alignment, it would create a broad corridor of interference through this area and further separate it from the Murray River. There would be the danger of introduction of exotic weeds and grasses, not only in the construction process but also as a result of the need to stabilize embankments. Also the railway proposal involves the establishment of radio communication masts with associated access roads on prominent hills. Obviously this would constitute a major impact in an area of woodlands and forest that has remained virtually undisturbed and that is currently set aside, in part, for the preservation of virgin upland jarrah forest. However, the Environmental Protection Authority, in its comments on the Worsley ERMP, suggested that the railway option might be less destructive to the environment.

2. Murray River Water Supply Proposals.

The Murray River falls within the area controlled by the Metropolitan Water Supply, Sewerage and Drainage Board for water supply purposes. The western forested portion of the catchment area has been declared a Water Reserve. This area covers much of the area of the reserve proposal.

Only preliminary studies have been carried out to date on the utilization of this water resource but various development possibilities have been suggested for the future. These include:

(a) a major dam, south of Dwellingup, on the Murray River, impounding both higher quality water from the forested catchments and saline water from the Hotham and Williams Rivers,

(b) a single dam or two separate dams constructed at or close to the confluence of the Hotham and

Williams Rivers to impound the saline water before it reaches the Dwellingup Dam which would store the better quality forest catchment run-off for immediate consumption. The upstream impounded saline water would be discharged into the Murray River downstreamof the Dwellingup Dam by a pipe and/or tunnel system,

(c) provision of pipe head dams in the more important smaller streams such as Bell Brook and Chalk Brook. The impounded potable water from the surrounding forest catchments will be reticulated and the undammed Murray River will allow normal residual flows of the higher saline water.

The implementation of proposal (a) or (b) would obviously be disastrous from the point of view of this reserve proposal. A major dam on the Murray River, south from Dwellingup, could impound water which would back up to the Hotham and Williams Rivers thus destroying the total forested river ecosystem. A second upstream dam would add the disruption of a pipeline if a tunnel was not constructed. The proposal for the provision of pipe head dams on Bell Brook and Chalk Brook would be the least destructive environmentally because the dam pondage would be necessarily small. The Bell Brook structure would be in an area not currently demarcated for reservation and the Chalk Brook structure would be only at the boundary of the area of the reserve proposal. However, damage could still occur to the existing river ecosystem from the increased salinity resulting from the reduced input of fresh water. To secure the integrity of the reserve, it would be necessary to incur the higher costs of locating the pipelines from these structures outside the area of the reserve.

The scientists of the Technical Advisory Group in their report said: "The natural ecosystems of the Darling Range, adapted as they are to a most unusual and harsh environment, have a scientific interest and constitute an irreplaceable genetic resource of great value, which is not calculable in purely economic terms." This proposal suggests that the reservation value of the jarrah forest, although not immediately quantifiable in monetary terms, should have at least equal consideration with the values of forestry, water supply , recreation and bauxite mining. All of these other interests can be secured elsewhere in the forest. This proposal is the only one for a major reservation in the jarrah forest.

The reserve should be given A class reserve status and all other potential land uses should be excluded if any other values than short-term expediency are to be considered.

Long-term plans indicate that the eventual re-location of water resources from the South-West to the Metropolitan area will be necessary. The foregoing of the Murray River resource would merely bring forward this eventuality.

3. Foregone Timber Resources.

The corridor connecting MPAs Bell and Surface and the forest block Stockyard are currently part of the forest available for timber cutting. Stockyard is outside of the quarantine zone. MPAs Murray River 3.3 and Yarrigal 3.1, as well as the buffer zones of the conservation MPAs, are seen by the Forests Department as being potential timber production areas.

The comments previously made relating to the potential water resource apply equally here. The requirement for adequate reservation is more important than the requirement for the limited foregone timber resource .

The Forests Department obviously has a prime duty to attempt to retain areas within its jurisdiction for timber cutting. However, bauxite mining has the potential to destroy the jarrah forest and the Hunt Steering Committee, the Technical Advisory Group, the Institute of Foresters, and even the Forests Department itself, have stated that it is still not known if the replanted areas will provide production timber in the long term. Thus, potentially, much of the jarrah of the northern forests is lost as a timber resource in any case. Parts of the forest may only be retained by the total exclusion of mining and other developments. Other developments must, in the case of this reserve, include timber cutting.

Perhaps government could, when considering the patent need for adequate reservation and when allocating funds towards that reservation, look towards the purchase of land in water catchment areas that are salt-sensitive. This land could be reafforested so that several objectives could be secured by the one action.

4. Introduced Flora.

As one of the prime functions of the reserve would be the preservation of indigenous flora, it would be necessary to exclude as far as possible

any foreign or exotic native species. Thus Forest Department plots or arboreta which come within the area of the reserve should have such tree species as have the potential to become "weeds", or spread to adjoining forest, culled. Former areas of private land should be similarly examined and treated.

5. Included Areas of Private Land.

The three pockets of private land located near the southern boundary of the proposed reserve should become part of the reserve. Their inclusion would greatly improve the included area/boundary ratio of the reserve and thus improve its viability. If they were not part of the reserve they would provide a corridor into the core of the reserve for the entry of exotic plants and feral animals. They could be a potential fire hazard. In addition the presence of human habitation, farming activities and the noises of timber-cutting and agricultural machinery, near the centre of a proposed wilderness area, would obviously constitute major inhibitive factors in the appreciation of that area.

This proposal suggests that the properties involved should be acquired, for the purpose of inclusion within the reserve, at the current market value when they become available for sale. Resumption of the land should not take place while current owners wish to remain in occupation, but because of the overall value of the land to the entire present and future populations of the State, the owners should not be given the option of selling the land to other than the authority in which the reserve will be vested.

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FURTHER ASPECTS & SUPPORTING MATERIAL

VESTING

It has already been suggested that the objectives of this proposed reserve make the vesting of it in an existing body inappropriate. The reserve is primarily for conservation, with recreation being a secondary use. The National Parks Authority (as a whole, including staff) is presently not well equipped to manage this type of reserve, while the Forests Department sees its priorities elsewhere - as can be instanced by the suggestion that its present management practices are inimical to conservation.

This submission is made in the knowledge that the existing System 6 Committee, and the Darling Range Policy and Research Co-ordinating Authority sub-committee and Study Group, may make separate recommendations for forest vesting and management in the near future. However, the structure of these organizations indicates that it is unlikely that recommendations emanating from them will provide for optimum long-term management of an adequate reserve in the jarrah forest. It is recognized also that the implementation of this proposal may present practical difficulties, particularly in relation to vesting; thus three vesting options are proposed.

It is essential that the proposed reserve have the security of tenure of a Class A reserve under the Land Act. Such a reserve can only be revoked by Act of Parliament. However, the recommendations of the Committee of Inquiry into the Mining Act (1971) regarding prospecting and mining in A Class reserves and National Parks in the South Western area - that these activities could proceed only with Parliamentary approval - is considered insufficient. NO mining should be permitted within the proposed reserve. A sufficient area of the northern jarrah forest has already been given over to this land-use which is considered completely incompatible with the objectives of the proposed reserve.

Option 1 (the preferred option)

It is recommended that a new and separate Authority be created to hold the vesting order of the Jarrah Forest Reserve, and to undertake through its

permanent staff the proper management (and related research) in accordance with the objectives of the reserve as outlined above.

This Authority should have a membership of about 10 persons who would include:

ex officio
- the Director of the Authority
- the Conservator of Forests
- the Director, Department of Fisheries and Wildlife
- the Curator, W.A. Herbarium

4 practicing biologists (2 botanists, 2 zoologists) particularly with management expertise

2 persons, representing the public, with a demonstrated interest in conservation, to be chosen by the Director of the Authority from 4 persons recommended by the Conservation Council of W.A. Inc.

The Authority should have constituted under it a Management Advisory Sub-Committee consisting of:

- Director of the Authority (Chairman)
- 1 Member Forests Department Protection Branch
- 1 Member National Parks Authority
- 1 Member Department of Fisheries and Wildlife Reserve Management Branch
- 1 Head of a Department at the University of W.A. or Murdoch University, from an appropriate discipline
- 1 of the two Members of the Authority representing the public.

The Authority shall be serviced by a professional staff consisting in the first instance:

- A Director
- 2 Research Officers to investigate optimum management strategies
- 1 Planning or Management Officer to devise the management plan and to supervise the overall implementation.

(Funding - as for the National Parks Authority from consolidated revenue.)

In addition to the professional staff, there shall be provision of adequate field staff, together with clerical and secretarial support staff (10 initially).

The Authority will be required to produce a detailed Management Plan (Working Plan) for the Reserve. The plan should be effective for a period no longer than 10 years. A Draft of the Management Plan will be made available to the public for comments for a period of 3 months. Following incorporation of changes arising from public comments, the final Plan will, on receipt of Ministerial approval, be put into effect. The approved Management Plan will be available for public scrutiny at any time.

The Management Plan may be prepared for sections of the reserve in the first instance.

Option 2 (the second preference)

Alternatively it is recommended that this new reserve be vested in the National Parks Authority. The National Parks Authority shall establish a Management Advisory Sub-Committee along the lines outlined for Option 1 but with increased public involvement.

The National Parks Authority shall be provided with additional research, management planning and field staff commensurate with its increased responsibility.

Option 3

It is recommended that the area remain vested in the Forests Department subject to the condition that the Forests Act be ammended to include provision for Forest Parks (Forest Sanctuaries) with security of tenure equivalent to Land Act Class A reserves as outlined in the CTRC Report (1974). The proposed reserve should thus be given secure tenure.

It is also recommended that a Management Advisory Sub-Committee be formed to develop a separate Management Plan for the area. The constitution of this committee shall be similar to that outlined in Option 1 but with additional representation from the public.

Additional staff should be provided to ensure that the quality of management of the reserve is in accordance with the objectives set out for it.

THE PINJARRA RESERVE: 1894-1911

The purpose of this proposal is the establishment of a reserve in the northern jarrah forest, a reserve inviolate in perpetuity for all the generations to come. This is not, however, the first such reserve to be proposed or indeed established; before the close of the nineteenth century, a reserve for the preservation of native fauna and flora had been created near Pinjarra. It survived for just seventeen years. In examining its history we shall find that the words of those who supported that reserve speak clearly across the dusty years to all those people now concerned at the continuing destruction of our irreplaceable jarrah forests.

On the 26th January, 1894, Mr. Bernard H. Woodward, as Vice-President of the Natural History Society of West Australia, wrote to the Hon. Commissioner for Crown Lands, petitioning him "to set apart a reserve for the protection and preservation of the indigenous fauna and flora".[1] The events leading up to this request had been in progress for over a year, and although Woodward himself brought the proposal before the W.A. Natural History Society, he gives the credit for the initial impetus towards preservation of flora and fauna, on a national basis, to the Australasian Association for the Advancement of Science.

This Association was founded in 1888 under the patronage of the Governor, His Excellency Sir William C.F. Robinson, G.C.M.G.. A prominent member, Baron F. Von Mueller, in his inaugural speech to the Association in 1890, referred directly to the need for reserves:

> Choice areas ... should be reserved in every great country for some maintenance of the original vegetation, and therewith for the preservation of animal life concomitant to peculiar plants. Where the endemic riches are greatest, there also the danger is more imminent of these being swept out of existence, unless timely measures are adopted for the preservation of some sequestered spots ... Such spots should be proclaimed for all time the people's unalienable property, and every inhabitant or visitor of the locality should consider himself the co-preserver of such areas, so as to aid in preventing accidental invasion or casual ignition of intentional spoilation.2

In the same address, Von Mueller drew attention to the great economic importance of forests in their relationship to water supplies.

Woodward at first was unable to arouse much interest in a reserve for Western Australia, largely, as he himself pointed out, because -

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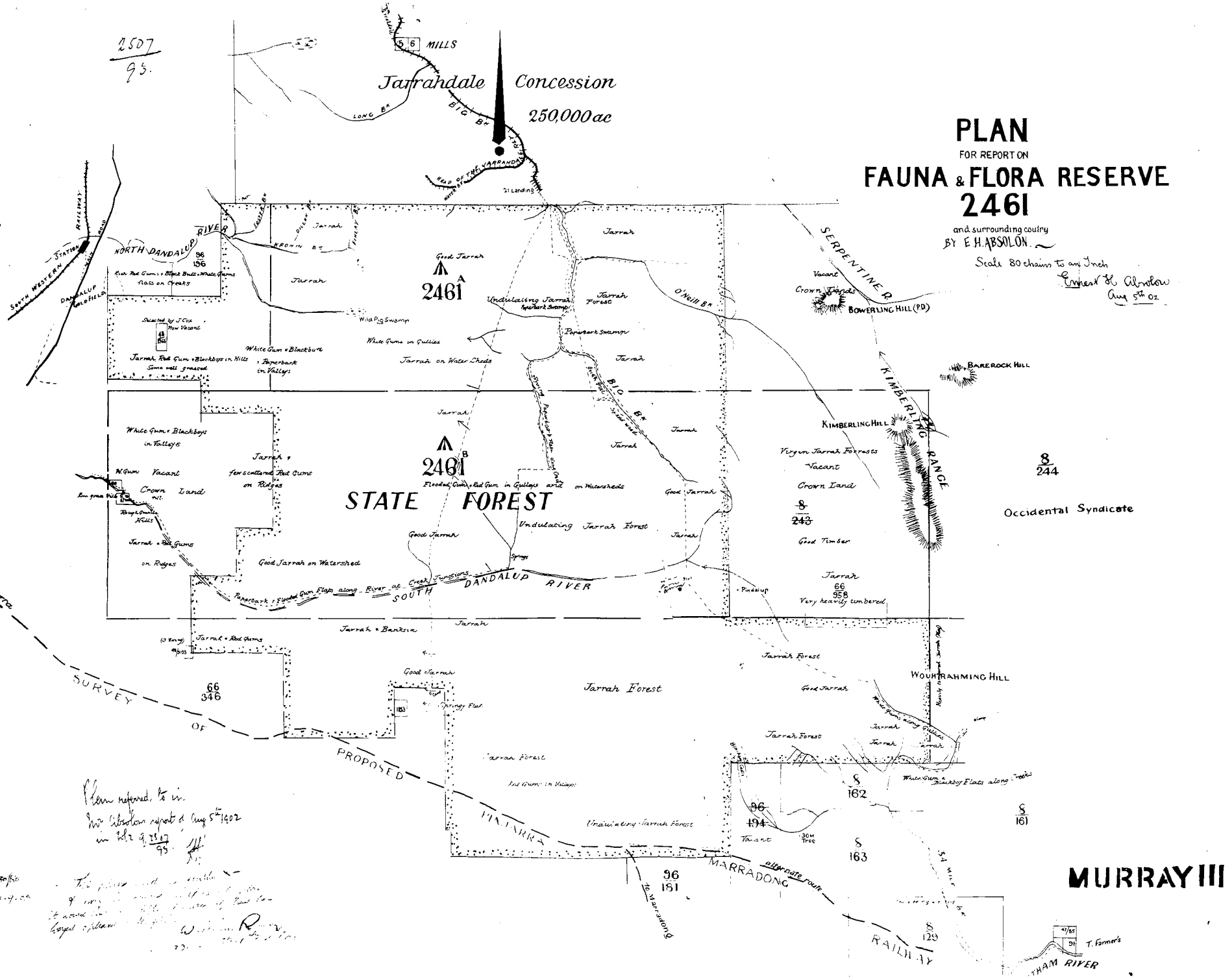

Figure 5. The original Pinjarra Reserve.

> the population was then only 50 or 60,000, scattered over an area of nearly a million square miles, so it was not deemed necessary to take any steps while such a vast extent of land was unoccupied save by the native animals and plants.[3]

However, the urging of Von Mueller through correspondence with the President of the W.A. Natural History Society, Sir John Forrest, who was also the Premier at the time, apparently overcame this dangerously short-sighted attitude, and Woodward was asked by the Premier to suggest a suitable area.

He accordingly chose three sites high in the ranges and unsuited to agriculture because of the abundance of poisonous plants. The land between Bannister and Pinjarra he marked as the best of the three because "great grey kangaroos and emus abounded":

> The country is very picturesque, consisting of gneissic hills covered on one slope with ironstone conglomerate. From the summit of Wourhaming Hill, an immense outcrop of diorite, 1,900 feet high, the view is magnificent, all the higher peaks in the Williams district in the south, Mount Darkan in the north, and Mount Brown near York being conspicuous.[4]

Woodward remarked that the country was so rugged that a member of the mounted-police, who had crossed it once, refused to do so again, preferring instead to ride an extra forty miles by way of Armadale than to cross this area of the forest.

As a result of Woodward's petition in January, 1894, Cabinet advised the Governor to approve an area of 160,000 acres in the Murray District, between Pinjarra, North Dandalup and Bannister. This reserve, No. 2461, for the preservation of native flora and fauna, was proclaimed in the *Western Australian Government Gazette* on the 14th February, 1894. Despite a friendly warning from a colleague, Mr. A.F. Robin, Hon. Secretary of the Native Flora and Fauna Committee of the Naturalists' Section of the Royal Society of South Australia, who suggested, "after sad experience with Forests and kindred reserves"[5] in South Australia, that the Reserve should be vested in Trustees in perpetuity, Woodward took no immediate action towards establishing greater security for this reserve, or others that might follow. He was at the time engaged in setting up the newly formed Western Australian Museum, and perhaps too confident of the support of leading members of the Colony. By 1902, when a request was finally made to vest the reserve in Trustees, it was already too late. One can only speculate on the immense benefit and enrichment the people of Western Australia would have received over the years, and would now receive,

if the reserve had been invested with unalienable security of tenure at its initial establishment in 1894.

Already in 1897 applications were being received by the Crown Lands Department for special licences to cut timber on the reserve. At this time, and indeed until the passing of the Forests Act in 1918, effective control of the forest remained with the Lands Department, a fact which caused continual and increasing concern to succeeding Conservators of Forests, who saw valuable timber resources being irretrievably lost as forested land was alienated to private timber contractors and to often unsuccessful farming settlement. Although the then Conservator of Forests approved these applications, the Commissioner of Crown Lands, Mr. George Throssell, refused to permit the issue of monthly timber licences. While suggesting the reserve was too large and should be reduced to 50,000 acres, Mr. Throssell concurred with the general objectives of preservation:

> ... there will come a day, if we do not take care, when an ancient tree will be a thing of the past, and the land selected for fenced reserves should contain some of the noblest trees existing on the whole area, so that in days to come ... those coming after us can see what noble trees the Colony possesses.[6]

Despite Mr. Throssell's view, the reserve came under increasing pressure from relentless commercial interests.

In 1897 Sir John Forrest apparently withdrew his earlier support for Woodward, and stated that all suitable timber should be cut, after which the reserve should be thrown open for selection. However, shortly after this statement was made, the Premier decided that "the country should be known by someone"[7] before anything further was done. The Surveyor-General, Mr. H.F. Johnston, while opposing the plan to reduce the size of the reserve, concurred with the Premier in requesting that the area should be properly classified. The expense of such an undertaking was too great, however, and the work did not proceed.

In 1901 an application by Oudaille and McCoy to cut timber on the reserve was approved, subject to certain conditions regarding the size of the trees. Early in this year also, a Surveyor Absolon requested that the reserve be cancelled on the grounds that the catchment areas for the Coolgardie Water Scheme would form an adequate alternative. Once again, lack of sufficient information as to the amount of marketable timber on the reserve acted as a reprieve. By this time, the dangerously insecure position of the reserve was apparent.

Woodward approached the Commissioner for Crown Lands in 1902, and "begged him to introduce a short Act vesting the reserve in Trustees".[8] Woodward's request was brought before Cabinet, but the appeal failed; instead, Cabinet proposed that the reserve be opened for timber cutting.

Meanwhile, Surveyor Absolon had made a horseback survey of the reserve. The descriptions in his report of the "excellent jarrah forests" and the many other species of vegetation he observed, including many and varied wildflowers, are followed by the somewhat hard to justify conclusion that "the country is scrubby and is not suitable as a reserve for fauna". His several references to good timber and to the suitability of areas of the reserve for settlement, help to explain the apparent anomaly. Absolon made recommendations to the effect that the reserve should be thrown open for orchards and timber leases.[9]

As a result of Absolon's report, the Under Secretary for Lands informed Woodward that the reserve was unsuitable for its proclaimed purpose, that the area of land set aside for the Coolgardie Water Catchment Area would be an adequate alternative, and that the reserve would be cancelled. It would appear that licences to cut timber were being issued at this time, although the area was still officially gazetted as a reserve. In 1903, a Royal Commission on Forests in Western Australia ordered that further cutting of timber on the reserve should cease, but these instructions apparently had little effect; the Minister for Lands, in 1904, granted the right to cut mill logs on the reserve to Whittaker Bros., I. Lynas, I.H. Brown, I.H. Harold, and E. Brown & Co..

In 1907, the Natural History Society of West Australia again petitioned for the vesting of the reserve in Trustees as a National Park. The petition was dismissed. Two years later, the Hon. Minister for Lands suggested that the land and its timber be reserved entirely for government purposes. On the 7th April, 1911, the reserve for the preservation of native flora and fauna ceased to exist, and its area was designated as Reserve No. 2461 (Timber - Government Requirements).

References:

1 Letter from Mr. Bernard H. Woodward to Hon. Commissioner for Crown Lands, 26.1.1894.

2 *National Parks & Nature Reserves in Western Australia*, Australian Academy of Science and National Parks Board of Western Australia, p. 16.

3 Bernard H. Woodward, "National Parks and the Fauna and Flora Reserves in Australia", *West Australian Natural History Society Report*, No. 4, 1907, pp. 13-14.

4. Ibid, p. 14.

5 Letter from Mr. A.F. Robin to Bernard H. Woodward, 22.2.1894.

6 Memo from the Hon. Commissioner for Crown Lands to the Under Secretary for Lands, 15.11.1897.

7 Memo from the Premier, Sir John Forrest, to the Hon. Commissioner for Crown Lands, 20.6.1898.

8 Letter from Mr. Bernard H. Woodward to the Hon. Commissioner for Crown Lands, 21.6.1902.

9 Report from E.H. Absolon to Surveyor-General, 5.8.1902.

Letters, memoranda and Mr. Absolon's Report are quoted from "The First Reserve for Fauna and Flora - Appendix 5", in a Report by the W.A. Sub Committee of the Australian Academy of Science Committee on National Parks, for *National Parks and Nature Reserves in Western Australia*. This Report is held by the Battye Library, Perth, Western Australia.

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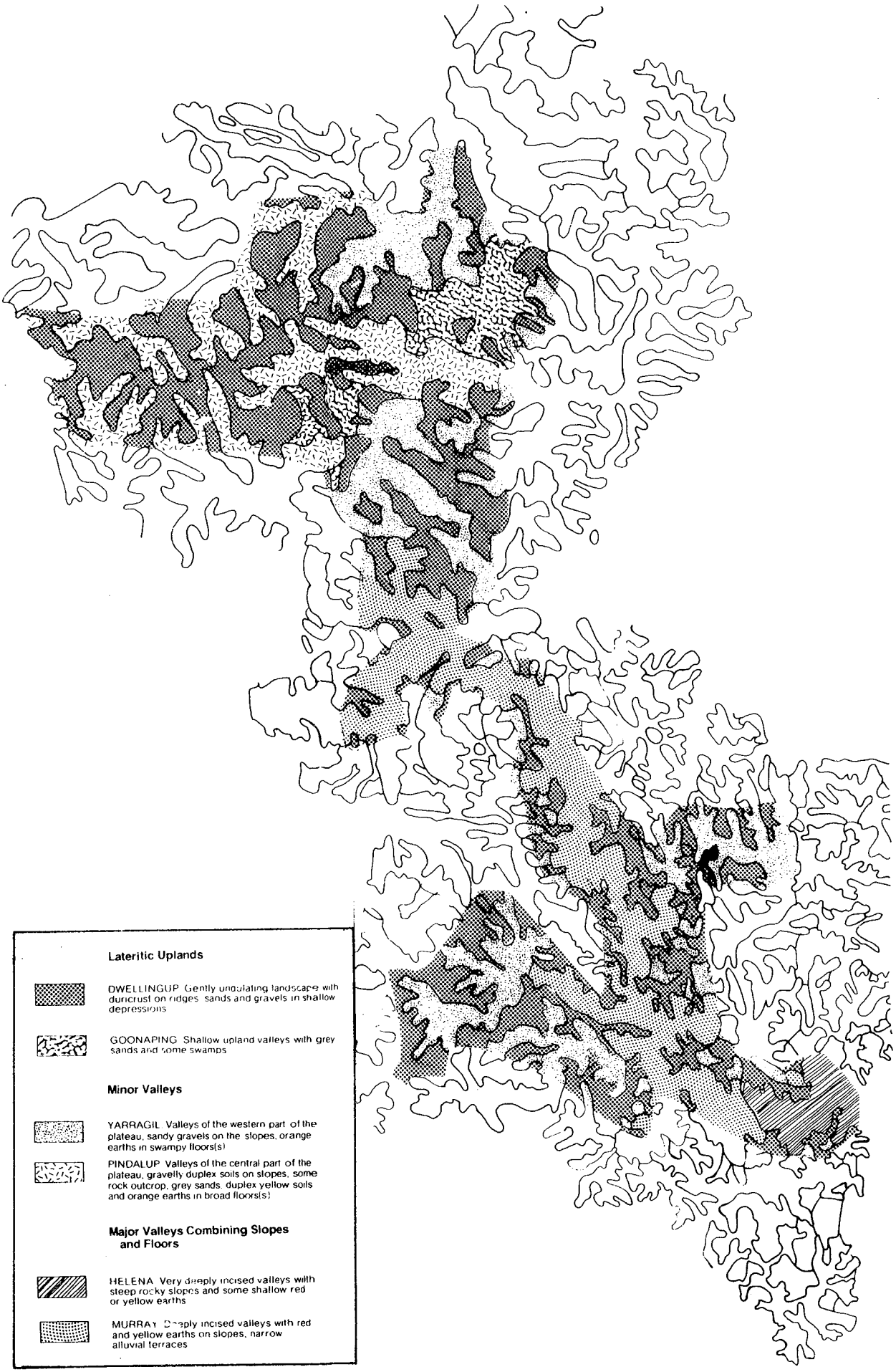

Figure 6. Landforms in the proposed reserve area.

LANDFORMS & SOILS

It is convenient to consider the landforms and soils of the proposed reserve by first referring to two contrasting tracts of land with which they are associated. One tract comprises the gently undulating Darling Plateau. This dominates the southern half of the reserve which by and large occupies the upper portion of the north eastern tributaries of the Collie River, in particular the Harris River. By contrast the steeper slopes of the deep valleys of the lower Murray River and associated tributaries form much of the northern half of the proposed reserve.

Maps of the soils and landforms of the Darling System prepared for the W.A. Department of Conservation and the Environment as part of the "System 6" study provides details of the soils and landforms in the proposed reserve (Churchward & McArthur 1980) and the pattern of these units can be seen on the accompanying scarps.

The units which comprise *the gently undulating Darling Plateau* in the proposed reserve are the Dwellingup, the Goonaping and the Pindalup units. The *Dwellingup unit (D)* occupies ridge crests and associated upper slopes and minor upland hollows and the upper ends of drainage lines. A capping of block laterite is very common and may be overlain by shallow gravelly sands. These gravelly sands may be deeper down slope and in local hollows where they can give way to yellow sands. Some ridges rising above the general level of the plateau skyline are mapped as the *Cook unit (c)*.

The *Goonaping unit (G)* occurs at the upper ends of some drainage lines and locally up onto ridge crests. It also contains some swampy elements such as Lake Nalyerin on the divide between the Murray and Collie Rivers. This unit is characterized by deep grey sand but there are some areas of block laterite and gravels.

Shallow valleys of the Darling Plateau are represented by the *Yarragil (Yg)* and the *Pindalup units (Pn)*. These comprise valleys that are often shallow and which have very gentle slopes mantled by gravelly sands. The swampy floors are dominated by orange earths in the Yarragil unit with some yellow and some grey sands particularly when the valley floors are wide such as in the upper Harris River. The Pindalup unit often has wider

floors than the Yarragil and the soil pattern is more complex. A more complex array of soils is often more extensive. Where the valley floors are wide enough, they have been delineated on the map as 'S'.

Within the proposed reserve the deep valleys cut into the Darling Plateau and include the Helena and the Murray units. The Helena Unit (H) comprises deep valleys with very steep rocky slopes just east of the Darling Scarp. Upstream the Helena unit gives way to valleys that are not as deep but with variable rock outcrops with smooth, though fairly steep, slopes. These areas form the *Murray unit (My)*. The soils of both these units range from red or yellow brown sandy loams to clay loams often with clay subsoils and with a variable gravel and stone content.

All mapping units represented are in both southern and northern parts of the proposed reserve (apart from the Goonaping unit) but they vary considerably according to their geographic position. The Dwellingup unit frequently occupies narrow ridge crest zones flanking the steep slopes of the Murray River valley. However, this unit and the associated Yarragil unit are extensive in the upper parts of the tributaries of the Murray, such as the Yarragil Brook. These are also the dominant units of the southern portion of the reserve in the tributaries of the Collie River. Such a pattern has resulted in fine textured and relatively more fertile soils in the northern portion and in more pleasing vistas. In the southern half gravelly sands of generally low fertility dominate the soil mantle. The low relief of this area possibly results in less attractive landscape. However, it is an area that contains a number of interesting and possibly unique plant communities.

References:

Churchward, H.M., and McArthur, W.M., (1980). "The Landforms and soils of the Darling Region, Western Australia", in *Atlas of Resources of the Darling System of Western Australia*, Department of Conservation and Environment, W.A..

FLORA

The primary basis of selection of areas to be included in the proposed reserve is floristic, as is also the case with the Management Priority Areas that comprise the bulk of the reserve. The perimeters of the reserve have been chosen to include within them a representative array of the plant communities that are typical of the heterogeneous vegetation found in the northern jarrah forest and, in several cases, the best remaining stands of these communities.

From a plant-association point of view the northern jarrah forest is rather poor. It has extensive stands of open forest and woodland punctuated with a few swamps, rock outcrops and fewer lakes, and the majority of the forests and woodlands are dominated by jarrah, marri and wandoo. But from a floristic point of view the northern jarrah forest is indeed rich in species and floristically diverse, features of the vegetation that were not reflected in any system of classification until Havel enumerated his twenty site-vegetation types or continuum segments (Havel 1975). Each of Havel's site-vegetation types is characterized by a suite of indicator species which is unique to that type, although the component species themselves are frequently shared with other site-vegetation types. While many suites of indicator species include no trees, every continuum segment does have a tree stratum of jarrah, marri or wandoo in at least part of its range. Shrub and sedge swamps, heath and non-arboreal monadnock vegetation are not covered separately by the system.

All of Havel's site-vegetation types except one, Segment L, are represented in the proposed reserve. That one exception, with a tree stratum composed mainly of wandoo with admixture of blackbutt, is similar to Segment M except it has more blackbutt and some jam (*Acacia acuminata*). Blackbutt is, however, well-represented in high-quality valley forest in the Federal MPA, an MPA unique in this respect.

Several of the Management Priority Areas around which the proposed park is designed have particularly good stands of plant communities that are now rare or degraded elsewhere in the Darling Range. Plavins MPA provides the only significant area of river banksia (*Banksia littoralis* var. *seminuda*), a species in great danger from a combination of dam

construction and dieback in the state forest, as well as an extensive area of high quality jarrah-marri forest not affected by dieback. Teesdale MPA was defined to preserve a small but unique area of virgin jarrah-marri forest in the high rainfall area near the scarp and a high-quality mixed valley forest with blackbutt. The primary purpose of Trees MPA is to preserve a viable sample of virgin jarrah forest of types Z, H and D, in the low-rainfall area. Although dieback has been introduced into the area along the transmission line, the forest is still largely free of the disease. Bell MPA contains good examples of flooded gum - swamp paperbark (*Eucalyptus rudis - Melaleuca rhaphiophylla*) forest, blackbutt open forest, wandoo woodland and virgin jarrah forest. The chief purpose of the Samson MPA is to preserve the best stands of bullich (*Eucalyptus megacarpa*) in the Darling Range. Surface MPA, adjacent to Trees MPA and similar to it, contains a significant area of virgin jarrah forest, the largest remaining area of virgin jarrah forest north of the Blackwood River. Nalyerin MPA includes a range of swamp vegetation and swamps, one with a fringe of *Eucalyptus decipiens*, of rare occurrence in the Darling Range, and an almost pure, clean stand of jarrah of a type that is relatively rare elsewhere. Stene MPA contains communities of wandoo that are typical of the eastern, low-rainfall zone. In combination with the other MPAs, it also preserves a wide range of species.

Taken as a whole, the proposed reserve would preserve a viable transect of the Darling Range vegetation, a band running from the high-rainfall Darling scarp on the west to the low-rainfall zone wandoo woodlands on the east. The protection that would be furnished by the creation and operation of the proposed reserve, as a unit, as an interconnected system of the Management Priority Areas, is essential for the preservation of this range of plant communities. Some elements of the Darling Range plant life that are not represented, such as the flora of the epidiorite dykes on the scarp, the butter gum (*E. laeliae*) and *E. drummondii*, should be preserved in other National Parks and Nature Reserves.

References:

Havel, J.J. 1975, Site-Vegetation Mapping in the Northern Jarrah forest (Darling Range): 1. Definition of Site-Vegetation Types, Bulletin 86 Forests Department, W.A.

Plate 11. A blackboy *(Xanthorrhoea preissii)* and kingias *(Kingia australis)* in an eastern area of the proposed reserve. Some authorities believe that kingias can live up to 500 years and blackboys up to 600 years.

FAUNA

There is general recognition of the need to set aside large areas of major ecosystems, such as forests, for the conservation of fauna. Costin & Frith (1971) give general reasons for this as:

- The maintenance of reservoirs of genetic diversity so that animals and plants which potentially may have value in commerce, medicine and food are not lost.

- The establishment of scientific standard or reference points against which the extent of changes in modified environments (such as bauxite minesites) can be measured.

- The aesthetic pleasure of being able to enjoy wildlife in its natural environment.

- The ethical view that human beings have a responsibility to conserve large areas in a natural and undisturbed state.

The proposed reserve would fulfil these needs and would become one of the most important areas for fauna conservation in Western Australia.

The jarrah forest contains a large proportion of vertebrate fauna species found in south-western Australia, including 16 species of frogs, about 50 reptiles, more than 100 species of birds, and 25 mammals. These include several species which have distributions generally restricted to the forest or which are rare (Tingay & Tingay, 1979). The diversity of vegetation associations within the proposed reserve would ensure that a very large proportion of these species would be protected.

Although the majority of vertebrate species have extensive distributions in southern Australia, the significance of the forest reserve is enhanced by the fact that the tall timber forests of south-western Australia comprise the only relatively undisturbed forest in a vast area of Australia west of the Great Dividing Range.

Between our forests and those of eastern Australia are woodlands, mallee and low shrublands, most of which have been cleared, heavily grazed

and invaded by feral animals. These factors have all had deleterious effects on wildlife and as a result the jarrah forest provides one of the last great refuges for many animals which formerly had a wider distribution, animals such as the Western Native Cat (*Dasyurus geoffroii*), Numbat (*Myrmecobius fasciatus*) and Ring-Tailed Possum (*Pseudocheirus peregrinus*) (Archer 1969; Winter, 1969).

Within the proposed reserve, the role of animal organisms in producing and maintaining a healthy forest ecosystem must be recognised. The majority of these animals are microorganisms and invertebrates which play a critical part in decomposing plant material and in thus recycling nutrients into the soil. These nutrients are essential for plant growth. Such small animals also comprise an important link in the food chains of larger vertebrate animals - the frogs, reptiles, birds and mammals.

Our knowledge of these small organisms is very limited (as many as 40% of Australian insects are as yet undescribed) but there is increasing information that their populations may be reduced by forest management techniques such as control burning, and that this could eventually cause a deterioration of forest health and quality (Springett 1976, 1979). For this reason the T.A.G. report suggested that burning practices should be amended in Conservation MPAs. Logging may have similar effects, particularly on larger animals which are dependent on mature trees, and should therefore also be excluded from conservation MPAs. Such facts highlight the necessity of drafting special management plans for the proposed reserve, and the need for employing a multi-disciplinary management staff to carry them out.

References:

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CLIMATE

The climate of the Darling Range is basically Mediterranean - warm temperate with predominantly winter rainfall and dry summers - but differs from the typical Mediterranean climate in its greater equability and occasional heavy summer storms. The greater equability is attributed by Gentilli (1948) to warm ocean currents along the coast.[1]

One of the heaviest storms recorded in the southern part of the Darling Range occurred in mid-summer, when a tropical cyclone moved southward across south-western Western Australia.

Weather stations, according to the Bureau of Meteorology, have been long established in the south-west, and the area is "except for the Metropolitan Region, the best served in Western Australia for climatological and rainfall stations".[2] The strongly seasonal and reliable rainfall (Havel, 1975) begins early in April, when it initiates the seven months long growing season. The growing season varies slightly in length from the north-west end of the proposed reserve to the south-east, from around six and a half months to somewhat more than seven. Rainfall in the areas proposed for the reserve averages 750 mm per annum in the south-eastern section, gradually increasing to 1125 mm per annum in the north-western section. Mean temperatures are 51°F (10½°C) in winter, and 70°F (22°C) in summer.

1 As quoted in Havel (1975), p. 11.

2 Commonwealth of Australia, Bureau of Meteorology (1965), p. 2.

References:

Bureau of Meteorology (1965), Climatic Survey, Region 16, south-west W.A..

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ABORIGINAL SITES

On the whole, the ethnographical and archaeological material on the inland area between Dwellingup and Harvey is scant. Erskine (1833) found Aborigines and evidence of their fishing activity in the Murray valley . Bunbury (see Hasluck 1965) records fords above the Dandalup and Murray Rivers, and Fraser (see Stirling 1827) reports a relatively dense population in the Murray valley, so it appears that the Murray valley and surrounding area was relatively well populated.

The area further south near Harvey, however, was not well populated according to Hallam (1965). Populations here were restricted to fairly small hunting groups mainly in winter. Grey, in 1841 (Hallam), records that the region around Harvey was virtually empty.

No systematic surveys of any kind have taken place in the region, and as a consequence no sites are known, although artifact scatterings have been found near the Dwellingup area. However, like most of the

south-west, the area would have been used in a regular pattern with established camp-sites and wells, so that it is highly likely an archaeological survey would yield results.

References:

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ACCESS

The proposed reserve is approached and crossed by several series of 1st Class gravel roads, 2nd Class forest roads and 3rd Class tracks. Access to the portions of the park situated in the western, non-quarantined area is abundant, and at the moment, largely unrestricted. Access to the eastern, quarantined portion is, on the other hand, restricted to some major 1st Class roads and to other roads and tracks peripheral to the quarantined area.

Collie-Nanga-Talanalla Road, the major north-south road between Dwellingup and Collie cuts the proposed reserve in two places, through the Samson MPA and the north-eastern end of the Murray Valley MPA. The Pinjarra-Williams Road intersects the Amphion, Yarragil and Plavins MPAs. The Harvey-Quindanning Road runs through the south-eastern corner of Bell MPA and along with Boundary Road on the East provides the closest motor access to Surface and Nalyerin MPAs.

Stene MPA is accessible by Stockyard Road and Stene Road, while the Collie-Williams Road runs close to the south-eastern boundary of Trees MPA. Surface and Nalyerin MPAs are accessible by foot along Trees Road and Nalyerin Lake-Winooka Road. Access to Teesdale MPA is by scenic drives along Scarp Road and Farley Road, and to Federal MPA by scenic drives along Big Brook and the west side of the Murray River.

The Forests Department's scenic drive originating in Dwellingup forms a roughly circular route through the north-eastern part of the proposed reserve, and the Willowdale-Driver Road provides access to Samson MPA and the part of the reserve lying to the east of it. Non-

quarantined roads render every MPA in the northern half of the park easily accessible and they approach within a few kilometres or less of the MPAs in the southern half.

All parts of the reserve are easily accessible by foot along networks of Forests Department tracks and compass-oriented routes through low-growing, open understorey.

Access to the proposed reserve is no problem. On the contrary, access needs to be restricted, to prevent the spread of dieback and to preserve segments of the Darling Range ecosystem intact.

WILDERNESS

The provision of a wilderness area is an item of major importance in this proposal. The word "wilderness", like many other environmental terms that are in general use, has a variety of connotations. While definitions may vary, there is always a core perception of a natural and untamed area. Apart from this fixed idea, there are other differences in attitudes about the uses and usefulness of wilderness areas and how large or small they should be.

When people were few and isolated and agricultural clearings were limited in extent, wilderness covered most of the earth. Wilderness was to be feared and tamed, but it was also a source of meat and other wild food. Because mankind was surrounded by natural things, he could take the spiritual enrichment they provided for granted. Now that people are many and cover the earth, it is the wilderness areas that are small and few. They are no longer sources of food but have acquired even more importance as a source of spiritual enrichment and in providing for temporary freedom from the pressures inherent in modern civilisation.

They have become sanctuaries where solitude and silence can ease the strains of urban living and encourage contemplation - places where serenity and equilibrium can be regained. Even a wilderness remembered or viewed from a distance can be rejuvenating: "The thought of 'the calm, the leaf, and the voice of the forest' is itself a refuge from stress, a wilderness at the back of the strained mind".[1] This idea is known to commercial interests, and wilderness can thus be appreciated vicariously in books, calendars, photographic essays and films.

"The experience of being there is part of the experience of wilderness, but only a part ... The exquisite sight, sound, and smell of wilderness is many times more powerful if it is earned through physical achievement ...".[2] Walking the wilderness, for both physical and psychological benefit, is recognised by a rapidly growing number of people as a particularly satisfying type of recreation. The Nuyts Wilderness Area in Walpole-Nornalup National Park, Western Australia's only designated wilderness area, accommodated more than one hundred walking visitors during a recent long weekend.

A definition of "wilderness", widely accepted in Australia, is as follows: "A wilderness is a large area of land perceived to be natural, where genetic diversity and natural cycles remain essentially unaltered. As such it is a resource which needs to be managed to allow only those uses which do not significantly reduce wilderness quality.

A wilderness should have:

(i) a minimum core area of 25 000 hectares,

(ii) a core area free of indentations,

(iii) a core area of at least 10 kilometres in width,

(iv) a management (buffer) zone surrounding the core area of about 25 000 hectares or more".[3,4]

Twenty areas satisfying the above definition have been identified in eastern New South Wales. Although south-western Western Australia is much less densely populated, this similar-sized region has very few areas that would satisfy the definition, certainly none in the northern jarrah forest.

As wilderness areas become more popular for recreation and for spiritual enrichment, they also become subject to overuse. Some regulation of visitor use will therefore be required.

Wilderness areas should provide these spiritual values but should also

serve as wildlife reserves, field classrooms and scientific laboratories. The scientific values of wilderness areas include their functions as genetic resources useful to mankind, as environmental reference areas for ecological research and biological monitoring, and for long-term conservation.

Maintaining the quality of wilderness that gives this level and diversity of usefulness requires a form of management that restricts access to the core, roadless area to walkers and canoeists, day-use visitors and campers who will have a minimum impact.

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RECREATION

Recreational use of the northern jarrah forest covers a wide spectrum of activities which can be divided into two groups - active and passive. Active recreation includes such activities as canoeing, horse-riding, orienteering, bush walking, camping and fishing as well as the motorised forms such as four-wheel driving, motor rallying, motor cycling and beach buggy driving. Passive recreation encompasses such activities as leisure driving, picnicking, nature study, painting and photography. In its General Working Plan No. 86 of 1977, the Forests Department said that the demand for forest-based leisure activities could be expected to increase annually by 7%, and that by the year 2000, day visits could be about 2.5 million per annum.

The Australian Travel Research Conference Survey of Australian Travel 1973-4 indicated that Western Australia has the highest proportion (90%) of trips made by car and that it is the State receiving its highest proportion of visits from within the State. When this is considered in conjunction with -

(a) the Department of Tourism's plans to increase the number of overseas visitors,

(b) the sealing of the Eyre Highway making W.A. more accessible from the east, and

(c) an overall increase in leisure time,

then a prediction can be made of a greatly increased demand for recreational space.

This demand has been recognized by relevant authorities. Thus, the Western Australian Department of Tourism, in its submission on System 6, recommended that as much natural bushland as is acceptably possible be set aside now for future wilderness reserves or national parks.

Figure 6 shows the national parks within 2-3 hours driving distance of Perth (an acceptable distance for one-day visits) and incorporates the area of the proposed reserve. Within this region, national parks cover an area of 41 983 ha. Some 21% of this area is forested. Of the twelve national parks within the 150 km radius, three are located within the metropolitan area, seven are to the north of Perth, and only two, Serpentine and Yalgorup, are to the south.

The Forests Department has pointed out (*A Perspective for Multiple Use Planning in the Northern Jarrah Forest, 1978*) that one of the greatest dangers posed by recreation is overuse. Thus there is a definite need for further national parks and reserves in the area, not only to cater for the needs of conservation but to cope with the forecast increase in recreational demands, and to help relieve the pressures of overuse of existing park area.

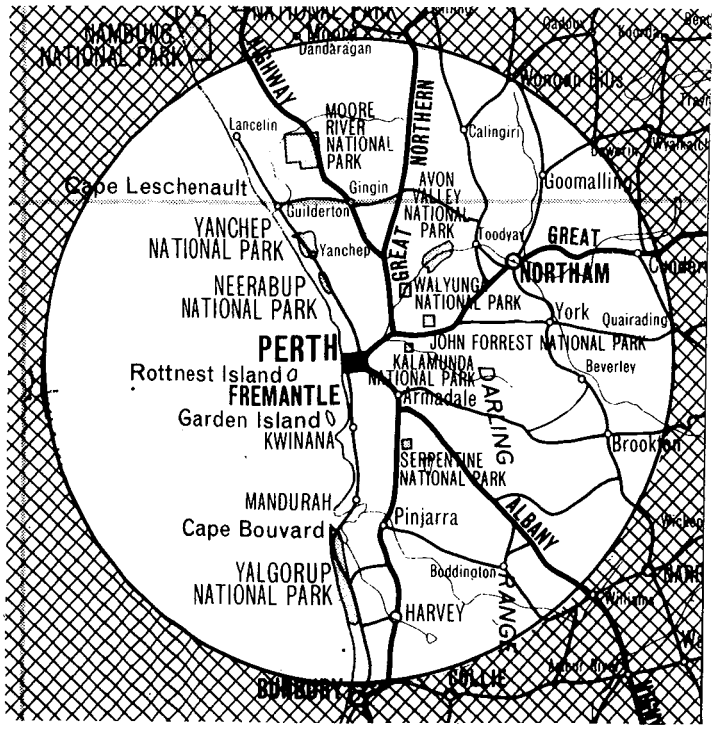

Figure 6.

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ENDORSEMENTS

The proposal was supported by the Wilderness Conference, sponsored by the Australian Conservation Foundation, held in Sydney on the 24th, 25th November, 1979.

The following organizations endorse the principle of the proposal to create a major reserve in the northern jarrah forest:

W.A. NATURALISTS CLUB INC.
THE TREE SOCIETY
W.A. NATIONAL PARKS AND RESERVES ASSOCIATION INC.
THE SCOUT ASSOCIATION OF AUSTRALIA (W.A. BRANCH)
PARENTS AND FRIENDS FEDERATION OF W.A. (INC.)
UNIVERSITY OF WESTERN AUSTRALIA GUILD
SOUTHERN REGION CONSERVATION COUNCIL
COMMONWEALTH BANK OFFICERS ASSOCIATION
WILD LIFE PRESERVATION SOCIETY OF AUSTRALIA
AUSTRALIAN CONSERVATION FOUNDATION
W.A. WILDFLOWER SOCIETY (INC.)
W.A. HUMANIST SOCIETY
ORGANIC GROWERS ASSOCIATION (W.A.)
YOUNG WOMEN'S CHRISTIAN ASSOCIATION
ALBANY JAYCEES
ALBANY CONSERVATION SOCIETY
AUSTRALIAN DEMOCRATS (W.A. DIVISION)
NATIONAL COUNTRY PARTY CONSERVATION COMMITTEE
MURDOCH UNIVERSITY WILDLIFE ASSOCIATION
DENMARK ENVIRONMENTAL GROUP
DENMARK COMMUNITY FORUM
COASTAL PROTECTION ASSOCIATION INC.
CHRISTIAN YOUTH CAMPS (W.A.) INC.
EASTERN HILLS APEX CLUB
THE AVICULTURAL SOCIETY OF W.A. (INC.)
SOUTH-WEST FORESTS DEFENCE FOUNDATION
CRANBROOK FLORA AND FAUNA GROUP
CANNING DISTRICTS HISTORICAL SOCIETY
GREENMOUNT CRAFTS GROUP

ALBANY BRANCH, W.A. WILDFLOWER SOCIETY

MOUNT HELENA BRANCH, COUNTRY WOMEN'S ASSOCIATION

EASTERN HILLS BRANCH, W.A. WILDFLOWER SOCIETY

KOJONUP ENVIRONMENTAL, ECOLOGICAL PROTECTION SOCIETY

ORIENTEERING ASSOCIATION OF W.A. INC.

DARLINGTON THEATRE PLAYERS (INC.)

LEEUWIN CONSERVATION GROUP

ABORIGINAL ADVANCEMENT COUNCIL OF W.A. INC.

SWAN CANOE CLUB

CAMPAIGN TO SAVE NATIVE FORESTS (W.A.)

FRIENDS OF THE EARTH

CYCLISTS ACTION GROUP

CAMPAIGN AGAINST NUCLEAR ENERGY W.A.

W.A. FIRE BRIGADES EMPLOYEES UNION

DESPERATE MEASURES INC.

CONSERVATION FARMING SOCIETY

CITY OF CANNING NORTH WARD RATEPAYERS AND RESIDENTS ASSOCIATION

EASTERN HILLS SENIOR HIGH SCHOOL P & C ASSOCIATION

MAHOGONY CREEK PROGRESS ASSOCIATION

OUTREACH LEARNING CENTRE

KALAMUNDA AGRICULTURAL SOCIETY

W.A. WILDFLOWER SOCIETY, ARMADALE-KELMSCOTT BRANCH

CATHOLIC WOMEN'S LEAGUE, MOUNT BARKER

MUNDARING BRANCH, COUNTRY WOMEN'S ASSOCIATION

W.A. WILDFLOWER SOCIETY, DARLING RANGE BRANCH

WEST KELMSCOTT COMMUNITY RECREATION MOVEMENT

CITY OF COCKBURN

KALAMUNDA AND DISTRICTS RATEPAYERS AND RESIDENTS ASSOCIATION

LIONS CLUB OF LYNWOOD AND DISTRICTS

MOUNT BARKER APEX CLUB

AUSTRALIAN FEDERATION OF UNIVERSITY WOMEN (W.A.)

ASCOT KAYAK CLUB

GREENMOUNT SPINNERS

SWAN VIEW HIGH SCHOOL P & C ASSOCIATION

WEST AUSTRALIAN FLORAL ART SOCIETY INC.

AUSTRALIAN LABOR PARTY (W.A. BRANCH) CONSERVATION COMMITTEE

ORIENTEERING ASSOCIATION OF W.A.

KALAMUNDA & DISTRICTS NURSES SOCIAL CLUB

CANNING RIVER CONSERVATION ASSOCIATION

PLANTAGENET CONSERVATION COMMITTEE

ROTARY CLUB OF MOUNT BARKER

BUSINESS & PROFESSIONAL WOMEN'S CLUB OF MOUNT BARKER

AMATEUR CANOE ASSOCIATION OF W.A.

FREMANTLE ANTI-NUCLEAR GROUP

KALAMUNDA & DISTRICTS ARTS AND CRAFTS GROUP INC.

LYNWOOD GIRL GUIDES ASSOCIATION

LIONS CLUB OF MUNDARING DISTRICTS

TOODYAY NATURALISTS CLUB

KING'S PARK AND SWAN RIVER PRESERVATION SOCIETY

WEST AUSTRALIAN TROUT AND FRESHWATER ANGLING ASSOCIATION INC.

EASTERN HILLS KINDEGARTEN ASSOCIATION

FRIENDS OF THE RAILWAYS

BEDFORD DISTRICTS YOUTH CLUB

W.A. POT PLANTS AND NORTHERN SUBURBS HORTICULTURAL SOCIETY

MUNDARING SHARING

KENWICK AND DISTRICTS YOUTH CLUB

PORONGORUP C.W.A.

BINNINGUP PROGRESS ASSOCIATION

VASSE CONSERVATION COMMITTEE

PEEL PRESTON GROUP

Endorsements are arriving continuously, thus the above list is far from complete.

The following organizations have given provisional endorsement:

MOUNT HELENA PROGRESS SOCIETY

AUSTRALIAN INSTITUTE OF LANDSCAPE ARCHITECTS

CHIDLOW RESIDENTS ASSOCIATION

JARRAH RESERVE PROPOSAL

The forested area of Western Australia is very limited. The major remaining high forest is the jarrah forest. This unique ecosystem is fragile despite its adaptation to a harsh environment. Rapidly increasing technological change in the State is placing this limited but precious resource at risk. There is an urgent need to adequately conserve a major representative segment of the remaining jarrah forest.

A reserve of sufficient area to afford it long-term viability should be established to provide for the increasing need of people to experience natural surroundings but, more importantly, to preserve a representative portion of the total ecosystem. This preservation would serve not only to acknowledge our responsibility to future West Australians but would allow for education, scientific investigation and research, and would serve as a retreat and sanctuary for fauna and flora that are elsewhere universally sacrificed to our material needs.

An area exists in the northern jarrah forest which is not only relatively close to the State capital, but which contains most representative vegetation types of the jarrah forest including several significant segments of virgin forest. This proposal suggests that a consolidation of existing reservation areas could provide a reserve of some 77,000 ha. It suggests that in a matter of such extreme importance nothing less than A class reserve status with adequate vesting and management is required.