The National Estate and the Conservation Reserve System in the Southern Forest of Western Australia

A Position Paper

March 1988

I N D E X

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TABLES

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1 SUMMARY

Listing of forests available for multiple use on the register of the National Estate has caused antagonism between State and Commonwealth Governments and community groups in New South Wales and Tasmania. This has arisen when the Commonwealth has attempted to use its powers under the Export Control Act (1982) to prohibit the export of woodchips from forests listed on the Register of the National Estate.

In Western Australia in excess of one third of the sawlogs and chiplogs in the Southern Forest Region is on areas of forest currently available for multiple use but either on the register of the National Estate, on the interim list or nominated awaiting evaluation.

This paper sets out the reasons why CALM opposes the listing of these forests and any other forest apart from those already allocated by the State Government to the secure reserve system for the preservation of conservation values.

These reasons are three fold, namely:

- The State conservation reserve system already adequately represents those values the A.H.C. are attempting to have listed.

  A detailed historical account of the methodology that lead to the present reserve system plus an analysis of ecotypes contained in the reserves clearly shows the scientific justification for the adequacy of the reserve system cannot be indispute.

- The A.H.C. are in effect imposing their own land use ignoring the work of the State Government.

  The imposition of additional reserves by the A.H.C. is ad hoc and undemocratic, ignoring all the accepted conventions of land use allocation procedures. They fail to evaluate competing uses, do not seek the opinion of the public, land owner or land manager and offer no appeal process to affected owners or managers.

  In contrast the State Government is responsible for the economic and social welfare of the people dependant on the land and has a sophisticated planning process to ensure an equitable allocation system.

- The listing and prevention of harvesting and regeneration on forests available for multiple use would cause serious economic and social disruption.

  The State Government's Regional Plans and Timber Strategy have introduced a degree of certainty into the timber planning and allocation on State forests that was not present in the past. This has encouraged investment of $150 million from Timber Companies to improve efficiency and add value to products. The withdrawal of the resource through listing on the Register of the National Estate would destroy this confidence and destroy the thrust of the Timber Strategy.

  In addition, the closure of two mills would result in the direct and indirect loss of income to 700 people. This would be socially and economically very disruptive to the south west. The loss to the State in direct royalties would be $182 million and an indirect loss of $124 000 000 in economic activity would follow on from the withdrawal.

The State Government has ensured the adequate representation of forest ecotypes in the south west and at the same time allocated sufficient timber to industry to ensure strong economic activity in regional centres. The activities of the A.H.C. threaten to disrupt this balance and are opposed by CALM.

2 INTRODUCTION

The Australian Heritage Commission (A.H.C.) is required to compile a register of National Estate places under the Australian Heritage Commission Act, 1975.

Nomination to the register may be made by any person or organisation or alternatively by systematic survey by consultants hired by the A.H.C.

Following nomination, the A.H.C. appoint a panel to assess the significance of the National Estate values on the nominated area. The panel produce a report which the A.H.C. considers and then decides whether to register the place or not. Neither the identify of the people making it up nor the report of the assessment panel is available to the public. In some cases there is reason to believe that assessment panels have on them the person involved in the nomination of the area. Following gazettal of the proposal to register (interim listing) there is a three month period for receipt of objections. The Act only allows objections which address the National Estate values or boundaries. The ultimate decision on registration is then made by the A.H.C. after considering objections.

In respect of natural environment areas of the National Estate the A.H.C. has recently made it clear that it seeks to have registered "representative areas" of old growth eucalypt forest. Old growth forest is basically virgin forest, but not necessarily as the principle criteria appear to be height and age.

Listing on the register of the National Estate constrains Commonwealth Ministers with regard to actions which may effect National Estate values. They may not authorise such actions unless there are no feasible or prudent alternatives, unless all action is taken to minimise damage where there is no such alternative and unless the Commission is informed and given time to comment.

There is no restraint on the actions of State Government Ministers or private individuals.

A compatibility matrix produced by the A.H.C. shows any form of timber harvesting as incompatible with National Estate values. (See Table 1). As a licence is required from the Commonwealth Government to export unprocessed wood (woodchips) any area of State forest available for wood production and listed or on the interim list of the register of National Estate places is likely to bring the Commonwealth and State into conflict.

This is particularly significant in Western Australia where the harvesting of sawlogs and of residue logs for chipping are fully integrated and chipwood production is only a by product of the sawlog operation. It would be extremely difficult to operate a sawlog only cut in southern forests.

Listing on the register of the National Estate also enables an influence over land use when Commonwealth Government actions are not involved. This is due to public pressure brought about by the perception that National Estate areas equate to National Park and should not be touched.

Early nominations of the natural environment in forest areas of the south west were those areas set aside by the Forests Department as conservation priority forest in the 1976 General Working Plan No. 86, (Forests Department 1976).

TABLE 1

(FROM A.H.C. SUBMISSIONS ON CALM DRAFT REGIONAL MANAGEMENT PLANS 1987)

COMPATABILITY MATRIX: NATIONAL ESTATE VALUES BY FORESTRY PRACTICE

The following table is a matrix setting out, in general terms, the degree of compatability between National Estate values (as defined by the criteria for registration of places, see Appendix 1) and a range of forest management practices which may be applied to forests of national estate significance. The table also indicates, for each criterion, various factors which may affect the level of compatability. These include factors in the environment or in the design of a proposal which might ameliorate or exacerbate the impact of a practice in a particular place.

The level of compatability is rated on a 7 point scale:

VHC = Very high compatability
HC = High compatability
LC = Low compatability
N = Neutral
LI = Low incompatability
HI = High incompatability
VHI = Very high incompatability

The forestry management practices considered include:

1. Clearfelling	(CLEAR FELL)
2. Selective logging	(SEL LOG)
3. Roading	(ROADING)
4. Salvage logging	(SAL LOG)
5. Fuel reduction burning	(HAZARD RED'N)

It should be noted that the matrix is intended only to provide general guidance to the impacts of forestry practices on National Estate values. In the absence of specific information about actual impacts or about areas to be affected, such general guidance is important for establishing the potential impacts of proposals on National Estate places.

COMPATIBILITY MATRIX: NATIONAL ESTATE VALUE BY FORESTRY PRACTICE

CRIT-NO	CRITERIA	CLEAR FELL	SEL LOG	ROAD -ING	SALV LOG	HAZARD RED'N	FACTORS AFFECTING THE LEVEL OF INCOMPATIBILITY
1.1.1	Evolutionary, biogeographic significance of flora, fauna, geology, landscapes, climates	VHI	LI-HI	LI-HI	HI	LI-VHI	range of species/community/etc; level of (genetic) isolation; ecological requirements; intensity of disturbance
1.1.2	Significance to natural systems or processes (incl genetic diversity)	VHI	VHI	VHI	VHI	VHI	genetic isolation; size/fragility of ecological unit (catchment,ecosystem); condition/integrity; ecological requirements; importance of naturalness; intensity of disturbance
1.1.3	Significance for richness or diversity	VHI	LI-VHI	LI	LI-VHI	LI-VHI	replication of similar sites elsewhere; resilience of the system;
1.2.4	Significance for history of science	VHI	LI-VHI	LI	LI-VHI	LI-VHI	nature of the place (eg. bot., geol); importance of naturalness
2.1	Rarity or scarcity value	VHI	HI-VHI	LI-VHI	HI-VHI	HI-VHI	level of rarity, vulnerability and threats; ecological requirements of species/ community; intensity of disturbance

[NOTE: For general guidance - not prescription. LI, HI, VHI = Low, High, Very High incompatibility, N= Neutral respectively]

COMPATIBILITY MATRIX: NATIONAL ESTATE VALUE BY FORESTRY PRACTICE

CRIT-NO	CRITERIA	CLEAR FELL	SEL LOG	ROAD -ING	SALV LOG	HAZARD RED'N	FACTORS AFFECTING THE LEVEL OF INCOMPATIBILITY
3.1	Representative communities, ecosystems or landscapes	VHI	N-VHI	LI-VHI	LI-VHI	LI-VHI	resilience of the system; replication of similar sites elsewhere
4.1	Associations with important scientists	VHI	LI-VHI	LI-VHI	LI-VHI	LI-VHI	importance of naturalness, nature of the place (eg. bot., geol.),
5.1	Aesthetic significance	VHI	N-VHI	LI	LI-VHI	LI-VHI	topography; soils; vegetation; design; scale/intensity of disturbance
5.3	Significant wilderness quality	VHI	VHI	VHI	VHI	VHI	none
8.1.1	Significance in understanding Australian natural history	VHI	LI-LHI	LI-VHI	LI-HI	LI-VHI	importance of naturalness; nature of the place (eg bot., geol.); replication of similar sites elsewhere;

[NOTE: For general guidance - not prescription. LI, HI, VHI = Low, High, Very High Incompatibility, N= Neutral respectively]

COMPATIBILITY MATRIX: NATIONAL ESTATE VALUE BY FORESTRY PRACTICE

CRIT-NO	CRITERIA	CLEAR FELL	SEL LOG	ROAD -ING	SALV LOG	HAZARD RED'N	FACTORS AFFECTING THE LEVEL OF INCOMPATIBILITY
8.1.2	Significant type localities	VHI	HI-VHI	HI-VHI	HI-VHI	HI-VHI	importance of naturalness, nature of the place (eg. bot., geol.); replication of similar sites elsewhere
8.1.3	Significance for benchmark or reference	VHI	VHI	VHI	VHI	VHI	possibly siting/ design

[NOTE: For general guidance - not prescription LI, HI, VHI = Low, High, Very High Incompatibility, N= Neutral respectively]

Over the last few years, however, there has been a trend to nominate areas of forest available for multiple use management including wood production. This has clearly been done by individuals seeking to impose a particular land use decision (preservation of old growth forest) outside of the normal State government land use decision making procedures. Such areas in the Southern Forest Region of Western Australia include the Deep River basin, Jane Block and parts of Beavis, Court, Giblett and Hawke blocks among a number of others. In all, in excess of one third of the total available timber resource in the region is included in these nominations.

The Minister for Conservation and Land Management has lodged objections to the listing of most of these areas. The objections are based upon:

- The State conservation reserve system already adequately represents all ecotypes.

- The National Estate listing process ignores the land use planning and allocation system developed by the State Government, which provides for public participation.

- The social and economic impacts of excluding harvesting from multiple use areas in which timber harvesting and regeneration occur are not considered by the A.H.C.

These points are expanded below:

3 THE ADEQUACY OF THE PRESENT RESERVE SYSTEM

Prior to the 1970's the area of forest set aside for conservation in the Karri forest was small. Most reserves occurred in small National Parks and Nature Reserves with the notable exception of the Walpole-Nornalup National Park. The vast majority of the forests in Government ownership was in State forest which at that time had timber production as its primary purpose.

Since 1970 a comprehensive reserve system has been developed. The initiative for this came mainly from two sources, the Forests Department of Western Australia (F.D.) and the Environmental Protection Authority of Western Australia (E.P.A.).

3.1 The Forests Department Proposals

During the early 1970's the F.D. evolved a policy of multiple use for the State forests under its control. As the majority of the karri and jarrah forests still in Government ownership were in State forest, the F.D. accepted the responsibility for the conservation of these resources as part of its multiple use policy. An essential component of this policy was the setting aside from commercial utilisation of a proportion of these forests adequate, in scientifically objective terms, for the purposes of conservation and to some extent recreation. This evolutionary process was presaged in the General Working Plan No. 85 of 1972, was defined in the General Working Plan No. 86 of 1977, and came to fruition in the General Working Plan No. 87 of 1982.

Southern forests do not have precise boundaries. Rather, the terms refers to all the forests in the wettest south west corner of Western Australia. (See Fig. 1). Generally they are confined to areas south of the Blackwood River until it crosses into the Donnybrook Plateau at the township of Nannup. Westward from Nannup southern forests include all the Donnybrook Plateau and the Leeuwin-Naturaliste Ridge. The most important component of southern forests is the karri with all its variants, ie. in pure stands on variously mixed with marri, jarrah, red tingle or yellow tingle, often referred to as "wet sclerophyll" forests.

Multiple use as described in the General Working Plan No.87 of 1982 relied upon a system of zoning, in which each zone was allocated a priority use. Other uses were encouraged, permitted, tolerated or forbidden depending upon the degree to which they conflicted with the priority use. (See Table 2). An area allocated a priority use was called a Management Priority Area (MPA) for that particular use.

The woodchip licence area encompasses the bulk of the more productive southern forests (Fig. 1). A reserve system which has the conservation of flora, fauna and landscape as its objective should sample the major ecosystems over their entire range. The F.D. conservation system therefore extended well beyond the confines of the woodchip licence area.

As this report is concerned primarily with conservation, it focuses mainly on the selection of areas for flora, fauna and landscape. Forest areas set aside for recreation are also listed because of their incidental conservation value.

TABLE 2

ALLOCATION OF SECONDARY AND TERTIARY USES BY PRIORITY USE, 1982

(FORESTS DEPARTMENT GWP NO. 87, 1987)

Management Priority	Secondary Uses +	Tertiary Uses †	Incompatible Uses
Flora, Fauna and Landscape (a) Preservation Areas	Catchment Protection	Scientific Passive Recreation Honey Production	Activities that alter structure or composition of the forest or introduce dieback disease.
Flora, Fauna and Landscape (b) and (c) Silvicultural and and Management Areas	Catchment Protection Scientific and Education Passive Recreation	Timber Salvage and Regeneration Honey Production Water Production	Activities that introduce dieback disease or remove native cover without the provision of successful regeneration.
Wood Production (a) Hardwoods	Conservation of flora and fauna Catchment Protection Protection of Forest Values Scientific and Education Recreation Water Production Honey Production Wildflower Management	Communication Lines Bauxite Mining	Activities that permanently destroy the productive capacity of the forest to produce hardwoods.
Wood Production (b) Softwood Plantations	Catchment Protection Protection of Forest Values Scientific and Education Water Production	Recreation Communication Lines	Activities that permanentlv destroy the productive capacity of the forest to produce softwoods.
Water Production	Catchment Protection Protection of Forest Values Scientific and Education Wood Production Bauxite Mining Wildflower Management Communication Lines	Conservation of Flora and Fauna Recreation Honey Production	Activities that restore a dense deep rooted vegetative cover through the area, or increase risk of erosion, siltation, chemical or biological pollution.
Protection (a) Catchment Protection	Conservation of Flora and Fauna Scientific and Education Wildflower Management	Recreation Wood Production Bauxite Mining Communication Lines Honey Production	Activities that introduce dieback disease, remove native cover without the provision of successful regeneration, or increase the risk of erosion or pollution.
Protection (b) Forest Values	Conservation of Flora and Fauna Scientific and Education Passive Recreation Wood Production Water Production Wildflower Management Honey Production	Active Recreation Bauxite Mining Communication Lines Softwood Production	Activities that introduce dieback disease, remove native cover without the provision of successful regeneration or increase the risk of erosion or pollution.
Scientific Study and Education	Conservation of Flora and Fauna Protection of Forest Values	Catchment Protection Passive Recreation Timber Production Honey Production Water Production	Activities detrimental to the scientific objectives of the study.

Management Priority	Secondary Uses +	Tertiary Uses †	Incompatible Uses
Recreation	Conservation of Flora and Fauna Protection of Forest Values Wildflower Management	Catchment Protection Scientific and Education Timber Production Bauxite Mining Communication Lines Water Production Honey Production	Activities that permanently destroy the aesthetic appeal of the landscape or require the cessation of recreation activities.
Public Utility	Nil	Catchment Protection Recreation Water Production	Activities detrimental to capital equipment or public use.
Mining (open cut)	Nil	Scientific and Education Recreation Wood Production Water Production	Activities that prevent the extension of mining and exploration.

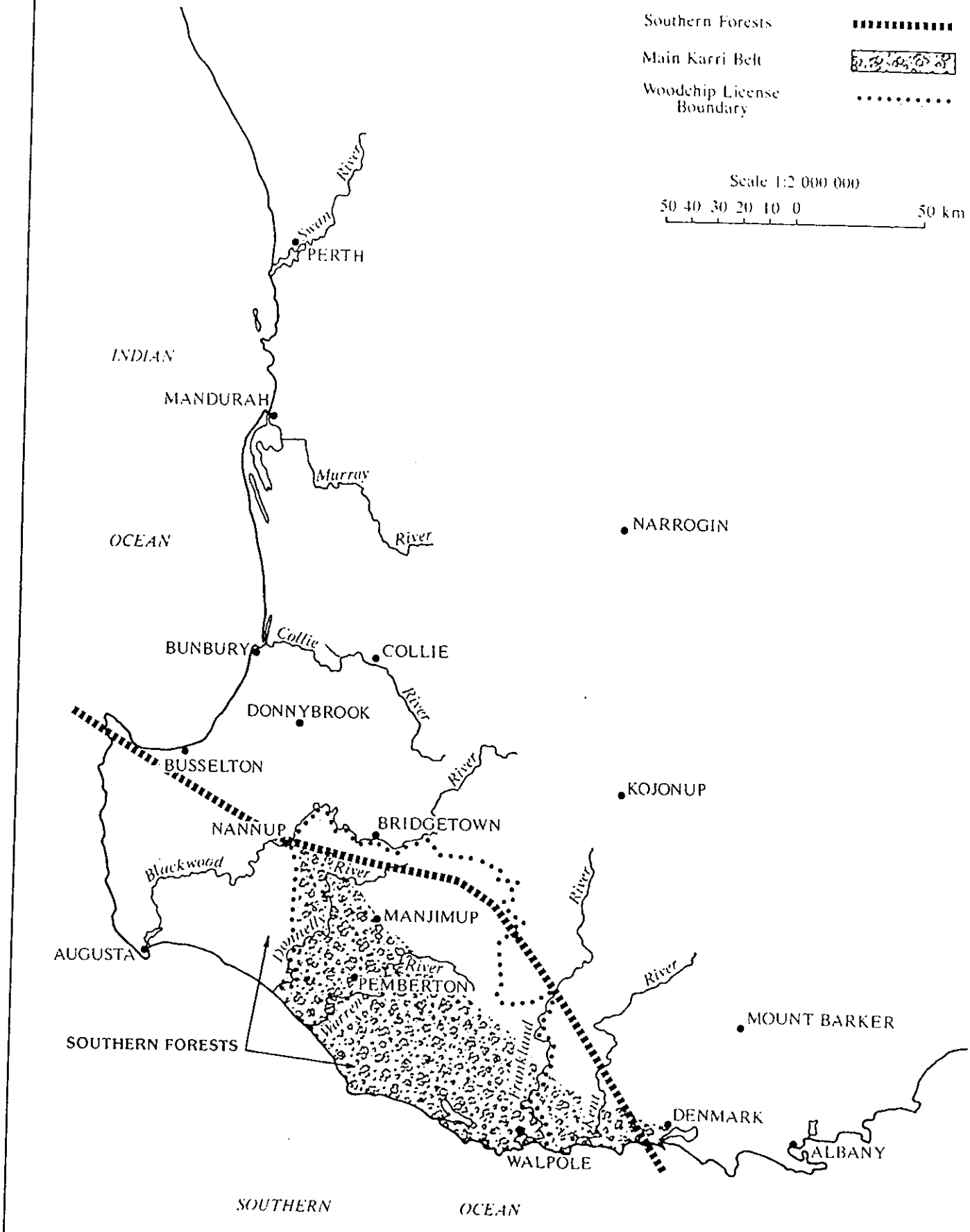
+ Secondary uses are those which are largely compatible with the primary use.

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

This is a provisional allocation provided as a basis for input from forest users and other interested parties. Government consideration and approval may be sought at an appropriate time.

Figure 1

LOCATION OF SOUTHERN FORESTS AS REFERED TO IN THIS DOCUMENT



3.1.1 Selection Objective

The objective of the selection and establishment of flora, fauna and landscape areas in southern forests was to adequately conserve examples of the full range of the karri forest. A secondary objective was the conservation of examples of other vegetation associations, particularly those confined to forests in the wettest south west corner.

3.1.2 Selection Criteria

Although selection of representation areas had already begun, the Australian Academy of Science (1975), Report No. 19 provided guidelines for the selection, boundary definition and management of reserves for flora, fauna and landscape. Chapter 1 of Report 19 gave the scientific justification for what was being attempted - viz - the preservation of genetic diversity within designated key communities representative of their biome. For this diversity to have a good chance of long term survival priority was given to reserve size:-

Specifically - "areas over 4 000 hectares appear to have a relatively good chance of achieving their conservation objectives, though areas larger than 20 000 hectares may be necessary for macropods. Smaller areas buffered within State Forest or Water Reserves, would ensure the conservation of many plant

communities and associated small animals" (Chap. 2, p.18). Elsewhere in the report 50 000 hectares is suggested as being desirable for Grey Kangaroos (Macropus giganteus) in humid areas of south-eastern Australia (Ch.3. p.27). It should be noted however that subsequent research has established that these preliminary estimates were excessive.

The perfect ecological reserve was shown to have the following features.

a) It would have to be representative of the biome it was intended to conserve.

b) It would contain examples of the complete range of vegetation types and animal populations involved, and would encompass the widest diversity of genetic resource within the species making up the various communities of plants and animals.

c) It would be large (20-50 000 ha), circular or compact in shape and would have natural boundaries such as coast lines, rivers, watersheds, geomorphological changes etc.

d) It would be in a natural undisturbed state, free of introduced pathogens or species.

e) Its tenure and purpose would be secured by Act of Parliament, requiring the agreement of that body to affect changes.

f) It would be, or contain, a core area which would remain inviolate from any disturbance other than for approved research, and which in turn would be surrounded by a buffer area in which certain uses compatible with the continued existence of the populations to be conserved, would be permitted.

g) It would be managed and protected by an appropriately skilled and funded organisation of a size adequate for the task.

h) It would be replicated elsewhere.

Perfection is unobtainable, but knowing what is ideal helps in trying to achieve it.

The Environmental Protection Authority of Western Australia (E.P.A.) and its independent committee The Conservation Through Reserves Committee (CTRC), accepted that the F.D. was a body appropriately skilled to manage for conservation. (CTRC 1974).

State forest has the highest security of tenure in that the approval of both houses of Parliament is required to effect change. However, because the purpose of State forest managed for flora, fauna and landscape could be changed by alteration of the Working Plan without reference to Parliament their security of purpose was perceived to be low. This was a

matter of concern for some sections of the community and the E.P.A., and was the subject of considerable deliberation until resolved in the CALM management plans of 1987.

3.1.3 Vegetation Alliances and Associations

The Report No. 19 of the Australian Academy of Science lists the major plant communities considered essential for conservation. Fifty-four communities are listed within the Warren Botanical Sub-Province, which approximates the southern forests of the former F.D. Of these, fifty-one are confined to Warren, the remainder occurring in other Botanical Sub-provinces as well. Many others are mainly coastal (twenty) or have their major occurrence inland or east of the main forest belt. This leaves about twenty-five or so which could be considered as being obligatory for inclusion in the State forest reserve system for southern forests.

The Specht Report (Specht et. al. 1974) is a useful addendum to Report No. 19 of the Australian Academy of Science.

It uses a structural classification system of plant communities which combines height/life form of dominant plants and the projective area of ground covered by the foliage of the dominant plants in the ecosystem. Within these structural sub-divisions, species composition of the upperstorey and the nature of the understorey are used to define botanical

alliances or associations. The Specht report also rates the then (1974) status of each alliance/association for conservation. The karri (Eucalyptus diversicolor) community is shown as occurring as three alliances, tall open-forest, tall wood land, and open forest. The highest alliance, tall open forest was listed as having "moderate" conservation status whereas the other two were rated consecutively as nil and poor. Reservation at the periphery of the range where the lower associations tend to occur was therefore important.

Since World War II the F.D. had developed considerable expertise in the use of aerial photographic interpretation (API) to define and map forest types. By the 1970s mapping was complete not only for all State forest, but for nearby private property and other crown land. Mapping of forest vegetation structure distinguished between mature, sapling, pole, and two tiered stands. Density as measured by the projective area of ground covered by the upperstorey was stratified into nine groups in karri, six in jarrah. Stand height was stratified into three groups in karri, five in jarrah. The species composition of the upperstorey and the relative importance of each in terms of frequency of occurrence was indicated. Other useful and relevant information such as the degree of fire damage and the odd occurrence of unusual other species was also provided. Rock outcrops, non forest,

swamps, lakes, rivers and streams, all shown accuratly were useful in management for conservation as well as other purposes. An example of a typical API map is shown in Appendix 1.

No other land management agency in Australia at the time could have claimed to have a superior coverage of vegetation mapping over its entire estate.

Although not using precisely the same classes, the F.D. API mapping covered the equivalent range of structural variation as that given in the Specht Report. It also gave a much more detailed upperstorey species classification, and mapped all strata with a high degree of accuracy. Forest types as defined on these maps therefore became the criteria for defining alliances and associations within biomes, and the maps themselves were used to help locate proposed reserves and compare options. This was consistent with the Specht Report classification systems.

The botanical composition of the understorey and the ground cover was less well known at the time. However, the following typical ground storey variations dominated by a single species were readily distinguished:-

a) Netic (Bossiaea laidlawiana) dominated in the Donnelly River Valley at the western extremity of the main karri occurrence.

b) Karri wattle (Acacia pentadenia) dominated from the Shannon River Basin eastwards.

c) Hazel (Trymalium spathulatum) dominated where karri was at its highest expression, and was particularly common in the Warren River Valley.

d) Other species which often dominated locally were Acacia urophylla, Chorilaena quercifolia and Hovea elliptica, the latter usually in mixed karri-marri stands.

To encompass the known variation it was considered essential to have reserves in all the major river valleys - viz. the Donnelly, Warren, Gardiner, Shannon, Deep and Frankland Rivers.

The wettest place in the southern half of Western Australia is in the vicinity of Walpole on the south coast. This coincides with the occurrence of the Tingles, Red (E. jacksoni), yellow (E. guilfoylei) and Rate's (E. brevistylis). Although all occurred within the Walpole-Nornalup National Park, Yellow plus Rate's Tingle typically occurred further inland. Wider representation of this end of the wet sclerophyll spectrum was therefore considered advisable.

During wetter times in past epochs karri had a much wider occurrence than it has today (Churchill D.M. 1968). As the climate became drier karri retreated to more favoured locations, leaving stands outside the periphery of the main occurrence. These outliers were considered worthy of reservation, where possible. Their expansion or contraction in future could provide evidence of climatic change. One such patch is in State forest in the Donnybrook Sunklands.

The second most important botanical association in southern forests is the "dry sclerophyll" type, ie. the jarrah and the jarrah-marri. This association is much wider in extent than the karri even in southern forests, and it reaches the peak of its expression further north in the central and northern forest regions. There its reservation became of primary concern, just as the wet sclerophyll had been in the south. Nevertheless, the southern variants of this association were important and were taken into account. The Specht Report lists ten structural variants of the jarrah-marri, with its most usual occurrence, open forest, having a "reasonable" conservation status. Variants in the top range, tall open-forest, and in the lower ranges were less well conserved and hence received particular attention. Again the F.D. API plans were used because they provided a wide range of accurately mapped structural and species associations. Karri occurs typically as a mosaic with other vegetation communities,

principally jarrah-marri. Hence reservation of karri in reasonably large reserves of necessity reserved areas of jarrah-marri and other communities as well. For example, one area of very high quality virgin jarrah and jarrah-marri was reserved in the Dixon area in the Donnelly River Valley.

Apart from the above two main vegetation associations, others which were considered obligatory for inclusion in reserves were:

- Wandoo (E. wandoo var elata)
- WA Blackbutt (E. patens) in both forest and swamp form
- Bullich (E. megacarpa)
- Flooded Gum (E. rudis)
- Yate (E. cornuta)
- Paperbarks (Melaleuca preissiana, M. raphiophylla)
- WA Peppermint (Agonis flexuosa), Agonis juniperina
- E. haematoxylon
- Banksias (B. attenuata, B. littoralis, B. littoralis var. semi-nuda)
- Sheoak (Allocasuarina fraserana)
- Kingia australis
- Pultenaea, Myrtaceous scrub and Acid peaty flats.
- Lithic complexes (granite, limestone) swamp and aquatic complexes.

These include all those associations found in the Specht Report, many of which were structural variants of the main karri and marri communities. Species of special value which did not form dominant life forms but which warranted inclusion in reserves are listed in Table 3.

In all thirty seven associations were identified for inclusion in conservation reserves. These are listed in Table 3 and their occurrence in reserves is shown in Table 4.

3.1.4 Naturalness

Ideally, conservation reserves should be free of perturbation caused by man. In 1970 about half the main karri forest was still virgin (ie. uncut or old growth). It was fortunate therefore that there were still extensive tracts of uncut forest from which reserves could be selected. Attention was focussed on uncut forest although Report No. 19 of the Australian Academy of Science was quite explicit in not ruling out cut-over and regenerated forest as potential ecological reserves. Cut-over forest was included in some reserves, particularly those for recreation.

The proportion of old growth and cut over and regenerated forest in the proposed (1988) reserve system can be seen in Table 5.

TABLE 3 — VEGETATION ASSOCIATIONS RECOGNISED IN SOUTHERN FORESTS

VEGETATION ASSOCIATIONS				*GEOMORPHOLOGICAL UNITS (Beard 1981)*			
Structural Groupings	*No.*	*Upper Strata Species Alliances*	*Important Understorey or Ground Indicator Species (incomplete)*	*Scott Coastal Plain*	*Blackwood Plateau*	*Darling Plateau (high rainfall)*	*Darling Plateau (dry inland)*
Forest and Woodland	1	*Eucalyptus diversicolor*	Casuarina decussata	x		x	
	2	*Eucalpytus calophylla/ Eucalyptus diversicolor*	Trymalium spathulatum Bossiaea laidlawiana Acacia pentadenia	x		x	
		Eucalyptus diversicolor/ Eucalyptus calophylla	Acacia urophylla Hovea elliptica Agonis flexuosa Bossiaea linophylla	x		x	
	3	*Eucalyptus calophylla*		x	x	x	x
	4	*Eucalyptus marginata*	Casuarina fraserana	x	x	x	x
	5	*Eucalyptus calophylla/ Eucalyptus marginata*	Banksia grandis Hakea lasiantha	x	x	x	x
		Eucalyptus marginata/ Eucalyptus calophylla	Bossiaea linophylla Bossiaea ornata Banksia littoralis Dasypogon hookeri Xylomelum occidentale Adenanthos obovatus Gastrolobium bilobum Eucalyptus decipiens Agonis parviceps Banksia attenuata Petrophile linearis Stirlingia latifolia Davesia incrassata Mesomelaena tetragona Hakea ceratophylla Melaleuca preissiana Hypocalymma angustifolium Agonis linearifolia Leucopogon australis Pimelia spectablis Hakea lissocarpha Xanthorrhoea gracilis Isopogon sphaerocephalus Hovea chorizemifolia Hovea elliptica Persoonia longifolia Pteridium esculentum	x	x	x	x
	6	*Eucalyptus patens*	Forest form		x	x	x
	7	*Eucalyptus patens/ Eucalyptus marginata*	Low woodland form		x	x	x
	8	*Eucalyptus megacarpa*		x	x	x	x
	9	*Eucalyptus rudis*			x	x	x
	10	*Eucalyptus wandoo*					x
	11	*Eucalyptus marginata/ Eucalyptus wandoo*	Eucalyptus decipiens				x
	12	*Eucalyptus wandoo/ Eucalyptus patens*					x
	13	*Eucalyptus gomphocephala*	Agonis flexuosa				
	14	*Eucalyptus cornuta*	Agonis flexuosa	x			x
	15	*Eucalyptus ficifolia*		x		x	
	16	*Eucalyptus jacksonii*				x	
	17	*Eucalyptus jacksonii/ Eucalyptus diversicolor/ E. calophylla*				x	
	18	*Eucalyptus guilfoylei/ E. calophylla /E. marginata/ E. diversicolor*	Banksia *spp.*			x	
	19	*Eucalyptus brevistylis/ E. marginata /E. calophylla*				x	
	20	*Melaleuca rhaphiophylla*		x	x	x	x
	21	*Melaleuca preissiana*		x	x	x	x
	22	*Agonis juniperina*		x		x	
	23	*Agonis flexuosa*		x	x	x	

VEGETATION ASSOCIATIONS				GEOMORPHOLOGICAL UNITS (Beard 1981)			
Structural Groupings	*No.*	*Upper Strata Species Alliances*	*Important Understorey or Ground Indicator Species (incomplete)*	*Scott Coastal Plain*	*Blackwood Plateau*	*Darling Plateau (high rainfall)*	*Darling Plateau (dry inland)*
Forest and Woodland — *continued*	24	*Eucalyptus haematoxylon*			x		
	25	*Banksia attenuata*		x	x	x	x
	26	*Banksia littoralis*		x	x	x	x
	27	*Banksia littoralis* var. *Semi nuda*			x	x	x
	28	*Banksia illicifolia*		x	x	x	
	29	*Allocasuarina fraserana*		x	x	x	x
Scrub, Heath, Shrubland	30	*Kingia australis/ Eucalyptus marginata*			x		
	31	*Pultenaea scrub*		x	x	x	
	32	*Ironstone shrubland*			x		
	33	*Myrtaceous scrub*	Agonis linearifolia Agonis juniperina Melaleuca preissiana Melaleuca incana Agonis parviceps Beaufortia *spp.* Leptospermum firmum	x	x		
Herblands, Sedgelands	34	*Acid peaty flats*	Beaufortia *spp.* Evandra aristata Leptocarpus scariosus Anarthria scabra Anarthria prolifera Lepidosperma persecans Lyginia barbata Leptospermum firmum Leptospermum oligandrum Astartea fasicularis Agonis linearifolia	x		x	
Lithic Complex	35	*Granites, granite/gneiss*		x		x	
	36	*Coastal limestone*					
Aquatic Complex	37	*Freshwater*	Juncus *spp.* Melaleuca rhaphiophylla Agonis juniperina Melaleuca preissiana Eucalyptus rudis	x	x	x	x
Other Plant Species of Special Value	38	*Diuris drummondii*					x
	39	*Kennedia glabrata*		x		x	
	40	*Caladenia spp.*					x
	41	*Drakea spp.*				x	x
	42	*Banksia verticillata*		x		x	
	43	*Caladenia plicata* ?				x	
	44	*Grevillea cirsifolia*					x
Animal Species of Special Value	45	*Setonix brachyurus* (quokka)	Widespread in swamps	x	x	x	
	46	*Bettongia penicillata* (woylie)					x
	47	*Macropus eugenii* (tammar)	Rare species found in Perup M.P.A.				x
	48	*Myrmecobius fasciatus* (numbat)					x
Bird Species of Special Value	49	*Dasyornis brachypterus* (bristle bird)		x	x		
	50	*Pezoporus wallicus* (ground parrot)	Old report from Soho			x	
	51	*Oreoica gutturalis* (crested bellbird)					
	52	Water fowl			x		

TABLE 4

SITE VEGETATION REPRESENTATION IN RESERVES

NAME	AREA (ha)	TENURE EXISTING/ PROPOSED	GEOMORPHOLOGICAL ZONE (BEARD 1981)	VEGETATION SYSTEM (BEARD 1981)	VEGETATION ASSOCIATIONS REPRESENTED (TABLE)
ONE TREE BRIDGE	640	Conservation Park	Darling Plateau	Warren Sub District Nornalup System	1, 2, 3, 4, 5, 6, 23, 27, 33, 37
JERVIK PARK	20	"	" "		1,
JARDEE	10	"	" "	" "	1, 2, 5
BRIDGETOWN	50	"	" "	Menzies Sub District Bridgetown	5
ELLIS CREEK	130	"	" "	" "	5
D'ENTRECASTEAUX (includes Lower Shannon)	104 000	National Park	Scott Coastal Plain	Warren Sub District Boranup and Scott River Systems	1, 2, 5, 7, 14, 20, 21, 22, 23, 25, 26, 27, 28, 29, 31, 33, 34, 35, 36, 37, 39, 40, 42

SITE VEGETATION REPRESENTATION IN RESERVES cont...

NAME	AREA (ha)	TENURE EXISTING/ PROPOSED	GEOMORPHOLOGICAL ZONE (BEARD 1981)	VEGETATION SYSTEM (BEARD 1981)	VEGETATION ASSOCIATIONS REPRESENTED (TABLE)
PEMBERTON (includes Hawke-Treen and Brockman)	5 900	" "	Darling Plateau	Warren Sub District Nornalup System	1, 2, 3, 6, 22, 23, 27
WALPOLE-NORNALUP (includes Giants)	9 500	National Park	Darling Plateau plus Scott Coastal Plain	Warren Sub District Nornalup, Boranup and Scott River Systems	1, 2, 3, 4, 5, 15, 16, 17, 18, 23, 42
WATTLE-SOHO JOHNSTON-O'DONELL MITCHELL CROSSING FRANKLAND	19 900	" "	Darling Plateau	Warren Sub District Nornalup System Menzies Sub District Bridgetown System	1, 2, 3, 4, 5, 6, 7, 8, 9, 15, 18, 19, 20, 21, 22 23, 25, 26, 27, 28, 29, 31, 33, 34, 35, 37, 41
SHANNON (includes Curtin)	54 000	" " " "		Warren Sub District Nornalup System	1, 2, 3, 4, 5, 6, 7, 22, 23, 26, 27, 28, 29, 33, 34, 37
EAST NANNUP RD	10	Nature Reserve	Darling Plateau	Menzies Sub District Bridgetown System	5

SITE VEGETATION REPRESENTATION IN RESERVES cont...

NAME	AREA (ha)	TENURE EXISTING/ PROPOSED	GEOMORPHOLOGICAL ZONE (BEARD 1981)	VEGETATION SYSTEM (BEARD 1981)	VEGETATION ASSOCIATIONS REPRESENTED (TABLE)
WILGARUP	80	" "	" "	" "	5, 21, 26
BIG BROOK	90	" "	" "	" "	5
DONNELLY RIVER	60	Nature Reserve	Darling Plateau	Warren Sub District Nornalup System	1, 2, 37
SMITH BROOK	100	" "	" "	" "	1, 2, 5
BLACKBUTT	40	" "	" "	" "	6
PERUP	40 200	" "	" "	Menzies Sub District Bridgetown System	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 20, 21, 26, 33, 37
LAKE MUIR (includes Unicup)	11 400	" "	" "	Menzies Sub District Bridgetown and Kwornicup System	3, 4, 5, 9, 10, 20, 21, 26, 28, 33, 38, 40
EAST BROOK	60	" "	" "	Warren Sub District Nornalup System	5,

SITE VEGETATION REPRESENTATION IN RESERVES cont...

NAME	AREA (ha)	TENURE EXISTING/ PROPOSED	GEOMORPHOLOGICAL ZONE (BEARD 1981)	VEGETATION SYSTEM (BEARD 1981)	VEGETATION ASSOCIATIONS REPRESENTED (TABLE)
JANE BLOCK	10	" "	" "	" "	5, 38
DALGARUP	920	" "	" "	" "	1, 2, 3, 4, 5, 6
DICKSON	550	Nature Reserve	Darling Plateau	Warren Sub District Nornalup System	4, 5, 6
STRICKLAND	1 700	" "	" "	" "	1, 2, 3, 4, 5, 6, 22, 23, 27, 37
BOORARA	610	Conservation Park	" "	" "	1, 2, 3, 22, 23, 27
DOMBAKUP	110	"	" "	" "	1
MUIRILLUP	160	"	" "	" "	1, 2, 35

TABLE 5

CUTTING HISTORY OF SOUTHERN REGION FORESTS BY TENURE CATEGORY

FOREST TYPE/LOGGING HISTORY(as at 31.12.85)	PROPOSED TENURE			
	National Park	Nature Reserve	Conservation Park	Multiple Use Forest
Pure karri-unlogged	12 500	360	240	12 200
-selection cut	1 600	40	180	12 600
-clear felled	2 300	-	80	15 500
-unclassified	100	-	-	100
TOTAL	**16 500**	**400**	**500**	**40 400**
Mixed karri-unlogged	25 400	860	410	35 700
-selection cut	1 400	130	290	23 730
-clear felled	2 700	-	-	18 540
-unclassified	100	10	-	430
TOTAL	**29 600**	**1 000**	**700**	**78 400**
Jarrah -unlogged	63 500	18 940	150	153 900
-selection cut	7 600	32 240	130	191 500
-clear felled	270	20	-	8 700
-unclassified	130	300	20	1 600
TOTAL	**71 500**	**51 500**	**300**	**355 700**
Other Forest-unlogged	1 800	280	-	760
-selection cut	-	420	-	620
-clear felled	-	-	-	160
-unclassified	-	-	-	60
TOTAL	**1 800**	**700**	**-**	**1 600**
All Forest -unlogged	103 200	20 440	800	202 560
-selection cut	10 600	32 830	600	228 450
-clear felled	5 300	20	80	42 900
-unclassified	300	310	20	2 190
TOTAL	**119 400**	**53 600**	**1 500**	**476 100**
Other than forest	139 800	15 800	-	126 100
TOTAL AREA	**259 200**	**69 400**	**1 500**	**602 200**

Report No. 19 of The Australian Academy of Science recognises that fire is an important natural factor in the environment, and that attempts to eliminate its effects by total exclusion can have serious consequences to "naturalness". However, there was ample evidence to suggest that catastrophic fire had become more frequent since the advent of European man, giving rise to extensive areas of dead topped mature karri classified on API maps as "severe fire damage" (SFD). This was avoided in reserves though the inclusion of some was sought for the benefit of ecological diversity. Where SFD was extensive its inclusion in commercial forest (other factors being equal) with early planned harvest and regeneration was considered good management despite its low commercial appeal to sawmillers.

3.1.5 Fauna

Report No. 19 of The Australian Academy of Science admitted that fauna was not considered directly because too little was known about it. The rationale was that faunal populations would automatically be conserved in habitats existing in the major vegetation alliances and associations. For the most part, the same rationale applied in southern forests, with one notable exception. An extensive tract of forest between the Perup and upper Warren Rivers, known as "the Perup", contains viable populations of rare mammals (Woylie, *Bettongia penicillata*; Tammar *Macropus eugenii*; Numbat,

Myrmecobius fasciatus; Ring Tail Possum, Pseudochierus peregrinus). This area was one of the first to come under special attention in the F.D.'s multiple use planning. Ecological research had already been initiated. In this case the conservation of fauna was given priority, which in turn ensured the conservation of a wide range of Wandoo, Jarrah, Jarrah-marri, and swamp associations which were not within the "wet slerophyll" community.

3.1.6 Geology, Landform and Soils

Five broad geomorphological regions were recognised (Clarke 1962):-

a) the Swan Coastal Plain,

b) the Donnybrook Plateau,

c) the Leeuwin-Naturaliste Ridge,

d) the Darling Plateau,

e) the Southern Coastal Plain.

Each had its separate characteristics which are reflected in vegetation. Reservations were made in all regions.

A number of soil studies had been carried out but none covered the whole area. Of particular relevance was McArthur and Clifton (1975), which showed the relationships between vegetation and soil type, and defined the main vegetation associations.

It proved to be very helpful in gauging representation, but unfortunately the extent of its coverage reduced its usefulness.

Karri is mainly restricted to red earths, but does occur on sands derived from limestone on the Leeuwin-Naturaliste ridge and in places along the south coast. Examples of the latter are included in reserves.

3.1.7 Reserve Size

As mentioned in section 3.1.2, Report No. 19 of the Australian Academy of Science emphasises reserve size. However, there must be some trade off between more smaller reserves to include the greatest diversity of vegetation associations, and fewer larger reserves which afford better protection to the more limited diversity within their boundaries. Advantage was taken of Report No. 19's recognition that the extent of State forest managed according to multiple use principles affords protection to smaller reserves by its buffering effect. Large reserve size is necessary primarily for the benefit of the long term survival of large mobile mammals, in this case kangaroos. Kangaroos are demonstrably under no threat in State forest in Western Australia. To some extent therefore reserve size could be compromised in favour of more smaller reserves containing greater diversity.

One way to effectively increase reserve size was to locate an area for flora, fauna and landscape adjacent to an existing National Park, provided of course that if contained the

vegetation type being sought. Important reservations were made adjacent to the Warren and D'Entrecasteaux National Parks in this way.

3.1.8 D'Entrecasteaux National Park

The close interdependance of the "wet sclerophyll" forest and rainfall means that karri seldom occurs far from the coast, and many of its associations are distinctly coastal in nature. Hence a system of reservation purporting to represent the wet sclerophyll in Western Australia has to include coastal landforms. The Walpole-Nornalup National Park is a good example of this fact. Generally speaking however, State forest tends to begin on the inland side of the typical coastal landforms.

Parallel with the development of the State forest reservation system, another proposal was emerging for the formation of a large coastal National Park. This latter proposal was put forward by F.D. officers, and a number were the same people developing the State forest reserves system. The South Coast National Park, later to be named "D'Entrecasteaux", was officially proposed by the WA Division of the Institute of Foresters of Australia, (Bradshaw et. al. 1975). The F.D. gave the D'Entrecasteaux proposal its full support. Thus the two initiatives were closely linked. The developers of the State forest reservation system were fully aware that important components of the wet sclerophyll existed in

the proposed coastal park, and assumed, correctly, that these areas would be reserved in due course. The lower Shannon flora, fauna and landscape priority area depended upon its conjunction with the proposed National Park to complete its remarkable diversity of landform and vegetation, and round out its boundaries.

3.1.9 Water Catchments

Complete undisturbed catchment areas were considered to be a desirable feature in reserves. This was feasible with so much virgin forest to choose from.

3.1.10 Recreation

It was not difficult to select the more valuable recreational areas because the public had already done so. The reasons for the public preference for such places as One Tree Bridge, the Cascades, the Rainbow Trail, Brockman forest, were self evident. The particular attractions were buffered by surrounding State forest and the combined areas were given a priority for recreation. Most had high intrinsic value for conservation. Most were located in old cut-over and regenerated forest, and it appeared to make little difference to the public whether the original operation was selection cutting or clear falling so long as a new forest had been successfully regrown.

3.1.11 The Selection Process

Using local knowledge and the F.D. API plans, and bearing in mind the above criteria, many options for flora, fauna and landscape areas were prepared and compared.

The final approach adopted was to firstly select two large areas which satisfied Report No. 19's emphasis on reserve size and replications. These were then supplemented by a series of smaller reserves buffered by State forest which sampled all the main river valleys and included all the factors mentioned above. The Perup, set aside specifically for fauna, comprised a third large reserve, which was however outside the wet sclerophyll community.

The final reserve system is set out in the General Working Plan No. 87 of 1982 in Plan 2 and in Appendix 3. These are listed in Table 6 of this report. This was considered by the Forests Department to be an adequate reserve system.

3.2 The Environmental Protection Authority and its Conservation Through Reserves Committee Actions

In December 1971 the Environmental Protection Authority (EPA) was established to among other things, "consider and initiate the means of enhancing the quality of the environment". The Authority recognised that the establishment of an adequate reserve system would be an important mechanism for achieving this objective. Accordingly it established The Conservation Through Reserves Committee (CTRC) which met for the first time in February 1972.

TABLE 6

CONSERVATION AND RECREATION PRIORITY AREAS IN SOUTHERN FORESTS, 1982

(FORESTS DEPARTMENT GWP NO. 87, 1982)

FLORA, FAUNA AND LANDSCAPE PRIORITY AREAS

ENUMERATION AND DESCRIPTION OF AREAS IN WHICH CONSERVATION OF FLORA, FAUNA AND LANDSCAPE ARE THE PRIMARY PRIORITY USES

(Areas 0-1000 ha to nearest 10 ha)
(Areas 1000 + ha to nearest 100 ha)

Map Ref.	Name	Area (ha)	Vegetation and Landscape Type Represented, Special Features
12.1	Dalgarup	3500	Lateritic upland, incised valley of Blackwood River. Most northern occurrence of karri in State forest. Open jarrah-marri forest.
12.2	St John Brook	3300	Incised valley of St. John Brook in eastern Sunklands. Outstanding development of blackbutt with shrub understorey. Possible rare fauna habitat
12.3	Milyeannup	5700	All variations of Sunklands landscape. Complete range of vegetation types from open jarrah-marri forest to sedgeland and shrubland.
6.1	Perup	39200	Mainly Perup soil association. Jarrah-marri open woodland and wandoo open woodland; contains rare endemic faunal populations.
6.5	Dickson	280	Pemberton and Balbarrup soil associations. Virgin tall open jarrah and marri-jarrah forest.
6.7	Strickland	1600	Pemberton and Balbarrup soil associations. Virgin tall open karri, karri-marri and marri-jarrah forest in lower Donnelly River Valley.
11.1	Hawke-Treen	1600	Pemberton soil association. Virgin tall open karri forest. 45-year-old regeneration. Complements Warren National Park in Lower Warren River.
11.2	Dombakup	120	Pemberton soil association. Virgin tall open karri forest.
11.4	Boorara	560	Pemberton soil association. Virgin tall open karri and marri-karri forest. Gardner River, east branch. Rapids.
11.6	Curtin	1300	Pemberton and Balbarrup soil associations. Virgin tall open karri forest and jarrah-marri open forest in upper Shannon River.
13.1	Lower Shannon	8500	Boorara, Quagering and Chudalup soil associations. Diverse vegetation, forest and flat. Complements proposed D'Entrecasteaux National Park.
13.2	Wattle	2900	Pemberton, Quagering soil associations. Virgin tall open karri forest. Entire undisturbed catchment.
13.3	Johnston O'Donnell	9200	Pemberton, Balbarrup, Chudalup and undescribed soil associations. Lithic complex. Tall open karri forest. Jarrah-marri open forest. Jarrah open woodland, banksia and casuarina tall open shrubland. All virgin.
13.4	Mitchell Crossing	10300	Undescribed soil associations. Lithic complexes. Yellow tingle included in diverse vegetation types present. Scenic.
13.5	Soho	6100	Undescribed soil associations. Rate's tingle, red flowering gum, included in diverse vegetation types present. Scenic.

RECREATION PRIORITY AREAS

ENUMERATION AND DESCRIPTION OF AREAS IN WHICH RECREATION IS THE PRIMARY PRIORITY USE

(Areas 0-1000 ha to nearest 10 ha)
(Areas 1000 + ha to nearest 100 ha)

Map Ref.	Name	Area (ha)	Outstanding Features Relevant to Recreation
6.3	One Tree Bridge	730	Medium size perennial stream suitable for fishing, historical bridge, outstanding karri trees.
11.3	Brockman	880	High quality karri forest, perennial streams with cascades suitable for fishing. Gloucester Tree fire tower.
11.5	Muirillup	190	Virgin karri forest, granitic outcrops. Scenic.
13.6	Mt. Frankland	1200	Virgin karri forest, granitic outcrops, scenic.

The CTRC divided the State of WA into 12 natural areas called "systems". Systems 1 and 2 more or less covered the same area as that covered by the "southern forests" of the F.D. The CTRC in looking into reservation for conservation in Systems 1 and 2 although acting independantly interacted with the F.D. Thus two officially responsible, qualified organisations evaluated the same system.

In August 1974 the CTRC published its report to the E.P.A. (CTRC 1974). This was then made available for public comment.

3.2.1 The Shannon River Basin

The CTRC took a different approach to the Forests Department in its consideration of reservation in the karri forest. It elected to concentrate all new reservation into one large reserve comprising the entire Shannon River Basin. This, added to what was already reserved in National Parks and Nature Reserves "met the aim of the CTRC to set aside sufficient native habitat to be preserved and managed both for the preservation of animals and plants, and for the enjoyment and education of the population" (CTRC 1974).

The CTRC wished to reserve the entire watershed because it was a large single continuous area containing karri and karri-marri. This area was proposed to act as a benchmark area for changes in biological, hydrological,

pedological, and sedimentological parameters which may take place elsewhere as a result of commercial timber harvestings. The presence of the Broke Inlet in a largely intact natural state at the mouth of the Shannon and the presence therein of a sedimentary delta of classic form added to its value.

The F.D. did not adopt the CTRC proposal. The main reasons were firstly the F.D.'s belief that the Shannon alone failed to include important variations in the wet sclerophyll community, and secondly the presence of tracts of severely fire damaged forest in the mid catchment of the basin. The F.D. had spent years persuading a reluctant local timber industry to undertake the task of utilisation to facilitate its regeneration, and was loathe to forgo its hard won success. The F.D. system included two areas for flora, fauna and landscape in the Shannon Basin, one (Curtin) in the north, and a larger one, (Lower Shannon) in the south.

When released for public comment the CTRC report generated intense public opposition in some areas, but the environmental movement adopted the Shannon River Basin proposal with enthusiasm. So intense was the opposition that the E.P.A. appointed a Special Committee to review the CTRC recommendations and the public response to them.

3.2.2 Special Committee Report (1976)

The Special Committee Report preferred the F.D.'s approach to reservation in the karri forest, and recommended its adoption.

3.2.3 The E.P.A. Report (1976)

The E.P.A. reply to the CTRC report and the Special Committee Report was published in 1976 in its official recommendations to Government (E.P.A. 1976). This was called the "Red Book". The E.P.A. also preferred the F.D.'s approach but did not reject the Shannon River Basin proposal. While recommending that the F.D. reserve system be adopted the E.P.A. also recommended that logging and regeneration in the Shannon Basin proceed in severely fire damaged areas for a further 5 years and that operations be limited to 9% of the basin area. The option to create a reserve of the basin at a later date was retained. Other recommendations were that priority areas for both flora, fauna and landscape and recreation be called "Forest Parks", the working plans of which should receive protection of a Parliamentary Regulation.

Five years later the question of conservation was raised again by the E.P.A. In its submission to the E.P.A. (Bradshaw and Lush 1981), the F.D. reaffirmed its belief that the present reserve system was the best approach, and put conservation in the context of management of the karri forest as a whole.

3.2.4 EPA Bulletin No. 123 and the Attiwill Report

To review the F.D.'s submission and the public and environmental movement response to it. (Conservation Council et. al. 1982), the E.P.A. appointed the services of an independent expert, Dr P. Attiwill reader in Botany at the University of Melbourne.

The Attiwill report (E.P.A. 1982) also favoured the F.D. approach, believing that it was adequate for conservation in biological terms. The E.P.A. reaffirmed that its 1976 recommendations were correct and should be fully implemented (E.P.A. 1982), citing the Attiwill report as being the rationale behind its position. The question of greater security of purpose of areas with value to conservation, better nomenclature of reserves, their management, and the future of certain areas (Beavis, Giblett) were among other important issues raised in the E.P.A. report. The E.P.A.'s position on the Shannon River Basin was essentially the same as that in 1976 - viz. that harvesting and regeneration of fire damaged forest should proceed in the central basin, with a view to its value as a conservation reserve being reviewed some time in the future.

3.3 The Labor Government Actions

3.3.1 The Shannon River Basin

In August 1983 the newly elected Labor Government acted on its policy that the Shannon River Basin would become a National Park. In accordance with this policy it instructed the F.D. to amended its General Working Plan No. 87 of 1982, making the entire Shannon Basin a State forest conservation area for flora, fauna and landscape.

This action combined two systems of reservation in the karri forest, both made by competent bodies, and both believing that their respective approaches were adequate in scientific bioligical terms. Adequacy of the final system should therefore no longer be in doubt.

3.3.2 The Department of Conservation and Land Management (CALM)

Another policy of the newly elected Labor Government was to rationalise its agencies responsible for the management of natural lands under Crown ownership. The Department of Conservation and Land Management (CALM) was created in 1984. It was formed from an amalgamation of the Forests Department, the National Parks Authority, and the Wildlife section of the Department of Fisheries and Wildlife. CALM became the management agency servicing the newly formed National Parks and Nature Conservation Authority (NPNCA) and the

Lands and Forest Commission (LFC). National parks and nature reserves (marine and terrestrial) were vested in the former, and State forest was vested in the latter.

In April 1987 CALM published for public comment draft management plans for its Northern, Central and Southern Forest Regions. In December 1987, following a period of public comment and review, final management plans were published which then became the offical blueprint for the ensuing ten years (CALM 1987 a,b). These replaced the General Working Plan No. 87 of 1982 of the former F.D. and in addition brought all the national parks and nature reserves under the one management umbrella.

In southern forests, as elsewhere, many changes were proposed to tenure, additional national parks and other reserves were created, and boundaries were adjusted. All areas designated for flora, fauna and landscape and recreation became either National Park, Nature Reserve, or were put into a new category called Conservation Park. The Regional Management Plans have provided for A class security of tenure and purpose thus overcoming the perceived weakness of the Forests Department's State forest reserve system.

The system of reservation in southern forests as of February 1988 is that shown in the Management Plans for the Southern and Central forest regions reproduced in Figures 2 and 3 of this report. This should be read in conjunction with the management Plan for the Shannon Park and D'Entrecasteaux National Park adopted in December 1987 (CALM 1987).

3.3.3 The Committee of Inquiry on the Shannon River Basin

In August 1987 following concerns raised in Parliament on the Government's proposal to effect its 1983 decision and declare the Shannon River Basin a National Park a expert Committee of Inquiry was established.

The terms of reference for the Committee of Inquiry were to:-

- examine the history of the reserve proposal;
- consider its validity in light of the current knowledge on southern forest ecosystems and the proposals in the then Draft Regional Management Plans;
- consider the impact of the reservation on the Governments capacity to meet its timber supply commitments.

The Committee concluded that the reservation had scientific merit and could be made without any derogation of previous reserve proposals or reduction in the level of economic activity in the timber industry. (Committee of Inquiry on the Shannon River Basin 1987).

Parliament accepted the report and the Shannon River Basin was subsequently gazetted a National Park.

3.4 Research

Since the original demarcation of the reserve system in the mid 1970's there has been a steady increase in the understanding of ecosystems resulting from work done in the botanical, ecological, zoological and geomorphological fields.

The more significant publications are listed below:-

a) Beard, J.S. (1981).

This work gives a coherent account of vegetation in the south west of Western Australia, and puts it in the context of the State as a whole. It makes use of the 1:25 000 mapping previously done by F.G. Smith (1972, 1973, 1974). Its chapters on History, Natural Regions, Climate, Geology, Geomorphology and Human Influences are a valuable drawing together of these factors. Beard's vegetation units which follow natural regions are now in common usage. There is a valuable discussion on the distribution of karri. This work does not invalidate any of the interpretation of basic data used in the design of the reserve system. No changes in the number or boundaries of reserves have had to be made as a result.

b) Heddle, E.M., Loneragan, O.W. and Havel, J.J. (1980).

This vegetation mapping covers part of the southern forests, and is an extension of work done by Havel (1975) in the jarrah forest further north. It used understorey floristics to distinguish types, and relates indicator species to environmental factors important to management for conservation and other purposes. The necessary duplication of Havel's work in the southern forests to elucidate the ecology of southern forests in now nearing completion - viz.

c) Inions, G. (in preparation).

This vegetation site typing extends Havel's (1975) approach in the Northern Jarrah Forest to the karri. Attention has been focussed on regenerated stands for urgent forest management reasons. However, as floristic pattern is very closely related to environmental factors (summer rain, pH and P levels) rather than perturbation as indicated by time since clear felling or fire regime, the results are likely to have application in all ages of stands. Relationships between floristics and climatic factors separate out distinctive regions of the wet sclerophyll. These are the central or main region, the northern and eastern margins of the main karri occurrence and the south coastal. Thirteen community types based on floristics are defined. All thirteen are represented in the reserve system. One floristic group is

restricted to the tingle forest and is virtually confined to the Walpole-Nornalup National Park. Another, group 2, is very restricted and is in effect confined to Soho Block within the new and as yet unnamed "Wattle-Soho or Mt Frankland" National Park. This work confirms the advisability of having reservation across the extent of the main karri occurrence. Nothing is raised which suggest a need for a change in reserve boundaries.

d) Strelein, G.J. (in preparation).

This work duplicates Havel's (1975) northern jarrah forest work in the southern jarrah. It relates floristics to environmental factors, including soil and landscape types as described in recent CSIRO work (see below). Seventeen site types have been recognized, all of which are represented in the reserve system. As reservation of the jarrah and jarrah-marri was not the primary aim in southern forests, its adequacy should be judged in the context of all three forest regions.

e) Churchward, H.M., McArthur, W.M., Sewell, P.L. and Bartle, G.A. (in print).

This soil mapping extends that done by McArthur and Clifton (1975), and covers most of the more productive wet sclerophyll in the southern forests. It is essential for the understanding and management of the ecosystem involved. Whilst yet to be published, its mapping was available to Department of Conservation and Land Management officers working in the floristics field.

f) Department of Conservation and Land Management (1987).

This Shannon-D'Entrecasteaux Management Plan contains descriptions of vegetation associations, species lists, and details of faunal populations pertinent to the whole of the wet sclerophyll forest.

The development of an adequate reserve system in the wet sclerophyll of southern forests had to include coastal landforms and vegetation. The conjunction of the D'Entrecasteaux and Shannon Parks is an essential component of the reserve system described in the Management Plans for the Central and Southern Forest Regions of the Department of Conservation and Land Management (see below).

g) Department of Conservation and Land Management (1987)b.

Department of Conservation and Land Management (1987)a.

The management plans for the Central and Southern Forest Regions give the existing reservation system in southern forests. They should be read in conjunction with the management plan for the Shannon Park and D'Entrecasteaux National Park (CALM 1987).

h) Christensen, P., Annels, A., Liddelow, G. and Skinner, P. (1985).

This publication gives species lists of plants and fauna collected during the course of biological surveys done by the Forests Department in southern forests since 1968. Descriptions of vegetation types and details of the occurrence of mammals, birds, reptiles, amphibians and fresh water fish are given. This is a summary of the work done to date by the Biological Research Unit stationed at the Forests Department's Research Station at Manjimup (now CALM). Work is continuing. No changes in reserves or reserve boundaries have been made necessary.

i) Christensen, P.E.S. (1980).

This work summarises work done by the author to 1980 on the biology of the Woylie and Tammar in the former Perup flora, fauna and landscape priority area. This is proposed to be a Nature Reserve in the Southern Region Management Plans.

The work referred to in the preceding publications was used by CALM to evaluate the former Forests Department and E.P.A. reserve systems in framing its proposals for the Regional Plans. It confirmed the validity of the existing system as being representative of the full range of ecotypes. Following an extensive public participation process Government accepted the existing system with its boundaries largely unchanged but with its security of tenure and purpose significantly improved.

3.5 Characteristics of the Final Reserve Proposal

The culmination of the work by the Forests Department and the E.P.A. is that adopted by Government as set out in the CALM Regional Plans for the Central and Southern Forest Regions (CALM 1987 a,b). This is reproduced in this text as Figures 2 and 3.

In relation to the renewal of the Western Australian Chip and Pulp Company's (WACAP) export licence the Southern Forest Region is the area of predominant concern. As a consequence the figures given below relate mainly to that Region.

3.5.1 Area of proposed land category by vegetation type in the Southern Forest Region

The area and proportion of the Southern Forest Region proposed to be allocated to, or in already in, the various tenure categories is shown in Table 7.

3.5.2 Cutting History of Southern Region Forests by Tenure Category

Section 3.1.4 outlines the criteria of naturalness sought by the Forests Department in selection of their reserve system. Areas free of perturbations cased by man were given priority however, cut over and regenerated forest was not rejected out of hand as it clearly had conservation value in representing the younger age structures of the forest.

TABLE 7

Area of proposed land category by vegetation type in Southern Forest Region

Proposed/ Existing Tenure Category	Area (ha) Pure Karri	Mixed Karri	Other Forest	Other Vegetation	Total	%
Nature reserve	400	1 000	52 200	15 800	69 400	7
National park	16 500	29 600	73 300	139 800	259 200	28
Conservation park	500	700	300	-	1 500	≈ 0.1
State forest						
- Road River & Stream Zones	8 700	15 600	42 700	6 700	73 700	8
- Other State forest	31 700	62 800	314 600	119 400	528 500	57
					932 300	100

SOUTHERN FOREST REGION

C.A.L.M. ESTATE AS PROPOSED BY REGIONAL MANAGEMENT PLAN 1987-1997

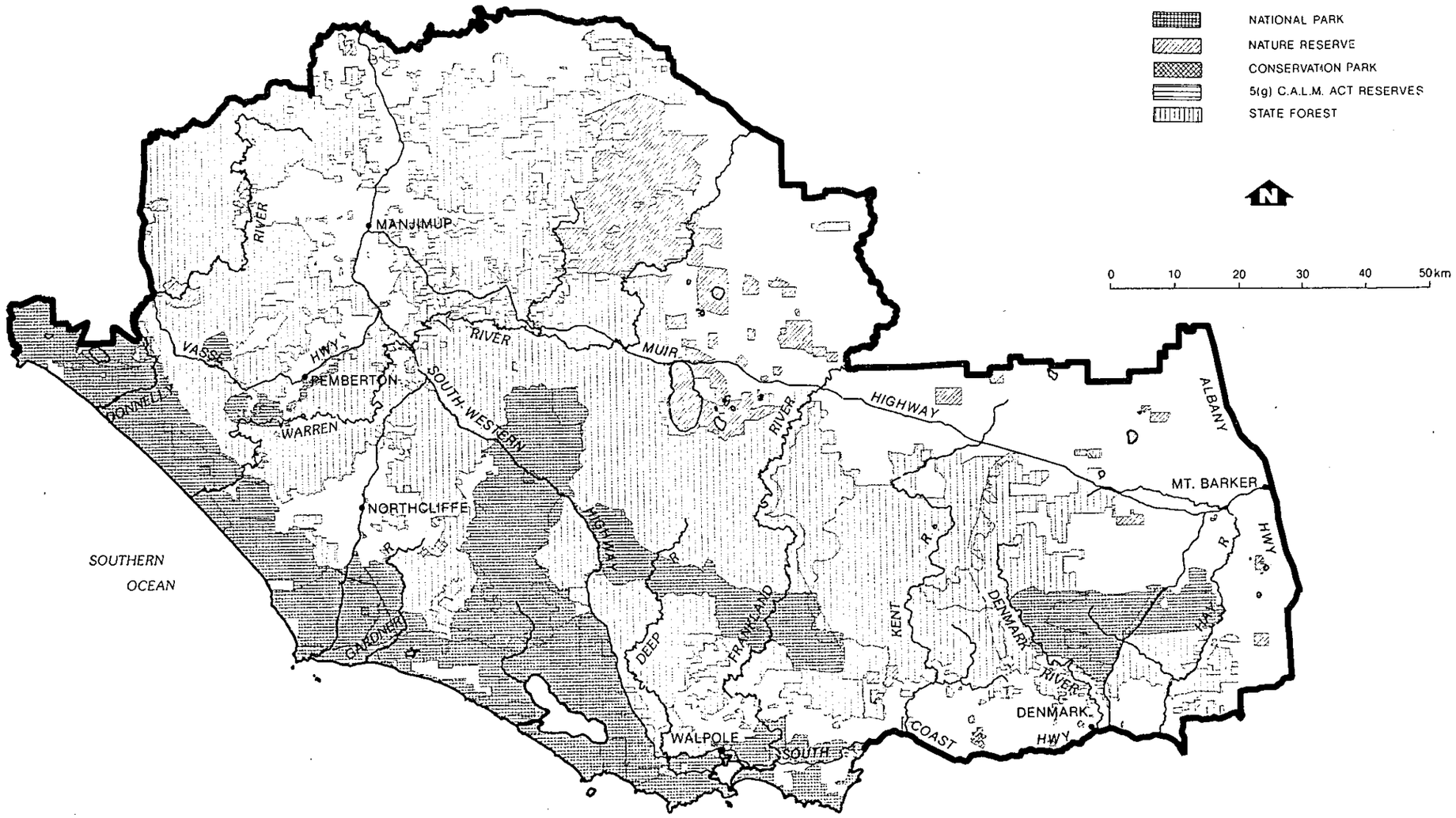


Fig.2

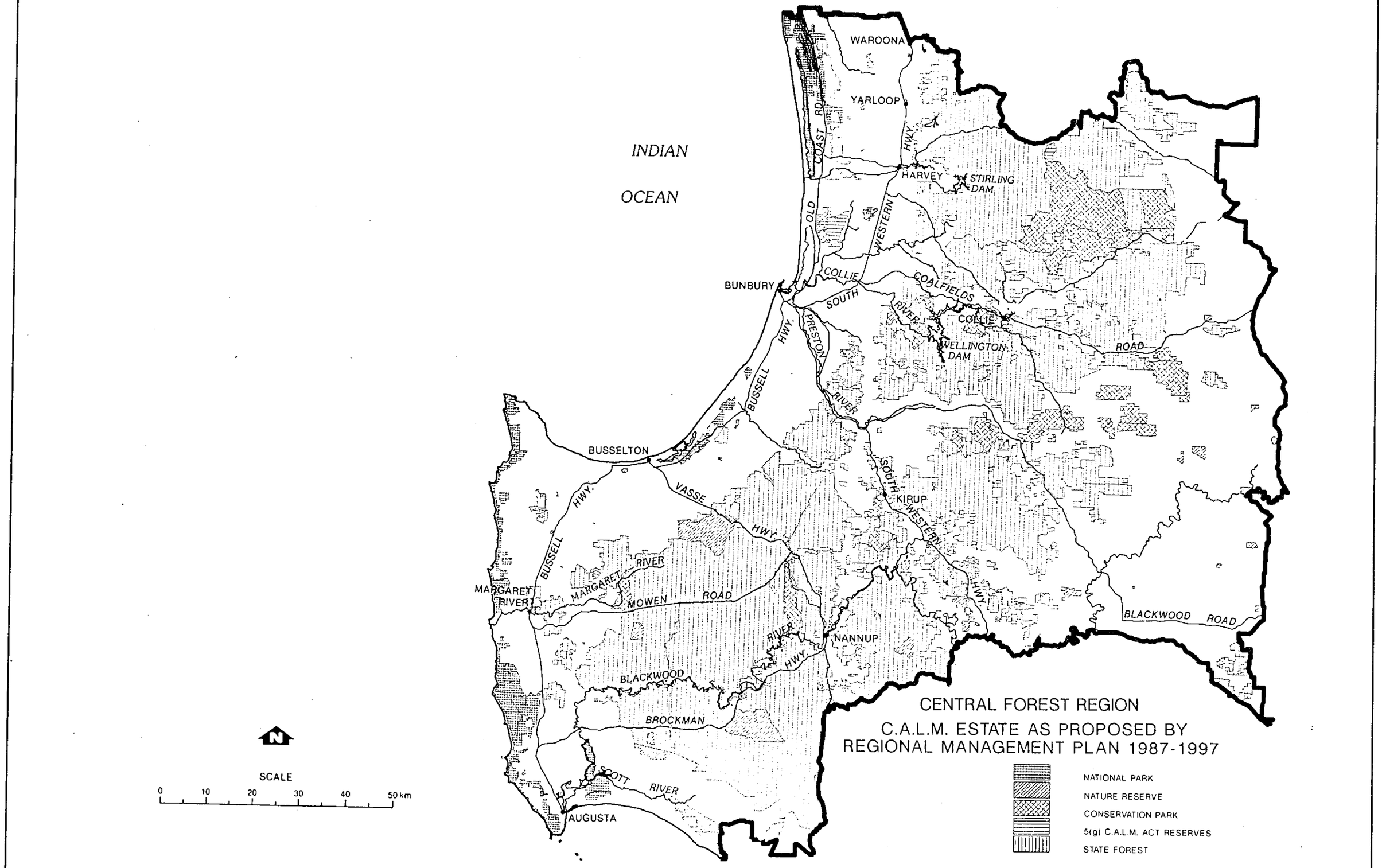

INDIAN
OCEAN
WAROONA
YARLOOP
COAST RD
HWY.
HARVEY
STIRLING DAM
OLD
WESTERN
COLLIE
COALFIELDS
BUNBURY
SOUTH
RIVER
COLLIE
PRESTON
HWY.
WELLINGTON DAM
ROAD
BUSSELL
RIVER
BUSSELTON
VASSE
HWY
SOUTH WESTERN
KIRUP
HWY.
BUSSELL
RIVER
MARGARET RIVER
MARGARET
MOWEN
ROAD
HWY
BLACKWOOD ROAD
RIVER
NANNUP
BLACKWOOD
BROCKMAN
SCOTT RIVER
AUGUSTA
N
SCALE
0 10 20 30 40 50 km
CENTRAL FOREST REGION
C.A.L.M. ESTATE AS PROPOSED BY
REGIONAL MANAGEMENT PLAN 1987-1997
NATIONAL PARK
NATURE RESERVE
CONSERVATION PARK
5(g) C.A.L.M. ACT RESERVES
STATE FOREST

Fig.3

The cutting history, hence proportion of old growth forest by vegetation type in the various land tenures of the Southern Forest Region is shown in Table 5.

From this can be seen that 86% of all National Parks is old growth forest. The figure for Nature reserves is 38% due to the proposed inclusion of the very large Perup area which had been selectively logged in the past.

3.5.3 Buffering by Multiple Use Forests

The value of this reserve system is considerably enhanced by the sympathetic management of surrounding forest. Unlike reserves in the wheatbelt, conservation reserves in forest areas are surrounded by State forest managed for multiple use. Of special significance are the 74 000 hectares in the Southern Forest Region managed as road, river and stream zones. These zones are managed to supplement the secure reserve system by providing faunal links between reserves, protecting stream quality and providing landscape protection. Whilst timber production is a significant part of the remaining multiple use forest its management ensures that the 528 500 ha of State forest is a major contributor to conservation in its own right and an important buffer to the secure reserve system.

Multiple use forest also contains approximately 28 000 ha of defacto reserve. This area comprises all areas excluded from harvesting on a coupe by coupe basis because it has low sawlog volume or according to management guidelines to protect environmental values. It will include woodlands, zones of steep slopes, heath, pure marri, rock outcrops, lakes and fringing wetlands. The area is not identified in any reserve figures.

3.5.4 Security of Tenure and Purpose

A perceived weakness in the Forests Departments conservation reserve system was its lack of security of management purpose. The Southern and Central Forest Regional Plans adopted by Government have solved that problem by proposing changing their tenure category from State forest to National Park, Nature Reserve or Conservation Park and revesting them in the National Parks and Nature Conservation Authority. This now makes their purpose of management for conservation as secure as possible as it is controlled by the objectives set out in the CALM Act for these tenure categories. To alter that would require approval of both Houses of Parliament to either change the CALM Act or revest the areas as State forest.

4 THE NATIONAL ESTATE LISTING PROCESS AND GOVERNMENT LAND USE ALLOCATION AND MANAGEMENT RESPONSIBILITIES

4.1 Deficiencies of the National Estate Listing Process as a Land Use Allocation Process

The Australian Heritage Commission Act (1975) clearly indicates it is not intended to dictate a land use to areas on the register of the National Estate. The A.H.C., however has used and is attempting to use the Act to impose its land use decision, the preservation of old growth forest, on areas of forest for which a Commonwealth export licence is required to facilitate harvesting.

The A.H.C. has done this by developing criteria for National Estate values, developing a compatability matrix of forest practices with those values which excludes harvesting (See Table 1), listing forest areas available and being used for wood production, then advising Commonwealth ministers accordingly.

The Act is deficient in enabling the A.H.C. to do this because:

- It has given them no power or responsibility to compare or reconcile alternative land uses for nominated areas.

- It has given them no responsibility to take account of the social or economic implications of their action.

- They have no responsibility for ongoing management of areas listed.

- There is a very limited onus on consultation and no appeal process for affected landholders, or land management agencies.

- There is no responsibility or opportunity for public input.

In addition the limited resources of the A.H.C. make the scientific basis for their nominations and assessments suspect.

In contrast, the State Government has management responsibility for the forest and a sophisticated planning process to ensure the overall needs of the State are met in a balanced way. This has recently been demonstrated in the production of the three Forest Region Management Plans.

4.2 The State Government Land Use Allocation Process

In April 1987 following a twelve months internal review, draft management plans for the southern forest region and the two other forest regions were released by the Government. These plans were to replace the former Forests Department's General Working Plan No. 87 for State forests.

The drafts, which were subsequently available for 3 months public input represented the Government's proposals for:

- a reserve system which represented all ecological types;

- a balance of land use between conservation, recreation, protection and production;

The final plans in response to public submissions abandoned the concept of State Park and Forest Park/Reserve and introduced Conservation Park. The seven categories of land managed by CALM now will be:

nature reserve
national park
conservation park
marine park
state forest
timber reserve
miscellaneous reserve.

Nature reserve, national park and conservation park all have nature conservation as their priority use with the prohibition of commercial timber production and the provision of A Class security of tenure and purpose. Definitions of the proposed categories are given on pages 5, 6, 7 and 8 of the Southern Forest Region Regional Management Plan 1987-1997 and the proposed changes in category, tenure and vesting is shown in Table 7 in the Plan on pages 24, 25 and 26. A comparison with the EPA system proposals is shown in Appendix 3 of the plan.

The Government accepted the plans and they were gazetted on 12/2/88.

The land use allocation as set out by the Government in the Regional Plans culminates fifteen years of scientific study, review and negotiation with different groups. It is eminently fair because it was made by a Government responsible for the management of the land, responsible for the economic and social well-being of people directly and indirectly concerned and was made with the assistance of public participation.

5 THE SOCIAL AND ECONOMIC IMPACT OF EXCLUDING HARVESTING FROM LISTED AREAS

There is approximately 120 000 ha of forest area in the southern region currently available for timber production which is either listed on the register of the National Estate, on the interim list or nominated for listing. This area contains approximately 5.7 million cubic metres of karri and marri logs only suitable for woodchipping, 2.6 million cubic metres of karri sawlogs and 1.9 million cubic metres of jarrah sawlogs. It represents 37% of the total available chipwood resource, 46% of the karri sawlog resource and 33% of the jarrah sawlog resource.

In theory only the chipwood resource should be effected by listing as it is this product which requires a Commonwealth export licence. However the felling for sawlogs, veneer logs and chip logs is very difficult to separate in southern forests because of the integrated nature of the operations, the large volumes of chip logs generated by felling trees for sawlogs and the need to remove non sawlog trees of both karri and marri to ensure regeneration.

As a consequence, a restriction on the use of, hence removal of, chipwood logs would destroy the carefully integrated harvesting and regeneration system currently in operation.

If all areas now nominated to the Register of the National Estate were to proceed to listing and if as a result of this the Commonwealth Government were to use their power through the export licence to exclude woodchip operations in them the State Government would have to choose from the following options:-

5.1 A Cessation of Harvesting in Listed Areas and Reduction of the Cut Commensurate with the Loss in Resource

The cessation of sawlog harvesting as well as chip log harvesting would be done because of the inability to satisfactorily regenerate forests after sawlog only cutting. The annual cut would be reduced commensurate with the loss in resource to maintain a sustainable yield from the forest.

The consequences of this are

- Loss of employment. A reduction of 46% of the karri cut and 33% of the jarrah cut means that a number of sawmills would have to close. The karri sawlog supply is basically cut at two mills supporting 180 employees. A 46% reduction would close one mill and on a pro rata basis put approximately 90 people out of work.

  The jarrah sawlog supply is distributed around four sawmills employing 245 people. A 33% reduction in supply would close one mill and put approximately 80 people out of work.

  In addition the overall reduction in logging activity would put a further 50 people out of work who are currently involved in logging and transport.

  In all 220 people would be directly effected which, using the Type II multiplier for the industry of 3.22 (DRD 1982), would mean 700 people suffering a complete or partial loss of income.

- Claims for compensation from logging companies that have invested money in roading to access coupes this year. Such claims cost the State Government in excess of a third of a million dollars when it elected to change the land use of the Shannon basin. It is estimated that such existing roading represents an opportunity cost of a half million dollars.

- Claims for compensation from sawmilling companies who have long term supply contracts which would be affected by the loss of resource.

- Claim for compensation by the Chip company which has an Agreement Act guaranteeing them a level of resource which could not be met.

- Destruction of the State Timber Strategy. Acceptance of the principles and direction in this strategy has encouraged a commitment of 150 million dollars of investment in new plant and processing equipment to make the industry more efficient.

- Loss of royalty revenue to the State of:

  $58 million of chipwood
  $75 million of karri sawlog
  $49 million of jarrah sawlog.

- Loss to the Western Australian economy of $124 000 000 in economic activity.

5.2 A Cessation of Harvesting in Listed Areas but Maintenance of the Total Cut in Available Areas.

This is not a realistic option because it is not sustainable. There are no uncommitted areas of forest which would enable substitution for listed areas to enable the cut to be sustained. As a consequence implementation of the above would be contrary to the CALM Act principles of sustained yield. It would also lead to crash in the industry in the mid term as old growth areas were exhausted but the regrowth not large enough to substitute for it. Although it would alleviate the immediate compensation problem for the State mentioned in 5.1 the loss of direct and indirect economic gain would be the same as for that option.

5.3 A Cessation of Chipwood Harvesting but Attempt to Maintain a Level of Sawlog only Harvesting.

The operation of a sawlog only cut would result in much higher regeneration costs. This is due to the need to cull the non sawlog trees to ensure space is provided for the regeneration. In addition the tangle of stems on the ground would add considerably to the regeneration burn preparation and be a hinderance to ongoing management and protection.

This option would however, ameliorate but not overcome the problem of compensation, loss of employment and decline in economic activity. The extent of the amelioration would be dependant on the proportion of sawlog able to be recovered economically to ensure regeneration of cut over areas is possible. Without detailed study and trials it is not possible to estimate this however the $58 million of chipwood would be lost to the State.

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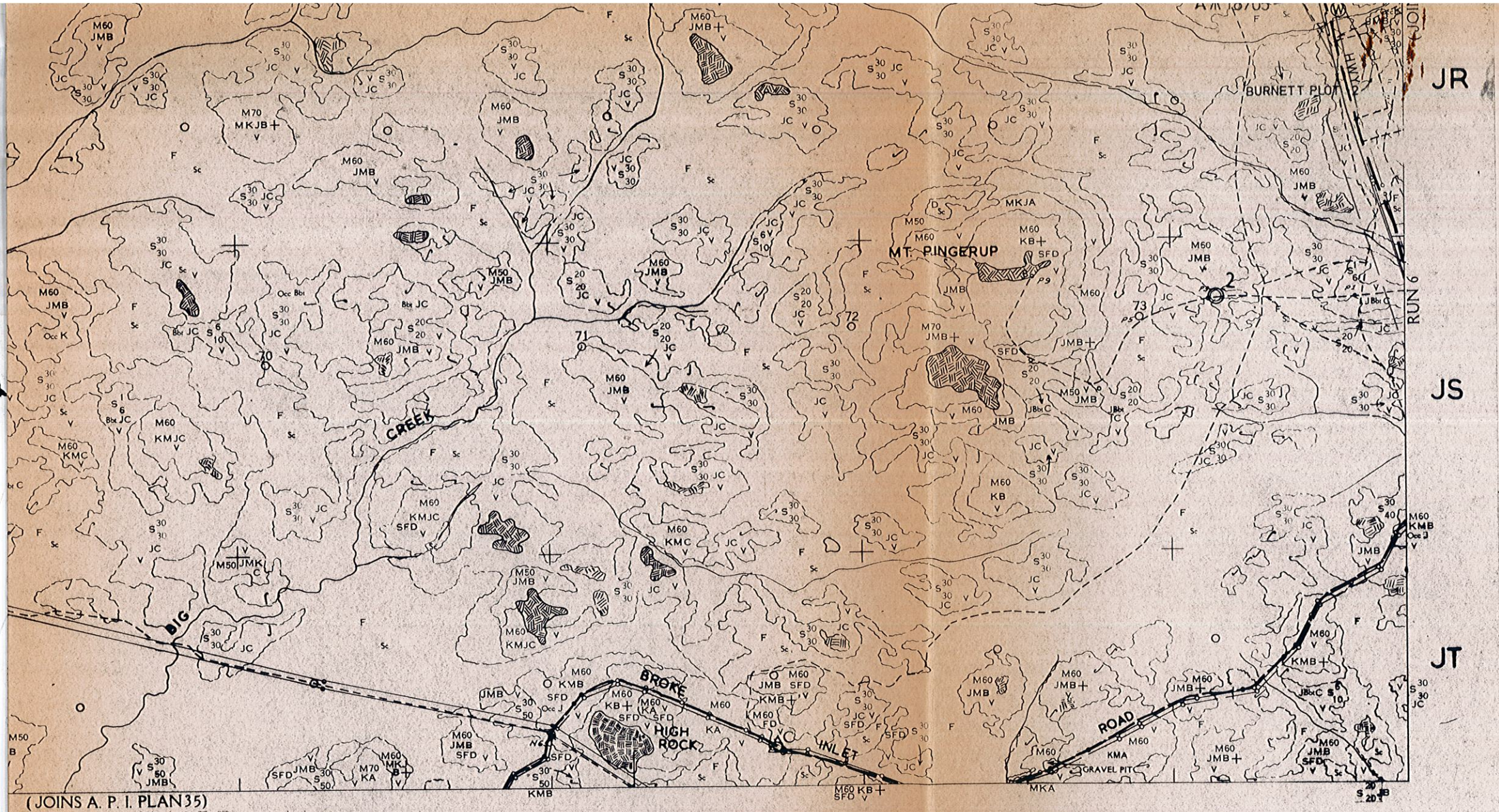


FOREST ASSESSMENT

HEIGHT CLASSES

Metres

	J M Bbt
A+	30+
A	25-29
B+	20-24
B	15-19
C	under 15
KARRI	
A	50+
B	40-49
C	under 40

FOREST TYPE

M - Massed Forest — High Density all sizes enter upper strata

P - Pole Forest — Upper Strata clearly separable from pole understorey

S - Sapling Forest — Upper Strata of large trees with understorey of saplings or scrub

UPPER STRATA

Percentage Crown Cover

JARRAH		KARRI	
0	1 - 5	1 - 4	5 - 9
6 - 19	20 - 29	10 - 14	15 - 19
30 - 39	40 +	20 - 24	25 - 29
		30 - 34	35 - 39
			40 +

20=% Upper Strata

60=% Total Density

M type—total density only

A.P.I. TYPE MAP 34

NOTE: TOPOGRAPHICAL AND CADASTRAL INFORMATION NOT UP TO DATE

FORESTS DEPARTMENT W.A.

METRIC SCALE

APPENDIX 1

EXAMPLE OF API MAP AVAILABLE FORESTS DEPARTMENT IN 1970

90 91 92 93 94

JOINS A. P. I. PLAN 23)

JN

JO

JP

JQ

MT FRANKLAND

RUN 5

I. PLAN 29)

34° 51'

TRIAL PLOT

BEARDMORE

WYE PLOT 2

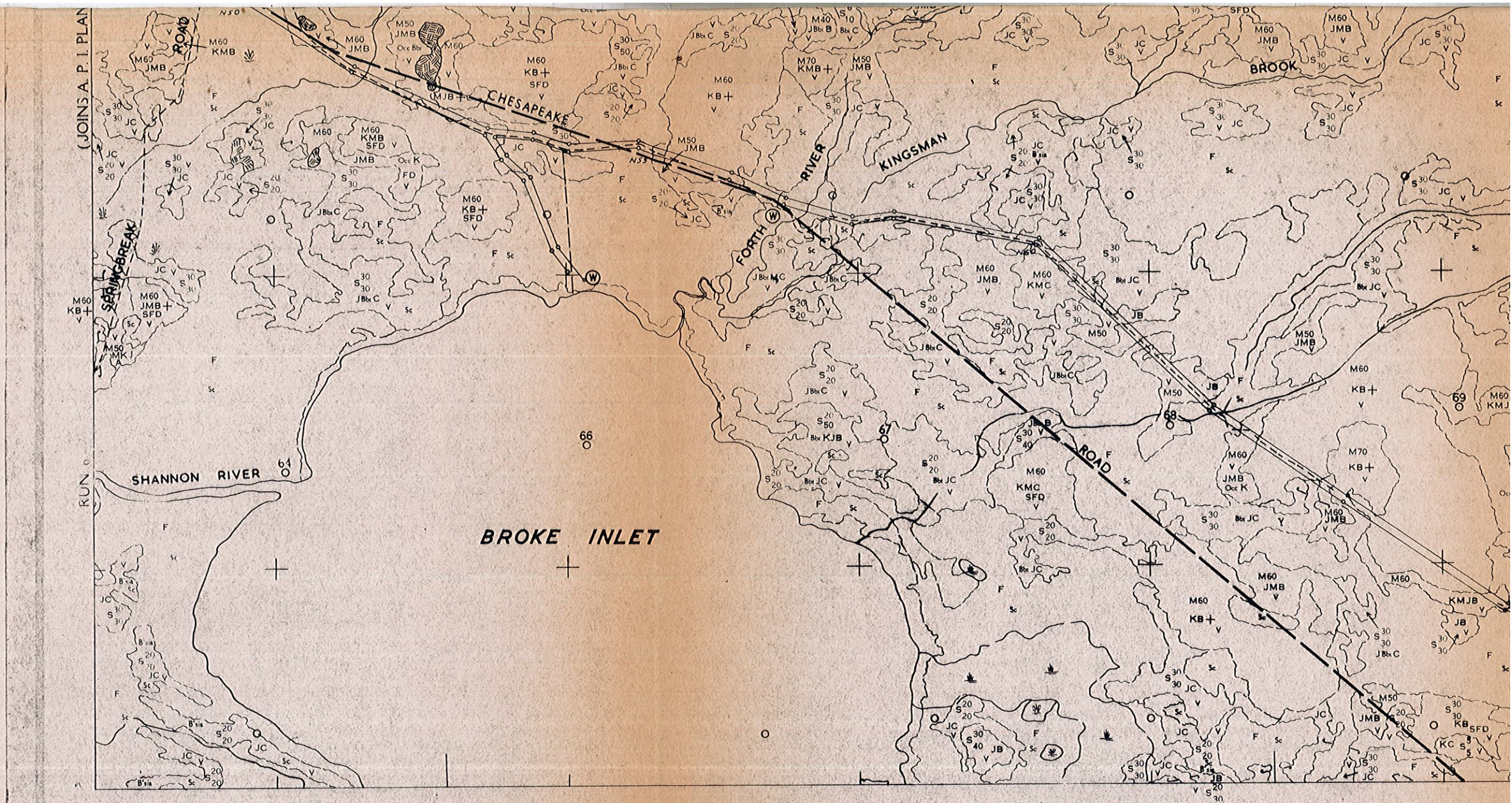
ROAD

SOUTH

WESTERN

GRAVEL PIT

GRAVEL PIT



LEGEND

1ST CLASS ROAD		J	JARRAH	F	Flats
2ND CLASS ROAD		M	MARRI	Sc	Scrub
3RD CLASS ROAD		K	KARRI	Rb	Ringbarked
UNMAINTAINED TRACK		W	WANDOO	Orch.	Orchard
REFERENCE TREE	THEODOLITE	Bbt.	BLACKBUTT	Pt. Cl.	Part Cleared
	COMPASS	Bull.	BULLICH	Cul.	Cultivated
TRANSFERRED FROM TOPO SHEETS		B'sia	BANKSIA	P	Pasture
PHOTO PRINCIPAL POINT		D	NON FOREST	▪	Building
PHOTO PICTURE TIE		D b	DIEBACK	S. T.	Shade Trees
PHOTO CONTROL POINT		P.D.	POSITION DOUBTFUL	V.O.	Very Open
		F.D.	Light Fire Damage	Dec.	Decadent
		S.F.D.	Severe Fire Damage	V	Virgin Forest

SCALE 1:25000

500 0 1000 2000 Metres

20 10 0 20 40 60 80 100 Chains

PHOTOGRAPHY	MT. FRANKLAND OCT 60 WAINBUP SEPT 63	
BASE PLAN	Z.T.K.	FEB 62
INTERPRETATION	HARVEY W.P.O. APR 62 65	
PLOTTING	R.C.K.	NOV 65
COMPILED	R.C.K. L.T.	AUG 66
CHECKED	D.J.C.	AUG 66
AMENDED	S.J.R	May 82


87
88
89
116°27'
MARRON
ROAD
RIVER
PINGERUP
SHANNON
WAINBUP
RUN 3
RUN 4
RUN 5
86
85
116°24'