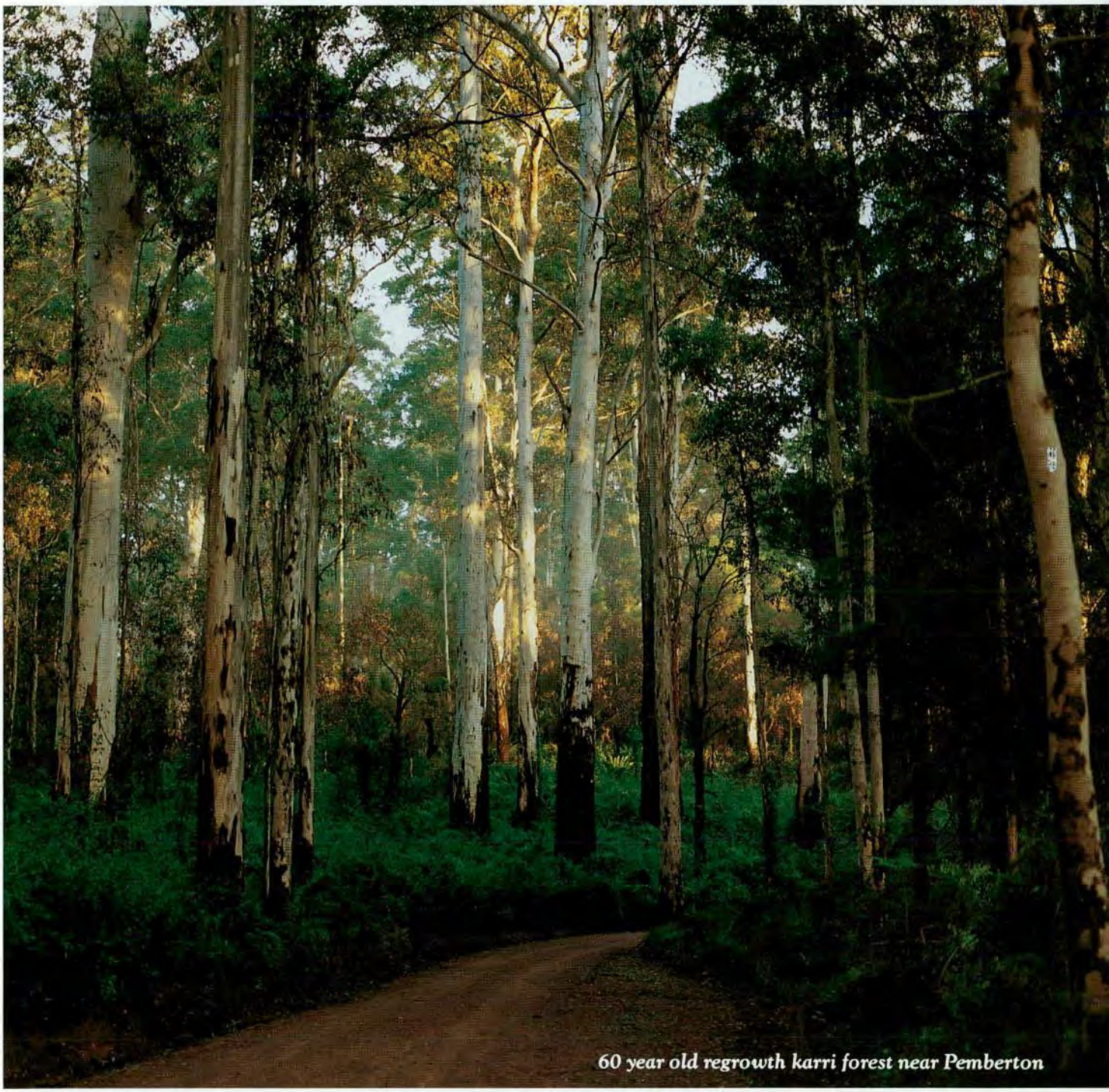

60 year old regrowth karri forest near Pemberton

WACAP

TOWARDS 2005

Environmental Review and
Management Programme.

Environmental Impact
Statement.

SUPPLEMENT

Dames & Moore
in association with
Margules and Partners Pty. Ltd.

7 year old karri regrowth forest near Manjimup

WACAP TOWARDS 2005

ENVIRONMENTAL REVIEW AND MANAGEMENT PROGRAMME AND DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE EXTENSION OF THE LICENCE FOR W.A. MARRI WOODCHIP EXPORT INDUSTRY

SUPPLEMENT

February 1988

TABLE OF CONTENTS

Page No.

Page No.

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The W.A. Chip & Pulp Co Pty Ltd (WACAP) established a paperwood export project in 1976 utilising mainly marri and some karri wood residues following sawlog harvesting from the southern forest areas of Western Australia. The original Environmental Impact Statement (EIS) for the project area was prepared in 1973 by the then Forests Department of Western Australia. The Federal and State licences controlling the production and export of woodchips are due to expire in May 1991.

In April 1987 WACAP submitted an Environmental Review and Management Programme/draft Environmental Impact Statement (ERMP/draft EIS) in accordance with State and Commonwealth requirements in order to obtain extensions to licences controlling the production and export of woodchips from the south-west of Western Australia.

The ERMP/draft EIS was subject to public review for the period from 22 April to 6 July 1987.

A total of 68 original substantive submissions were received by WACAP from the Environmental Protection Authority of Western Australia (EPA), for analysis and comment. 13 of these submissions were multipaged reports, whilst the remainder ranged from handwritten paragraphs to typewritten letters. A summary of comments from 8 Government Departments was also prepared by the EPA, and forwarded to WACAP for analysis. In addition, over 9500 proforma letters were received by the EPA and the then Commonwealth Department of Arts, Heritage, and Environment. 37 of these proforma submissions were individually prepared with notes or comments attached, and these were forwarded to WACAP by the EPA. Subsequently several additional submissions were received and reviewed. The complete list of 114 substantive and proforma submissions received and reviewed by WACAP, is presented in Appendix G.

This document responds to matters raised in the various submissions received following public review and, in conjunction with the ERMP/draft EIS, will form the final EIS which meets the Commonwealth Government's requirements under its Environment Protection (Impact of Proposals) Act 1974-87.

The forest management information in this document has been based on the ratified W.A. Department of Conservation and Land Management (CALM) management plans (CALM, 1987). Therefore any amendments to the draft CALM management plan which affect the WACAP extension are reflected in this supplement. Otherwise there have been no changes to the basic findings of the ERMP/draft EIS as a result of the analysis of public and Government submissions.

2.0 SCOPE OF DOCUMENT

The public submissions ranged from very brief statements of opposition or support to one document which was 139 pages in length and commented on almost every issue raised in the ERMP/draft EIS.

To respond to every issue raised in every submission would result in unnecessary duplication. Therefore, rewriting the ERMP/draft EIS to include all issues mentioned was not considered to be warranted.

In selecting the issues requiring a response, the following approach has been adopted:-

1. Where errors of fact in the ERMP/draft EIS have been pointed out, these are corrected in this document.
2. New issues raised in the submissions but not treated in the ERMP/draft EIS are discussed providing that they are relevant to the proposals.
3. A number of misconceptions appear to be reflected in many of the submissions. These misconceptions are discussed in an early part of this document.
4. The main issues of public concern - as judged from the number of submissions in which they are mentioned, and the attention devoted to them in the detailed submissions - are addressed individually. In some cases the conclusions of the ERMP/draft EIS are re-stated when there is no additional information on which to base any changes. In other cases additional discussion is introduced in support of the original conclusion, or discussion is introduced to refute statements that occurred commonly in the public submissions.
5. Relatively detailed discussion has been devoted to the issue of National Estate values as they relate to the proposals. This was in response partly to a detailed submission by the Australian Heritage Commission.

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3.0 SUMMARY OF SUBMISSIONS

Of the total proforma submissions, approximately 5,600 supported renewal of WACAP's licences while approximately 3,900 either opposed the licence renewal or called for restructuring of the industry. Appendix B.1 presents the text of the four types of proforma submissions.

Appendix B.2 identifies the main issues raised in the individually prepared submissions. Those expressing opposition without discussion, are checked against "general opposition to proposal".

Of the 28 specific issues listed in Appendix B.2, those most commonly raised concerned:-

- Need for additional reserves,
- Opposition to CALM's silvicultural practices, specifically thinning of stream reserves and clearfelling,
- Need for more ecological research,
- Adverse impacts from exotic eucalypts,
- Competition for timber resources, and
- Tourism.

There was widespread support for WACAP's plans for increasing hardwood plantations on cleared land, although there was also some opposition to these plans on the basis that they could adversely affect agricultural production, by using land suitable for other types of primary production and by lowering water yields.

Other submissions in support of the project cited economic and employment benefits and the role played by WACAP in enabling the Government to implement appropriate forest management programmes.

A common objection concerned the fact that woodchips are exported. Many submissions supported production of woodchips provided that they could be utilised in Australia, and several suggested establishment of a pulpmill to add value to the product.

The longer, more detailed submissions dealt, in some cases at length, with the more scientific issues of nutrient status, species diversity and genetic diversity.

A lengthy submission from the Australian Heritage Commission dealt mainly with National Estate areas (and potential National Estate areas) and impact of forestry practices on these areas.

Finally, the largest submission, that of the combined conservation groups, was very wide-ranging, covering virtually all aspects of the proposals.

Common to many submissions was criticism of the fact that public review of the ERMP/draft EIS overlapped with that of CALM's Timber Strategy and Draft Management Plans. Likewise the time allocated for public review was claimed to be insufficient in many submissions.

4.0 PUBLIC MISCONCEPTIONS CONCERNING PROJECT

From statements made during public debate and discussion on the proposed woodchip licence renewal, it is clear that many members of the public misunderstand either part or all of the proposal and WACAP's overall role in the forest industry. This section therefore seeks to clarify some of the more common misconceptions. Those public comments which are based on the misunderstandings shown below will not be addressed in detail.

4.1 EXPANSION OF WOODCHIPPING

Many of the public submissions appeared to assume that WACAP was preparing the draft EIS/ERMP in order to obtain approval for an expansion of its operations. This is not so. **The applications for licence renewal will be for the same tonnages as have been specified on the original licences which are valid until 1990/91.**

4.2 CONTROL OF FORESTRY OPERATIONS ON STATE FOREST

Despite repeated explanations in the ERMP/draft EIS, many submissions reflect the misconception that WACAP dictates or is in some way responsible for forest management on crown land. In fact, **the State Government, through land use plans prepared by CALM, is totally responsible for determining which areas are to be harvested for sawlogs and paperlogs and which areas are to be reserved. CALM decides when and how the harvesting operations proceed and which logs go to WACAP.** CALM is also responsible for silviculture, fire protection and control, roads and the management of other land uses within State forests such as beekeeping, recreation and tourism. Funding for all these State activities is obtained from the timber industry, including WACAP.

4.3 SILVICULTURE

Many public submissions refer to the results of CALM's silviculture practices as "even-age monoculture". To refer to the type of forest that develops as a result of clearfelling and subsequent regrowth as "monoculture" is quite erroneous. CALM's practices are certainly designed to favour species which were originally on the forest site, and a variety of tree species do, in fact, regrow wherever they existed

previously. This particularly applies to marri, the seeds of which germinate readily and which also re-establishes from lignotubers and shoots from the stump (coppice). Understorey species also regrow readily. More than 80 percent of species present before clearfelling are present within one year after regeneration. This percentage increases with time as the regrowth forest approaches the composition of the old growth forest it replaces. (See ERMP Section 7.1.4.1 and Appendix H). In addition harvesting coupes are dispersed in space and time so, on a regional basis, the regrowth forest will have a diversity of ages.

At no stage is there a monoculture (i.e. only one species present) or anything close to it.

4.4 HARVESTING OF FOREST ON PRIVATE LAND

The responsibility for clearing of private land in the operations area is between the landowner and Government. There are two Governments Acts that affect the clearing of private land;

- Country Area Water Supply Act, 1947-78
- Soil and Conservation Act, 1945-82

Landowners are required to meet the regulations applicable to these Acts, before clearing of land is allowed (see ERMP/draft EIS, Section 4.3.2). WACAP is not, and can not, become involved in the decision of whether or not to clear. If clearing in a particular area is against the local, State or National interest it is up to the appropriate authority to decide so and to legislate accordingly. On the other hand if a landowner has the legal right to clear and decides to do so, it would be illogical for WACAP to be precluded from utilising the wood.

4.5 COMPETITION BETWEEN SAW-MILLING AND WOODCHIPPING

Several submissions suggested that in years of low sawlog demand, paperwood logs do form a higher proportion of the total harvest than during periods when demand for sawlogs is high. These submissions indicated that saw quality logs were being used for paperwood at these times.

This conclusion is incorrect. Economic conditions vary the demand for products from time to time and, to balance the harvest, CALM uses natural variations in the proportion of products which occur from place to place in the forest. The proportion of sawlogs to paperwood logs is influenced by the tree species present, size classes, and incidence of effects from burning or other causes. CALM puts this to good use to ensure marked variations can be accommodated without inappropriate use of products.

In the South-West there are cottage industries based on use of local timbers to produce furniture and a range of craft products. CALM makes specialist timbers available to this industry through auctions.

CALM's programme of sustainable yield timber production limits the maximum level of cutting in any year. If demand is lower than the maximum level, then this level is not harvested. An example occurred during a decline in the timber industry in the early 1980's when the actual harvest of jarrah sawlogs was well below the Forests Department's allowable cut. With the development of, among other things, new technology, sawmills are now able to accept logs of a lower quality than historically.

Since WACAP commenced operations, all harvested logs have been offered by CALM first to the sawmills, with WACAP taking only those that are not wanted for other, higher value purposes. This is one important way in which Western Australian forest operations differ from some Eastern States operations. As sawlog quality declines it becomes particularly important that wood of timber quality is used for that purpose. Close inspection of all potentially usable logs has resulted in increases of up to 15 percent in sawlog yields in particular areas.

4.6 TIMBER PRODUCTION VERSUS OTHER LAND USES

Several submissions suggested that alternative land uses for areas of State forest used for timber production had not been addressed in the ERMP/draft EIS. This view is based on the erroneous assumption that timber production is incompatible with other land uses such as recreation and tourism, water catchment, beekeeping, cottage industries and wildflower collection. Such multiple uses of the forest can co-exist and have done so for many years. CALM's Regional Plans were written and made available for public review to address the issues involved in competing land uses.

4.7 ALTERNATIVES TO HARDWOOD WOODCHIPS

Several submissions recommended recycling of paper or the substitution of other non-hardwood pulping materials as an alternative to woodchipping. Recycling changes the quality of paper such that it is or becomes unsuitable or unacceptable for many purposes. The current extent of recycling paper meets the demand for recycled paperpulp.

5.0 RESPONSE TO SUBMISSIONS

5.1 TIMING AND DURATION OF PUBLIC REVIEW PERIOD

A common theme among submissions was that the WACAP licence renewals should not be considered until after CALM's Timber Strategy and Management Plans had been finalised. Some submissions claimed that there was insufficient time to review and respond to the CALM documents and WACAP's ERMP.

The time allocated for public review was more than 10 weeks and, in fact, submissions arriving up to one month after the closing date were accepted and considered.

5.2 NEED FOR EARLY APPROVAL OF PROPOSALS

A common contention in public submissions was that, since WACAP's licences do not expire until 1990/91, there is no urgency in assessing the extensions to the licences. Several submissions suggested that the assessment be deferred for two years or more.

Such a delay would be detrimental to both WACAP and the State. The ability to sell logs unsuitable for sawmilling is essential to CALM's forest management strategy. Approval of the renewal of WACAP's licences will enable:-

- WACAP to plan its capital expenditures, including the purchase of new equipment required to utilise the changing nature of the resource,
- Contractors and suppliers to WACAP to plan their capital purchases and future employment policies,
- WACAP's customers to be assured as to the security of supplies, and therefore to negotiate extension of present purchase agreements,
- Private landholders, who are considering establishing plantations on their land, to proceed on the basis of a secure market,
- CALM to implement its plans and strategies for sustained yield timber production in the South-West.

5.3 NATIONAL ESTATE AREAS

5.3.1 Summary

In the ERMP/draft EIS (Sections 6.6.3 and 7.1.7) it was concluded that, given the security of tenure and purpose proposed in CALM's Regional Management Plans, the existing system of reserves fulfilled the conservation requirements of the Southern forests and would not prejudice the National Estate values of the forests as a whole.

Several submissions, particularly that of the Australian Heritage Commission (AHC), stated or inferred that the existing system of reserves was inadequate. The arguments used to support this view, if taken to their logical conclusion and accepted, would inevitably lead to the cessation of the timber industry in the South-West (Section 5.3.3 of this Supplement). Accordingly these submissions, and the arguments contained therein, have been considered and investigated in considerable detail. Investigations have included considerable field inspections of each area.

As a result of these investigations, it has been concluded that:-

- CALM has established a comprehensive, scientifically based reserve system, coupled with an active programme to locate, assess and if necessary protect, additional areas with significant conservation or heritage attributes.
- The existing reserve system is the result of combining two independent systems, each produced by a body competent to assess adequacy, and each using basic data which were better than usual for the time. The existing reserve system is based on sound scientific principles and, because it combines two systems, each of which was adequate in its own right, over caters for both conservation needs and National Estate values.
- The AHC substantially underestimates the extent to which conservation and National Estate values are retained in areas other than the parks and reserves.
- The arguments advanced in support of many areas newly nominated for National Estate listing, have been poorly researched. As a result of this and the fact that the attributes of existing listings have not been considered, the newly nominated areas unnecessarily replicate values that are already adequately represented on the Register.
- There should be no additions to the National Estate register, unless some future, well researched survey indicates significant values that are not represented in the existing reserve system.

The following sections present a more detailed analysis of these issues. Appendix C provides the results of detailed assessments of individual areas nominated for, or on the interim list of, the Register of the National Estate.

5.3.2 Submissions Relating to National Estate Matters

Several respondents commented on National Estate matters with the largest submission provided by the Australian Heritage Commission (AHC). Matters raised in this submission are listed below and discussed in subsequent sections.

The adequacy of the existing reserve system was questioned on the bases that there was insufficient biological information and that the specific conservation values of the individual reserves comprising the system were not spelt out.

Similarly, regarding the treatment of safeguards and protective measures, the AHC considered that the specific values intended to be protected should be spelt out.

The AHC's submission included a large number of recent nominations covering extensive areas which are currently multiple use forests in which timber production is permitted.

The main issues raised in the submission included:-

- Adequacy of the existing reserve system;
  The AHC considered there is insufficient "... information currently available to assess whether the present or proposed CALM reserve system does contain adequate representative areas of all vegetation types in the region and whether the system caters for the conservation of the flora, fauna and landscapes".
- Resource estimates in National Estate areas nominated for timber production.
- Effect of CALM land use status on potential impacts;
  The AHC considered that only National Parks and Nature Reserves would be unaffected by the proposal. Forest parks could potentially be affected if particular purposes were nominated at the time the park's purpose and tenure were specified. Since the AHC submission, CALM's final management plans (CALM, 1987) indicate that Forest Parks have been reclassified and the majority of the area has gone to Conservation Parks, which will not be affected. The remainder has been reclassified as State forest.

- Impact of land management procedures on National Estate values;
  The AHC maintained that the impact of forest operations on National Estate places with State forest and Forest park status could only be determined in very general terms where the proponent has specified a land use. The AHC made reference to its "Compatibility Matrix: National Estate Value By Forestry Practice" to assert that the extent of loss of National Estate values due to CALM's Forestry practices would be "highly significant".

  In order to assess impacts on National Estate values at a "more localised scale" the AHC maintained it required detailed information on the biological resources of each place, and the proposed forestry operations including "location of compartments and type and timing of logging, regeneration programme and location of buffers within them etc".

In addition to the above matters the AHC provided details of areas nominated for listing since the ERMP/draft EIS was prepared (Figure 2). A further area has since been added to this list. The August 1987 listing for the Shires of Manjimup, Denmark, Boyup Brook, Nannup, Bridgetown-Greenbushes and Plantagenet has been provided in Appendix C.

5.3.3 The AHC Listing Process

The process by which the AHC assesses places for inclusion in the register is of importance to the proposal.

The AHC stated that its objective was to identify and register viable representative samples of all major vegetation types, particularly old growth forests within the licence area (AHC submission P. 14). Once these are registered the Commission will seek a clause in the export licence that would preclude implementation of forestry practices within these places, which it considers are incompatible with National Estate values (AHC submission P. 3).

Given the AHC's definitions of forestry practices and their assessments of compatibility with National Estate values (AHC submission Appendix 4), this clause would require an immediate cessation of current harvesting practices for sawwood as well as paperwood in affected areas, and could potentially stop the fire protection programme over a much larger area.

To prohibit forestry activities automatically because they are planned to take place in National Estate Areas, goes beyond the requirement of Section 30 of the Australian Heritage Commission Act 1975. This Section requires the actioning Minister to consider whether there are no prudent and feasible alternatives, rather than to place a blanket ban on operations. Section 30 is quoted below:

> "**30.** (1) Each Minister shall give all such directions and do all such things as, consistently with any relevant laws, can be given or done by him for ensuring that the Department administered by him or any authority of the Commonwealth in respect of which he has ministerial responsibilities does not take any action that adversely affects, as part of the national estate, a place that is in the Register unless he is satisfied that there is no feasible and prudent alternative to the taking of that action and that all measures that can reasonably be taken to minimise the adverse effect will be taken and shall not himself take any action unless he is so satisfied.
>
> (2) Without prejudice to the application of sub-section (1) in relation to action to be taken by an authority of the Commonwealth, an authority of the Commonwealth shall not take any action that adversely affects, as part of the national estate, a place that is in the Register unless the authority is satisfied that there is no feasible and prudent alternative, consistent with any relevant laws, to the taking of that action and that all measures that can reasonably be taken to minimise the adverse effect will be taken.
>
> (3) Before a Minister, a Department or an authority of the Commonwealth takes any action that might affect to a significant extent, as part of the national estate, a place that is in the Register, the Minister, Department or authority, as the case may be, shall inform the Commission of the proposed action and give the Commission a reasonable opportunity to consider it.
>
> (4) For the purpose of this section, the making of a decisive recommendation (including a recommendation in relation to direct financial assistance granted, or proposed to be granted to a State) the approval of a program, the issue of a licence or the granting of a permission shall be deemed to be the taking of action and, in the case of a recommendation, if the adoption of the recommendation would adversely affect a place, the making of the recommendation shall be deemed to affect the place adversely."

In view of the detrimental economic and social consequences for the timber industry and the rural communities dependent on it, it is reasonable to expect that the process of identifying, analysing and registering places on the AHC's Register would be rigorous and thorough. Presumably, efforts would be made to avoid unnecessary duplication of representative samples which would lead to additional adverse impacts on timber production and forest management.

The AHC's submission described the processes it uses in identifying, assessing and entering places on its Register. It provided complete listings for the places considered in the WACAP document together with a number of new nominations for listing.

It is a matter of serious concern that the AHC has made decisions with respect to the National Estate values of places without making full use of the wealth of available information or holding discussions with the State authorities responsible for management of the areas and without public participation. Much of the information presented in support of the listings appears to be superficial, out of date or simply incorrect (Appendix C).

Despite the extensive periods of time for which most places have been listed on the Register, there appears to have been only a cursory examination of the National Estate value of these already registered places.

The Management Priority Areas for conservation of flora, fauna and landscape within the karri forest, are places that have been carefully examined and then selected to meet the conservation needs of the region's flora (ref. Section 5.3.5). Despite the fact that they have been listed since 1979, they are accorded only the most superficial statement of significance by the AHC (Appendix C). This statement does not attempt to address the many National Estate values of these areas. Obviously the AHC considers these areas to have National Estate significance because they are now on the Register. However, the AHC does not appear to be aware of the attributes for which these areas were originally deemed significant (see Sections 5.3.5.3, 5.3.5.4).

This information is vital if the AHC is to properly undertake the work of compiling the Register. Given the objective to identify viable representative samples, as stated in the AHC submission, it would appear prudent to at least know what is already represented on the Register before seeking out and nominating more areas.

In addition to meeting the AHC's own stated needs, this information is important to assist other government departments in discharging their responsibilities under Section 30 of the Australian Heritage Act.

Part of the assessment process detailed in Appendix 1 of the AHC submission requires that a place, prior to its inclusion in the Register, be evaluated by itemising and testing the elements and claims for significance for that place. This process is intended to provide:

- o A clear statement of the criteria governing assessments,
- o Identification of National Estate elements against each criterion, and
- o A rating of significance of each criterion.

Judging from the information provided in the AHC submission, this process has not been completed for any places within the WACAP licence area.

No rating of significance of criteria has been undertaken, although such a rating process would allow comparison of areas sharing the same National Estate values and elements. It would be very difficult for Government Ministers to discharge their Section 30 responsibilities without having sufficient information, in particular as they apply to prudent and feasible alternatives. It could also be used to guide land management agencies to accord priorities to protect values, should that prove necessary.

The AHC's approach to the listing of areas in the licence area would, if ratified, almost surely result in over-representation. This would be a consequence of the paucity of information used to compile the Register and the evident lack of rigour in applying the stated analytical techniques.

Appendix C of this document analyses the statements of significance for places on the register and interim list and nominated places. It is evident that a large degree of unnecessary replication has already occurred with the inclusion of some of the places on the interim list. Further replication will occur if areas nominated are listed.

5.3.4 Compatibility of National Estate Values and Forestry Practice

The compatibility matrix provided in the AHC submission purports to set out, "in general terms", the degree to which 'forest management practices' are compatible with National Estate values (Appendix F).

The matrix may be of assistance to the AHC should it wish to assess impacts that occur within a recently harvested coupe, but as a tool to analyse impacts on a larger scale, or over an extended period it is misleading and dangerous. The danger arising from using this sort of simplistic approach is that serious misconceptions about the imagined and real impacts of forestry operations are introduced or reinforced. In particular it suggests that these operations or practices are applied uniformly over a large area of forest. The 'forest management practices' which are alluded to, and identified by the AHC as being incompatible with heritage listing, are not applied uniformly over an area of forest, whether it is the whole southern forest region, all forest available for timber production or an individual coupe.

The AHC has drawn attention to this fundamental flaw in its own matrix through the statement "it is not possible to assess impacts of forestry operations on National Estate places at a more localised scale without more detailed information covering prescriptive, planning and resource aspects". This amounts to a tacit acknowledgement by the AHC that forestry operations are not uniformly applied over entire areas and hence that some values can be maintained.

In reading the matrix (Appendix F) the clear impression gained is that almost no harvesting operations are compatible with the nominated National Estate values. This is simply not the case and is discussed in Section 5.3.7. The AHC appears to have recently changed its views on this matter. In its submission to the Tasmanian Woodchip Export EIS (AHC 1985), the AHC indicated that, while some values such as wilderness could not be accommodated, others such as aesthetic values could be retained through visual management planning. In addition, discrete reservations within harvested areas could be used, if necessary, to cater for rare and endangered flora and education and recreation values. These approaches have long been recognised by land use managers and are incorporated into forest planning and management procedures.

The AHC would have a better basis for assessing compatibility if it took the current CALM land purpose and tenure break-up into account and then applied the current prescriptions to areas nominated for harvesting. This would provide a more informed picture of those values likely to be affected by CALM's management of the forests.

CALM provided a matrix as part of the management plan which goes some way towards this type of analysis. This matrix is reproduced as Table 2 in Section 5.3.6 of this Supplement. The CALM matrix provides a more realistic picture of the extent to which certain non-wood values or 'land uses' can be retained within the range of reserve categories planned for the State's forests.

The analysis of National Estate values for each place on the register will demonstrate that many values are maintained within harvested areas. Recognition of the validity of the multiple-use approach to forest management will require the AHC to again shift its focus from exclusively large areas containing relatively few localised values to smaller places with an appropriate improvement in the degree of resolution.

The AHC has little basis for the assessment given in its matrix to hazard reduction burning. With respect to the karri forest, Attiwill (1982) states that "present indications are that the karri forest ecosystem recovers from control fires with little obvious effect. That is not to say that burning is excellent. Rather, we have to meet today's problem with today's knowledge". Today's problem is the need to protect life and property and the aesthetic values of the karri forest using techniques which have been proven to be effective.

Fire, and fire management needs, have changed significantly with the increase in European settlement of the region, so that the option of allowing natural processes to operate is simply not responsible. The alternative to prescribed burning in the present circumstances is frequent wildfire with catastrophic consequences. More frequent wildfire would have a highly significant adverse impact on National Estate values that depend on virgin, old-growth forest in an undisturbed condition.

In summary, the AHC's assessment of impacts on National Estate values following forestry operations is questioned. Use of the matrix prepared by the AHC would significantly overstate impacts on National Estate heritage values and would inevitably lead to inappropriate conclusions about the compatibility of forest practices and National Estate values.

5.3.5 Adequacy of the Existing Reserves

5.3.5.1 Purpose and Definition

Reservation in the southern forest region of Western Australia, and the woodchip licence area in particular, aims to adequately conserve samples of its most important vegetation component, namely the wet sclerophyll forest comprising karri with all its varying associations. Other vegetation associations such as dry sclerophyll forest (jarrah, wandoo), coastal associations, non-forest, lithic complexes and wetlands also warrant reservation.

It is not proposed in this report to justify reservation. Suffice to say that reservation is also concerned with, and must take account of

- recreation needs and opportunities,
- landscapes,
- aesthetic values,
- hydrology,
- scientific values and opportunities for research,
- natural systems and processes,
- rarity and scarcity values,
- benchmark reference areas,
- geomorphology,
- soils,
- landforms,
- wildlife, and
- wildlife habitats.

Many of these factors are interdependent, and reservation of an area for one purpose is likely to meet other needs as well.

Existing reservation in this report means that system recommended by CALM in its 1987 Management Plans for the Southern Forest Regions. Operations and day-to-day management by CALM assume its de-facto existence.

5.3.5.2 Historical Background

The existing reservation system is the sum of two separate approaches made during the 1970's. One was by the then Forests Department (FD), implementing an essential objective of its newly introduced policy of multiple use. The other was by the Conservation Through Reserves Committee (CTRC), a body commissioned by the State Government through its Environmental Protection Authority (EPA) to address the subject of the conservation of natural areas statewide. Both bodies working largely independently, chose different approaches. The FD opted to select representative areas of varying size, all buffered by State Forest, throughout the entire geographic range of the karri occurrence. The CTRC preferred to concentrate reservation into one large reserve in the form of a substantial area of the Shannon River Basin (Recommendation 4, CTRC 1974). Both considered their separate approaches to be adequate, and both were qualified to address the problem.

In an attempt to resolve this and other differences, the EPA in 1976 convened a new committee to review CTRC proposals for reservation in the South-West. This committee found in favour of the FD approach. The EPA, whilst agreeing with and adopting the Special Committee's finding, chose not to abandon the Shannon River proposal, but recommended that limited harvesting be permitted to continue mainly in fire damaged areas, with a view to eventual reservation. A further review by an independent expert, Attiwill (1982), also found that the FD approach was adequate.

In 1983, the newly elected Government announced it's intention to halt harvesting in the Shannon River Basin and to add the entire basin to the existing reservation system. The Management Plan, 1987 (CALM) now proposes that the Shannon Basin becomes a National Park.

Thus the two approaches, one by the FD and the other by the CTRC, have been combined, almost in toto.

5.3.5.3 Criteria Used in Selecting Reserves

Both the FD and the CTRC had available to them the forest type mapping, (derived from aerial photography) carried out by the FD in the 1960s. This showed with good accuracy the floristic composition, the structure (height, density and tiered

arrangement) and general health of the upper storey, not only of State Forest, but of all other Crown Land and private property in the entire Lower South-West. This information had in turn been aggregated into vegetation systems, formations and associations for larger scale mapping by Smith (1972). No other tract of forest of similar extent anywhere in Australia had superior forest and vegetation type mapping coverage at that time. Arguably, this remains true today. The understorey and ground flora were less well known, and not mapped. Nevertheless, considerable local knowledge was available and was used in the reserve selection process.

In selecting its system of reserves, the FD drew upon the rationale for the selection of ecological reserves as described in Chapters 1, 2 and 3 of the Australian Academy of Science Report No. 19 (August 1975 - A Natural System of Ecological Reserves in Australia). Criteria taken into account included diversity of vegetation association, naturalness (least disturbance), representativeness, reserve size, buffering, rarer species, replication, compatibility with other land uses, soils, landform, wildlife habitat, recreation, and landscape values. An account of the selection process is given in Forest Focus No. 18 (White 1977 - Southern Recreation and Conservation Management Priority Areas - Forests Department of Western Australia). An important factor which influenced the FD to favour a series of reserves was the known variation in the dominant ground flora of the karri forest from east to west, and its soil-dependent topographical variation from the coast progressing inland. Thus it was considered essential to have reserve areas in all the major river valleys.

The CTRC on the other hand chose to seek adequacy of representation of the karri and karri-marri forest types in one extensive reserve. By focussing on one entire river basin the CTRC sought to maximise biological, hydrological, pedological and sedimentological values. The presence of the undisturbed Broke Inlet estuary within the reserve, with its classic delta at the mouth of the Shannon River, was an important consideration. Recreation, tourism, aesthetic and other values were also considered. An account of the approach that was used is given in the publication "Conservation Reserves in Western Australia - Report of the Conservation Through Reserves Committee to the Environmental Protection Authority (1974)".

Both the FD and CTRC had access to considerable geological, soil and landform information through publications and personal contact with relevant experts. The CTRC had a number of geologists, a wildlife expert and a botanist on its main committee and subcommittees.

5.3.5.4 Adequacy

The Heritage Commission criticises the existing system on the basis that too little is known about the vegetation. Criticism of any continuing human activity, on the basis that too little is known about it, is facile and often meaningless. Irrespective of the amount or quality of work done, a statement such as the above - that insufficient is known to select an adequate reserve system within it - can safely be made at any time in the past, now, or in the foreseeable future with equal validity. The adequacy of a system of reservation can more fairly and sensibly be judged by assessing whether it is based on rational principles, whether it effectively used what information was available at the time of its inception, and by whether it still remains valid in the light of increasing knowledge and understanding in the meantime. By each of these yardsticks the current system measures up well.

It is emphasised that the existing system is the result of combining two independent systems, each produced by a body competent to assess adequacy, and each using basic data which were better than usual at the time. It would be difficult to conceive of a more positive result for conservation reservation in a multiple land use situation, particularly when both approaches conserve many of the same values.

Since the time that both these approaches were implemented, a wealth of additional environmental information has become available and more is currently being developed.

In the biological field, Beard (1981) extended Smith's vegetation mapping. Heddle et al (1980), Annels (1986), Christensen et al (1980; 1985), Environmental Resources (1971) and Griffin et al (1984) have produced species lists or maps of parts of the region. Currently Wardell-Johnston (CALM) is studying the floristic and structural changes before, during and after felling operations, in relation to their effect on bird and other vertebrate populations. He is also investigating habitats in the Walpole-Nornalup National Park. Inions (CALM) is studying over 200 regrowth karri stands of varying age relating their floristic and structural composition to site factors and age. The floristic composition, including the understorey and ground cover of the southern jarrah forest, is being studied by Strelein (CALM) with the objective of relating its composition to site factors. An honours thesis from the University of Western Australia also positively relates forest type, as shown on FD airphoto type plans, to

floristic composition of the ground cover. No recent or current work suggests that the existing reservation system is inadequate or poorly chosen.

In the soils and landform field more information has also become available in the meantime. Geomorphic units have been recognised by Beard (1981). Further details on geology are available from Biggs et al (1980), Muhling et al (1985), and Wilde and Walker (1984). Landform and soils for parts of the region are available from Churchward and McArthur (1980) and Churchward et al (1986 inpress.). These complement past work done by Hosking and Burville (1938), McArthur and Clifton (1975), Northcote et al (1967) and Smith (1951). Churchward and McArthur's work has been aggregated in 10 recognisable landforms which are mapped in the WACAP ERMP/draft EIS (1987) for the woodchip licence area.

A matrix showing the representation in reserves making up the existing system is shown in Table 1.

This Supplement concludes that, contrary to claims by the AHC, the existing reservation system is more than adequate to meet both conservation and heritage needs.

5.3.6 Effect of Land Uses on National Estate Values

CALM has proposed a system of land use classification that recognises certain priority uses while allowing other compatible uses. The relationship between land use objectives, status and compatibility is shown by Table 2 (Source: CALM management plans, supporting papers).

From this it can be seen that timber harvesting has the potential to affect only places within the State Forest land-use category. Places in National Parks, Nature Reserves or Conservation Parks would not be impacted.

TABLE 1
VALUES REPRESENTED IN EXISTING AND PROPOSED RESERVES

			SHANNON RIVER BASIN	PERUP	WATTLE - SOHO	D'ENTRECASTEAUX	WALPOLE - NORNALUP	LAKE MUIR	STRICKLAND	DICKSON	BROCKMAN	WARREN HAWKE - TREEN	BEEDELUP	MUIRILLUP	BOORARA	BIG BROOK	GIANTS	DALGARUP	BORANUP	PORONGORUPS	ONE TREE BRIDGE	CHESTER
VEGETATION :																						
FORMATIONS AND ASSOCIATIONS																						
Tall Open Forest (wet sclerophyll)		E.diversicolor	X		X	X	X		X		X	X	X	X	X	X	X	X	X	X		
		E.diversicolor - E.calophylla	X		X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X
		E.calophylla . E.diversicolor . E.marginata	X		X	X	X		X		X	X	X	X	X	X	X		X	X	X	X
		E.marginata	X		X						X							X			X	
		E.calophylla	X				X		X		X		X		X	X		X			X	
		E.jacksonii					X										X					
		E.guilfoylei			X		X										X					
		E.jacksonii - E.diversicolor					X										X					
		E.guilfoylei . E.diversicolor - E.calophylla . E.marginata			X		X										X					
		E.diversicolor . E.patens	X						X												X	
Open Forest (dry sclerophyll)		E.marginata	X	X	X	X	X	X	X	X			X				X	X	X		X	X
		E.marginata - E.calophylla	X	X	X	X	X	X	X	X			X				X	X	X		X	X
		E.calophylla	X	X	X	X	X						X		X				X			
		E.patens - E.calophylla - E.marginata	X	X	X	X	X			X	X							X			X	X
		E.megacarpa	X	X	X	X	X												X			X
		E.rudis	X	X	X	X		X														
Woodland		E.redunca v.elata		X																		
		E.marginata		X		X		X														
		E.marginata - E.redunca v.elata		X																		
		E.cornuta				X		X														
		Agonis flexuosa	X			X	X				X	X				X			X		X	
		Melaleuca preissiana	X	X	X	X	X	X														X
		Banksia spp.	X	X	X	X	X	X	X		X					X					X	X
		E.redunca v.elata - E.patens		X																		
Scrub Heath		Pultenaea	X			X	X															
Schrubland		Myrtaceous scrub	X	X		X		X													X	X
		Kingia australis	X			X	X															
Herbland Sedgeland		Acid peaty flats	X		X	X	X															X
Lithic Complexes		Granite	X		X	X	X							X			X			X		
		Coastal limestone				X	X												X			
Aquatic Complexes (freshwater)			X	X	X	X	X	X	X		X	X	X		X	X					X	X
SPECIES OF SPECIAL VALUES		E.ficifolia			X		X															
		E.brevistylis			X		X															
		Cephalotus follicularis	X		X																	
		Agonis juniperina	X		X	X	X					X			X	X						
		Boronia megastigma	X		X																	
		Boronia heterophylla			X																	
		Allo Casuarina fraserana	X		X	X	X															
RIVER VALLEYS	Donnelly / Warren	Western ecosystem (Bossiaea laidlawiana scrub layer)			X				X	X		X									X	
					X						X	X			X	X						
	Gardner / Shannon / Deep / Frankland	Eastern ecosystem (Acacia pentadenia scrub layer)	X		X									X	X							
					X		X										X					
	Other																	X	X	X		X
LAND FORMS & SOIL TYPES (WACAP ERMP Figure 13)		1.	X	X				X	X	X												
		2.		X														X				
		3.	Not represented - mostly private property																			
		4.						X														
		5.	Not represented - mostly private property																			
		6.							X		X	X	X		X						X	
		7.	X		X		X							X	X							
		8.			X		X										X					
		9.	X																			
		10.	X			X	X															
HIGH SEDIMENTOLOGICAL VALUE (delta formation etc)			X																			
POPULATIONS OF RARE MAMMALS				X																		
HIGHEST SECURITY OF TENURE			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NO HISTORY OF COMMERCIAL WOOD HARVEST					X	X	X	X	X	X			X	X	X				X			
NO COMMERCIAL WOOD HARVEST PLANNED			X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		
SIZE OF RESERVE	>10,000 ha.		X	X	X	X																
	1,000 - 10,000 ha.						X	X	X			X	X		X	X		X	X			X
	< 1,000 ha.									X	X			X	X		X			X		
BUFFERING PRESENT (usually State Forest) for at least half of boundary			X		X	X		X	X	X	X	X	X	X	X		X	X			X	X
HIGH SCENIC VALUE																						
Old growth present			X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X
Permanent stream flow			X		X	X	X	X		X	X	X		X	X						X	
High diversity of land form and/or vegetation			X	X	X	X	X										X		X			X
CALM RECREATION SITES			X		X	X	X			X	X	X		X	X		X	X	X	X		

(SOURCE: White, pers. comm.)

TABLE 2

COMPATIBILITY BETWEEN LAND USES AND RESERVE CATEGORIES

LAND USE	RESERVE CATEGORY				
	Nature Reserve	National Park	Conservation Park	Marine Park	State Forest
Nature Conservation	/	/	/	/	o
Recreation	o	o	o	o	o
Catchment Protection	/	/	/	N/A	/
Timber or Fishery Production	x	x	x	/	/
Water Production	x	o	o	N/A	/
Public Utility	x	o	o	o	o
Mining	o	o	o	o	o

Key
/ Compatible with objectives for reservation
o Conditional to specific time, area or use constraints
x Not compatible with objectives for reservation
N/A Not applicable.

The matrix also shows that all parts of State forests are managed on the multiple use basis and thus always provide some non-wood values as well as timber production values. Thus an area of State forest, in addition to providing timber, also provides tourism, honey, recreation, conservation and catchment protection values.

The AHC in its discussion of this aspect, misrepresented the ERMP/draft EIS by selectively quoting from it as follows:

> "The proponent acknowledges that forest operations will entail a loss of national estate values which 'depend on large undisturbed areas of forest'" (P. 30).

In fact the ERMP/draft EIS (P. 194) stated "The vast majority of National Estate areas will remain unaffected by harvesting operations. Places that are harvested would lose National Estate values that depend on large undisturbed areas of forest. However, values related to specific sites .... are readily accommodated by reservation from harvesting".

The proponent maintains that if National Estate values depend on large undisturbed areas of forest, then they will be adequately conserved in the existing reserve system.

5.3.7 Identification and Protection of Values Other Than Wood Production

CALM has developed a series of strategies to protect the range of values of the lands under its control. These strategies are discussed below.

5.3.7.1 The Reserve System

CALM's proposed reserve system has been selected following the long process of identifying land appropriate for reservation described in Section 5.3.5. These reserves form the basis of CALM's management strategy for purposes other than timber production. This process is continuing and the reservation system is evolving to meet new requirements that may be identified. The land use and tenure changes proposed by CALM in its Regional Management Plans are evidence of this.

5.3.7.2 Short Term Measures to Retain Desirable Values in Harvested Areas

Conservation and other environmental values within areas nominated for wood production are protected through the use of a comprehensive series of planning and implementation steps coupled with a strong commitment to research, monitoring and feedback (see Sections 9.2, 9.3, 9.4 and 9.5 of the ERMP/draft EIS).

The system is aimed at developing a strong prescriptive approach to ensure protection of known or anticipated values on a routine basis. Examples of this type of protection include road, river and stream zones.

Other environmentally sensitive places in the coupe are identified during the early planning process. Wetlands, visually sensitive areas, rock outcrops, outstanding trees, pure marri stands and areas of other distinctive vegetation are included in this category. These areas are protected by retaining buffers of non-harvested forest. In addition, steep slopes are identified and harvesting is either excluded or modified. CALM officers undertake a series of inspections of the forest areas during the planning stage to assess, among other things, coupe boundaries, karri seed crops, identification of environmentally sensitive sites, burning boundaries, etc.

In addition to protection of values through this type of field-based reservation, CALM undertakes reconnaissance surveys through various forest types to search for rare or endangered plants and animals. Results of this programme are used to modify harvesting plans should that prove necessary.

5.3.7.3 Long Term Measures to Protect Multiple Values in Harvested Areas

CALM has also established a comprehensive research programme aimed at providing the baseline information needed to properly assess impacts on the forest resulting from management practices. Included in this programme are:

- Hydrology studies - paired catchments, salinity, water quality (in conjunction with the Water Authority).
- Flora - floristics, recolonisation, genetics.
- Fauna - distribution, recolonisation, habitat needs.
- Impact of burning - flora, fauna, burning guides.
- Landscape - classification of landscape types, visual management.

These programmes were discussed in greater detail in Section 9.0 of the ERMP/draft EIS and Part 4 of the Southern Forest Region Management Plan (CALM, 1987). Good baseline information coupled with regular monitoring will allow CALM to detect changes, including gradual long-term changes, should they occur. Research into the ecology of the region's forests will provide some understanding of the factors leading to changes and the remedial management required. It was through this kind of monitoring and feedback that the then Forests Department discovered that selection harvesting was detrimental to the karri forest with the result that clearfelling was re-established as the preferred harvesting approach.

5.3.8 Analysis of Current National Estate Listings

The National Estate listings within the licence area and additional places outside the area likely to be affected by the proposal are assessed in detail in Appendix C. The assessment examines the statement of significance for each nomination, the information provided to support the statement, and the extent to which each value is represented elsewhere.

An example of a listing sheet and a preliminary assessment have been provided in Appendix C as an indication of the extent of information used by the AHC in assessing places for registration.

5.3.9 Prudent and Feasible Alternatives

CALM has established a comprehensive, scientifically-based reserve system, coupled with an active programme to locate, assess and if necessary protect, additional areas with significant conservation values or other attributes. The wealth of evidence currently available clearly indicates that this system protects a representative sample of the region's biota (CTRC, 1974; Attiwill, 1982). These reserves also encompass many of the best stands of virgin, old-growth forests and include areas of prime aesthetic amenity.

Outside of the reserve system, measures already in place identify and protect conservation values within areas designated for harvesting.

On this basis there should be no additions to the National Estate register unless some future, well researched survey identifies significant values that are not represented in the existing reserve system.

The alternative to this approach is to ignore the existing reserve system and to set about registering large new areas, often containing existing reserves plus 'adjacent areas'. This approach, if successful, would effectively eliminate much, if not all of the Timber Industry in the South-West, as much of the remaining old growth forest outside the reserve system has been included in the nominations.

Adoption of the AHC's recommendation, that a clause should be inserted into the export licence to prohibit exports of woodchips obtained from National Estate places where values would be lost, would effectively eliminate a major part of the timber industry in the South-West, as well as seriously hinder forest management practices.

The paperwood and sawlog resource on lands available for harvesting contained in the total of existing nominations, interim listed places and registered places exceeds

5.7 million m^3 paperwood
2.6 million m^3 karri sawlogs
1.9 million m^3 jarrah sawlogs

or 37% of the predicted available resource for paperwood and 46% of karri sawlogs and 33% of jarrah sawlogs in the licence area. These raw materials are the basis of industrial production totalling approximately $2.5 billion. In addition to this the Government would lose royalties, taxes and payments to utilities, also amounting to millions of dollars.

A loss of resources of this order of magnitude cannot be replaced from alternative sources as none exists.

Based on the correlations between resources and employment and economic activity, established in the WACAP ERMP/draft EIS the following impacts can be anticipated:

- Serious reduction in employment.
- Greatly reduced regional economic activity.

Acceptance of the AHC approach cannot be viewed as a prudent and feasible alternative to the multiple land use approach adopted by CALM.

5.4 HARVESTING ON PRIVATE LAND

Many of the submissions expressed opposition to WACAP's plans for continuing to utilise paperlogs made available from clearing operations on private land. Most commonly cited reasons were the ecological value of areas of remnant forest on private land, the possible effects of clearing in terms of salinity or erosion problems and a perceived lack of environmental management applying to harvesting operations on private land. Whether or not the private property resource is sufficient to supply the quantities estimated in the ERMP/draft EIS was also questioned in several submissions.

5.4.1 WACAP's Attitude to Removal of Paperwood From Private Land

In the ERMP/draft EIS, WACAP based its estimates of future utilization of paperwood from private land, mainly on the current level of availability from this source. It is important to recognise that paperwood from private land represent only nine percent of current production and that this is expected to decline substantially and eventually cease within the licence period.

WACAP has gone to considerable lengths to ensure that it does not create a demand for paperwood which would encourage landholders to clear forests from their land. As part of this policy, WACAP does not solicit logs from private sources and pays only modest prices for the paperwood which it purchases.

The company is in an invidious position. On the one hand, if it sets its stumpage rates too high, it will be encouraging the clearing of land. On the other hand, if it pays nothing, then the farmer will in all probability burn the timber, having no incentive to do otherwise. WACAP's approach has therefore been to pay a relatively low stumpage rate. However, if the EPA advises otherwise, WACAP will change this approach.

There have been a variety of detailed suggestions relating to what WACAP should and should not do in relation to the imposition of controls over private land clearing. Common to all of these submissions is a basic misunderstanding of the situation. Under the current situation even the Government has only limited control over clearing of private property. There are two pieces of legislation which enable some

control to be applied. However, in the case of both the Soil Conservation Act and the Country Water Supply Act, once a permit-to-clear is granted, no further control can be applied.

If the Government has little control, WACAP has even less. Commonly the company is not approached to purchase the timber until the trees have already been felled. WACAP is certainly not in the position at this or any other stage to dictate to private landholders or lessees that they must retain stream buffers or particular areas for conservation purposes. If such controls are to be imposed, then they are clearly the responsibility of Government.

5.4.2 Private Property Resources

The EPA's report on the McLean Forest Project (EPA, 1987) demonstrated that within the area addressed by that project, the private forest resource was much lower than had been estimated by McLean Consolidated.

The situation in respect of WACAP's proposals is quite different. Firstly, WACAP's operations are nowhere near as dependent on private resources as would have been the case for the other project. WACAP estimates that it will produce approximately 76,000 tonnes per year of paperwood from private sources for the next four years, declining substantially thereafter. McLean, on the other hand, advised a requirement for 211,000 tonnes per year of paperwood from private property. The other main difference is the fact that WACAP can receive paperwood from a much greater area, as would be expected from its inland location as compared to McLean's coastal location. WACAP's area of supply is calculated to be almost 3.5 million hectares of private land, compared to the 1.8 million hectare area from within which most of the McLean Forest Project supplies were to have been obtained. Specifically, WACAP offered a significant proportion of its privately sourced timber from the south-west corner of the State between Busselton and Augusta (see Appendix D).

The areas of forests on private land within WACAP's licence area, as measured by the Department of Agriculture (EPA, 1987) are listed on Table 3. These areas, which amount to 43,000 ha, exclude forests in areas of salinity hazard such as the Warren River catchment which are subject to clearing restrictions. Further exclusions

amounting to nearly 18,000ha have been made on Table 3 to account for unsuitable land and forest types that are estimated to have been cleared since the date to which the inventory applies.

This nett figure of 25,163ha is an extremely conservative estimate of the potentially available private property resource within this portion of the State.

The WACAP ERMP/draft EIS in Table 19 gives an indication of the expected intake of paperwood from private property clearing over the proposed licence period. The areas of forest clearing which would produce these supplies can be estimated using an average yield of 60 tonnes per hectare, which is the average yield of paperwood from private property areas based on WACAP's experience to date. However, it should always be borne in mind that the above is the estimate of clearing which farmers will undertake, with or without paperwood sales.

From Table 4 it can be observed that the area of private property resource required to meet WACAP's expectations is 9,484ha. Assuming WACAP's private property operations were restricted to the McLean ERMP study area reviewed by the EPA, then it would amount to only 38 percent of the conservatively estimated area of potentially available private property resource within that study area. However, as previously noted, WACAP's area of supply is almost double that which was considered in the McLean's ERMP. It is therefore concluded that WACAP's expectations are reasonable and likely to be achieved even in the absence of inducements.

Whilst the EPA report on the McLeans ERMP did not detail specific rates of clearing in the area under review, it did state that "the average annual clearing rate estimated by ..... (McLean's sic) (2.3%) was substantially less than had occurred in the eastern portion but was a more reasonable approximation in the more heavily forested western portion." Further, in Appendix B of the EPA report, the W.A. Department of Agriculture stated that "in some areas less than a quarter of the vegetation present in 1974 now (1985/6) remains." This statement can be converted to an approximate annual rate of clearing of around 6.8 percent per year. If these two extremes are averaged, an annual rate of clearing figure of 4.6 percent is derived, which would mean clearing of approximately 1,157 ha/yr of the 25,163ha potential resource within the McLean's project area. This rate is close to the area of clearing required to produce the estimated supplies between now and 1990, and much more than that needed to supply the estimated tonnage beyond that date.

TABLE 3

PRIVATE PROPERTY NATIVE FOREST RESOURCE

LAND UNIT	POTENTIALLY AVAILABLE PRIVATE PROPERTY RESOURCE (ha)	COMMENT
Albany	5,512	From Table 3, EPA report on McLeans Forest Project
Mt Barker	3,847	
Rocky Gully	9,252	
Torbay	N/A	
Kalgan	590	
King	32	
Porongorup	1,084	
Denmark	942	
Quingup-Kent	445	
Frankland	3,986	
Manjimup-Pemberton	11,814	
Northcliffe	5,579	
	43,083	
	- 590	McLeans ERMP estimated 5% of Manjimup-Pemberton resource is unsuitable species.
	- 9,159	EPA report estimate of Jarrah component (regarded as high)
	- 8,170	Areas covered by applications to clear since early 1986(though not necessarily cleared)
	25,163	

TABLE 4

EXPECTED AREA OF PRIVATE PROPERTY RESOURCE TO BE UTILISED OVER PROPOSED LICENCE PERIOD

Period	1987 - 1990	1991 - 1995	1996 - 2000	2001 - 2005	Total All Periods
Tonnes of Paperwood/yr	69,000	30,000	30,000	0	576,000
Private Property Clearing (ha/yr)	1,136	494	494	0	
Total for Period (ha)	4,544	2,470	2,470	0	9,484

5.4.3 Establishment of Plantations on Already Cleared Land

Despite the incentives offered by WACAP to reforest pasture (Section 4.3.4 ERMP/draft EIS), the majority of hardwood plantation has been established on recently cleared sites. Of the 580ha planted in 1987, around 70 per cent (406ha) was established on recently cleared land and 30 percent (174ha) on pasture land. At present, a considerable proportion of the plantation is being established on WACAP's own forested and partly forested land, an area amounting to 350ha (60 percent) of the 1987 plantation.

WACAP envisages that in the next five years the ratio of pastured to newly cleared plantation sites will be around 1:1.5. After this period, as the benefits of plantation establishment on pastured sites becomes more widely known, the trend is expected to reverse with ex-pasture sites becoming the exclusive plantation base by the year 2001.

In considering the private property native forest resource, it is important to consider the health and vigour of individual stands. In many instances, the privately owned native forests have been treated by individual landowners merely as an emergency cash reserve fund, by infrequent and repeated harvesting for sawlogs. In such circumstances, little regard is given to the future viability of the stand or its fauna/flora values. That private forests are poor in relation to State forests is supported by a comparison of the average paperwood/sawlog yield:- the private property yield is 8:1 compared to approximately 1:1, which is the average on State forest. In addition, the much higher payments received by the farmers for sawlogs compared to the low rates for paperwood ensures the sale of sawlogs is maximised. This emphasises the point that when considering private native forest for conservation, its quality must be considered as well as its overall area.

The removal of cleared land from agricultural production is a point used to oppose the establishment of plantations. The Manjimup Shire Council in its submission makes the point that only 15 percent of the Shire is freehold land, so that the loss of agricultural land to private plantation is of concern. Clearly the degree to which both land uses are accommodated will depend on relative economics, unless the Government takes specific measures to favour a particular land use.

The future in relation to private property plantations is encouraging, as traditionally conservative farmers observe the progress of WACAP's early plantations and become aware of WACAP's treefarmer schemes through neighbourhood participation. Prior to the 1987 planting season, WACAP had 52 landholders and a total area of 340ha entered into the various tree growing incentive schemes. In 1987, a further 22 landholders and 230ha were added to the tally and this figure looks like being at least maintained into the future (WACAP, per. comm.). Renewal of the woodchip licences is a necessary prerequisite to future farmer participation in the scheme.

5.4.4 Choice of Species for Hardwood Plantations

Several respondents to the ERMP/draft EIS expressed concern about WACAP's practice of using a non-indigenous species Tasmanian blue gum (Eucalyptus globulus) as its main plantation species in preference to indigenous species such as karri (E. diversicolor).

The primary reason for this practice is economic. Plantations on private land are an agricultural unit and in order to be economically viable they should produce high quantities of cellulose over a relatively short duration. If tree growing is not economically attractive to farmers then cleared land will not be replanted with trees and the conservation and other advantages of trees will not be gained.

Research by WACAP and others has shown that, over a range of sites, karri plantation grows at a rate of 6 to 12 m^3/ha/yr (CALM pers. comm.) over 15 years, whereas blue gum can achieve growth rates of 15 to 30 m^3/ha/yr on the same sites (WACAP ERMP/draft EIS, Appendix F).

Therefore, to achieve a targetted 219,000 tonne/yr of plantation paperwood by 2002, it would be necessary to plant a minimum 1,200ha of karri plantation per year in comparison to 600ha/yr of blue gum. This would not be an economic proposition for either WACAP or its treefarmers, who would have to alienate twice the area of productive agricultural land.

Another reason for the selection of blue gum as the major plantation species is that it is able to tolerate a wider range of soil types and rainfall conditions than karri (CALM pers. comm.).

In relation to comparative water consumption and transpiration rates, research by CALM in the Wellington Catchment has shown that blue gum takes up similar quantities of water to karri regrowth. Blue gum is however a more salt-sensitive species (CALM pers. comm.).

5.5 WATER RESOURCES

Since the ERMP/draft EIS was published, the Water Authority of Western Australia (1987) has released a report on the impact of harvesting on the water resources of the southern forests. The report presents the results of four researched projects carried out over the period 1975 to 1986, under the direction of the Research Steering Committee for Land Use and Water Supply (previously the Kelsall Committee). The results of this research were summarised in the ERMP/draft EIS even though they had not all been published at the time. However, it is appropriate now that the Committee's report is available, to highlight its conclusions and recommendations which are as follows:

"CONCLUSIONS

1: In the high and intermediate rainfall zones, logging operations have caused small and temporary increases in stream salinity and/or sediment concentration in many local streams but this presents no significant threat to regional water resources.

2: Further refinement of logging practice is possible to moderate local transient effects on stream salinity and sediment concentration.

3: With appropriate management, there is no significant stream salinity risk from heavy selection cutting in the low rainfall north-east sector of the Woodchip Licence Area.

RECOMMENDATIONS

1: Woodchipping operations can proceed in the north-east sector of the Licence Area subject to the implementation of recommendations 2 and 3.

2: Practical techniques for the identification of local salt-sensitive areas in the intermediate and low rainfall zones should be developed and implemented.

3: Methods to control deep groundwater contribution to streamflow should be refined and incorporated into practice in the salt-sensitive areas of the intermediate and low rainfall zones. Methods include the greater use of stream buffers and phased logging operations.

4: Methods to further reduce any temporary increase of stream sediment concentration should be developed and incorporated into operations. Methods include improved road location and design, more extensive use of stream buffers, phased logging operations and limiting winter operations in the most sediment sensitive areas.

5: The current level of monitoring of research catchments should continue with a further major review in 1990. Monitoring and evaluation should be carefully conducted to guide operational development, especially with respect to phased logging and permanent groundwater management.

6: Management prescriptions to protect water quality and quantity should be regularly modified in response to improved understanding gained through research and operational experience."

CALM accepts these recommendations and will implement them (CALM, pers. comm.).

Some submissions have nevertheless cited increased stream salinity or sediment concentration as reasons for opposing the project. Some have claimed that aquatic organisms will be adversely affected by the changes in water quality. However, no evidence has been submitted in support of this claim. In view of marked seasonal changes in physical and chemical conditions to which the aquatic organisms are adapted, it appears unlikely that the small, localised and temporary changes in water quality that will result from harvesting practices would have a measurable effect on the aquatic ecosystem.

5.6 NUTRIENT DEPLETION OF FOREST SOILS

Several submissions suggested that repeated rotations of harvesting and regrowth would deplete the nutrients, with a consequent negative impact on the sustained yield. One submission presented a lengthy and highly technical argument in support of this position.

The major concern was with the nitrogen (N) balance. The detailed submission contended that the total nutrient loss figure presented in Table 34 of the ERMP/draft EIS (i.e. 2,055kg/ha N over a 100 year rotation) omits substantial slash burn losses. This is not correct. The regular control burn was estimated to volatilise 186kg N (i.e. 75% of 224kg N [litter] + 30% of 60kg N [shrub] on nine occasions) to give a total control burn loss of 1,674kg N. The slash burn was estimated to volatilise 274kg N (i.e. 75% of 224kg N [litter] + 60kg N [shrub] + 81kg N [tops]) to give a total of 1,948kg/ha/rotation. The confusion on this point appears to result from the submission's failure to notice the "pools" row in Table 34. Instead of using the data presented in this row indicating a quite modest biomass + litter pool of 473kg N (which when reduced by harvest loss of 108kg gives total potentially volatilisable nutrient for the slash burn of 365kg N) the submission drew on 'applicable' data from a Tasmanian wet sclerophyll forest having a litter pool alone containing 1,700kg N. This led to the incorrect conclusion that the slash burn loss estimate was deficient by some 2,000kg N.

The conclusions on nitrogen and phosphorus balance in the ERMP/draft EIS remain intact i.e. there is no cause for serious concern. The system is very well buffered by available pools and will be resilient to the proposed operations. The conclusion that there is cause for serious concern cannot be justified. Further research is justified but the evidence to date suggests that it does not require a high priority.

It should be recognised that any adverse effect could only develop after centuries have elapsed. Clearly management practices could and would be modified if monitoring indicated that significant nutrient depletion was occurring.

5.7 RARE AND ENDANGERED FAUNA AND FLORA

Eight species of mammals and birds which are classified as rare and endangered were identified in the ERMP/draft EIS as probably present in areas subject to harvesting. The terminology 'rare and endangered' applies to fauna referred to in the gazetted notice for rare species under the Wildlife Conservation Act as 'Rare or otherwise in need of special attention'. Details of the status, preferred habitats, distribution and occurrence in conservation reserves for each of these species is given in Appendix E. Also given is an assessment of the likelihood of impact of forestry activities on each species.

None of the species has a distribution which is confined to the area of proposed harvesting operations. For this reason, because the species prefer habitats other than those subject to harvesting, and because all occur in National Parks or fauna reserves, none of the species is considered to be threatened by timber production activities (Appendix E).

Appendix B of the ERMP/draft EIS listed 30 species of rare or restricted flora in the woodchip area. Since then, 26 species of flora have been taken off the Wildlife Conservation Act Schedule of rare flora and hence, three of the species listed as rare in Appendix B are no longer listed as rare (Grevillea drummondii, Grevillea ripicola and Pultanaea skinneri). None of the remaining rare and restricted species in Appendix B of the ERMP/draft EIS are directly affected by the proposed industry.

5.8 FAUNA DEPENDENT ON HOLLOWS IN TREES

Some species of birds, particularly parrots and cockatoos, require tree hollows for nesting. Similarly, some mammals such as bats and the brushtail possum, utilise hollows for shelter or for nesting. As hollows do not usually develop in trees until after they mature, then any harvesting system that removes the older trees will reduce the number of hollows. The consequences are, perhaps, worse in the case of a clearfelling system where areas of regrowth forest, without hollows, will be produced.

In the case of some cockatoo species such as the White-tailed Black Cockatoo, which have been the subject of considerable research by CSIRO scientists (Saunders, pers. comm) the availability of hollows may, in some areas such as the northern Wandoo woodlands, provide a limiting constraint on the population. In the south-west forests, however, it appears that there are sufficient hollows to meet the demand on a regional scale (Wardell-Johnson, pers. comm.).

Old trees with hollows suitable for nesting will continue to be present in the National Parks, Nature Reserves, Conservation Parks and in the road, river and stream zones. Areas of pure marri, which will also be exempted from harvesting, will also contain hollows.

CALM biologists have undertaken research aimed at establishing artificial nesting boxes in regrowing forests. Results to date have been disappointing (Wardell-Johnson, pers. comm.) but research will continue.

5.9 ROAD, RIVER AND STREAM RESERVES

It was pointed out in the ERMP/draft EIS that road, river and stream zones play a very important role in maintaining environmental values in the south-west forests. Their value includes the following :-

1. They help to limit the rise in groundwater levels which, in the intermediate rainfall zone, can lead to increases in stream salinity.
2. They help to minimise entry of sediment into streams and rivers.
3. They provide a stock of plants and animals from which colonisation of adjacent harvested areas can occur.
4. They act as corridors for the movement of fauna from one forest area to another.
5. They help maintain the genetic resources of the forest.
6. Because they contain old-growth forest, they include standing and fallen trees with hollows, which are required by certain species for shelter and for breeding.
7. They help preserve the visual amenity of the forest.

CALM's Timber Strategy includes provision for selective harvesting of road and stream zones. Many of the public submissions opposed this strategy.

CALM's intention is that any harvesting in these areas would be carried out on a limited scale with minimal disturbance of the soil. There would be no clearfelling and the level of harvesting would be flexible to meet the requirements of each location. Areas which are harvested will be regrown.

CALM has also given notice that it intends to undertake an intensive review of the road, river and stream zone system. This follows from research which suggests that improved results in terms of environmental protection could be achieved by a redistribution within zones, without changing their total area (see ERMP/draft EIS, Section 9.3.2). In particular, it is believed that narrower road zones could be retained with additional areas to be retained along streams.

This review and any proposed changes resulting from it will be presented to the EPA

for consideration before implementation. Any changes to the management or distribution of road, river and stream reserves, which are approved and implemented by CALM, will become normal practice to which WACAP will conform.

5.10 THE VALUE OF MARRI

Several submissions extolled the virtues of marri (Eucalyptus calophylla). The following desirable attributes of this species were noted:-

- o Its value to wildlife,
- o Its value to beekeepers,
- o Its value as sawn timber.

One submission advocated that silvicultural efforts should be directed towards producing more sawn timber from marri and using the species for hardwood plantations.

While some marri logs can be and are used to produce sawn timber, it is in lower demand for this purpose than karri and jarrah. Because the timber value of this species is so easily damaged by wildfire and insect pests, it makes more sense that production efforts be directed at those species which are more in demand and which are less susceptible to damage.

The value of marri to wildlife and to the beekeeping industry is well known. However the status of the species needs to be kept in perspective. Not only is it the most prevalent tree species in the South-West and therefore one of the most common in Australia, its relative prevalence has increased over the decades prior to 1965, due to the old silvicultural practice of selection harvesting.

In the jarrah-marri forest, the balance between jarrah and marri has been changed even further. Not only did past selection harvesting practices remove jarrah and leave most of the marri, but jarrah dieback disease has had the same effect. With its ability to respond to decreased competition by growth from coppicing, lignotubers or seed, marri has benefitted substantially from these dynamic changes in the forest. The current silvicultural practices, which include some marri removal as paperwood, will therefore tend to reverse that trend of increased dominance of marri over other species.

5.11 PESTS AND DISEASES

5.11.1 Armillaria

Several submissions referred to the Armillaria fungus and the lack of discussion of this fungus in the ERMP/draft EIS.

The Armillaria fungus (Armillaria luteobubalina) "has a widespread but discontinuous distribution" in the South-West (Pearce et al 1986). The disease is considered to be endemic in the south-west forests. Unlike jarrah dieback disease, the Armillaria fungus does not infect broad areas of vegetation. It infects and ultimately kills isolated trees in the forest.

CALM undertakes ongoing research into this fungus, focussing on an understanding of its ecology and on the interaction between forestry operations and subsequent susceptibility. Most research is concentrated on wandoo woodlands as these are more susceptible than jarrah, marri and karri forests.

In conjunction with dieback mapping, any areas infected by Armillaria are identified and mapped, then demarcated in the field with a 10m buffer zone from the visible infection. These areas are avoided by harvesting operations.

There is no evidence that current management practices are exacerbating the impact of this fungus.

5.11.2 Jarrah Dieback Disease.

Several submissions called for more information on this disease, its impact on the forest and the success of CALM's forest hygiene procedures.

Jarrah dieback disease is caused by Phytophthora cinnamomi, a fungus which attacks the roots of plants and kills susceptible species. The disease spreads readily under conditions where soils are both moist and warm. As a result, infection is widespread in most of the low-lying parts of the forest.

Various plant species of the forest are susceptible to varying degrees. The most susceptible species include banksias and other members of the Proteacae family, blackboys and zamia palms. Jarrah is moderately susceptible and other eucalypts such as marri and karri are resistant to the disease and continue to grow in diseased areas.

Infection of previously uninfected areas can occur due to introduction of soil containing fungus spores. An elaborate hygiene prescription has therefore been developed by CALM to minimise the chances of spreading the disease as a result of forestry activities. The procedures include quarantining, restrictions on activities in the forest during periods when infections are readily spread, and washdown of vehicles and equipment before they move from diseased sites to undiseased areas. The timber industry has been observing these hygiene procedures now for more than a decade, so that they are now carried out as a matter of routine.

Within those parts of the forest classified as Disease Risk Areas, harvesting is allowed in areas which have:

- had a sufficient period of quarantine to allow all dieback infections to express itself in the form of understorey death;
- been photographed and subsequently mapped for dieback presence;
- had harvesting plans drawn up and approved which conform to the CALM dieback policy 7 way test (see Section 4.2.7.2, ERMP/draft EIS).

Outside the Disease Risk Areas, similar procedures apply.

It was never CALM's intention that Disease Risk Areas (quarantine) be isolated forever (CALM, pers. comm.). The quarantine period was to allow accurate mapping to take place so that operations could be undertaken with the absolute minimum risk of spreading disease.

The effects of the disease have been far more pronounced in the jarrah forest than in the karri forest, due primarily to the higher incidence of susceptible species among the jarrah forest flora. Also, because of climatic conditions the effects of the disease are more pronounced in the northern jarrah forest than in the southern jarrah forest.

CALM continues a major research programme into the disease and possible control measures.

5.11.3 Insect Pests

A few submissions suggested that insect damage may become serious in regrowing forest. This idea appears to be based on the view that regrowth results in a monoculture. As pointed out in Section 4.3 this is quite erroneous. No evidence has been presented or is known that indicates that silvicultural practices used by CALM will lead to increased damage by insects.

5.11.4 Spread of Exotic Species

Some submissions speculated that exotic eucalypts grown in plantations on private property could spread into the surrounding bush with various adverse consequences.

The then Forests Department established a large number of plots of various exotic species within the South-west forest. Monitoring of these plots over a long period has shown very little evidence of exotic eucalypts spreading outside the plots.

Firebreaks will be established and maintained around areas of plantation, and maintenance of these should ensure removal of exotic seedlings, as seed dispersal is generally restricted to a distance equal to the height of the tree.

Finally, CALM officers would notice any invasion of exotic species that did occur and would act to control such incursions. The period from one generation to the next is sufficient to preclude the possibility that any unlikely invasion could spread more rapidly than the ability to control it.

5.12 BEEKEEPING

Several submissions expressed concern that timber production and silvicultural practices have an adverse effect on the beekeeping industry. Specific references were to loss of nectar and pollen production due to intensive timber harvesting or clearfelling, replacement of productive mature forest with regrowth forest and prescribed burning regimes.

There are an estimated 2,500 apiary sites in Western Australia, with approximately 60% being located in State forest (Dept. of Agriculture, pers. comm.). The distribution of

sites in State forest is usually one site every three square kilometres. Apiary sites in State forest are under the jurisdiction of CALM and site availability and production are affected by:

- o Jarrah dieback control through Disease Risk Areas
- o Prescribed burning
- o Harvesting of mature trees
- o Density and type of flora present

In 1986, there were 153 beekeepers with 40 or more hives registered in Western Australia. Since 1981, the number of beekeepers has fluctuated, though no trend is apparent (Table 5). A beekeeper may utilise a number of sites; however 8 sites are usually required per 100 hives, as burning or harvesting may limit individual site suitability (Dept. of Agriculture, pers. comm.).

Honey and beeswax production is very variable. The Department of Agriculture estimates the current annual value to the producer to range between $3,000 and $6,000 per site. Experimental hives have achieved an annual average value of $4,000 per site, with a 35% variation at the same site between seasons (Dept. of Agriculture, pers. comm.). Table 5 details honey and beeswax production since 1981. Production levels are variable from year to year, although there appears to have been a marginal overall increase in average and total production during the 1981 to 1986 period.

The impact of the woodchip industry on beekeepers was addressed in the ERMP/draft EIS in Section 7.2.10. The document detailed the effects that CALM's current forest management practices have on the beekeeping industry, with specific reference to jarrah dieback control, prescribed burning and harvesting of mature trees. The ERMP/draft EIS acknowledged the productive loss for beekeepers due to the harvesting of an additional 20,000ha of karri type and possibly 60,000ha of jarrah forest over the 15 years of the proposal. This loss would be compensated somewhat by the development to flowering age of regrowth forests, although the relative value of regrowth forest compared to mature forest is not known. Given that the number of productive beehives since 1981 has remained seasonally constant and that no declining trend in honey production is evident, it appears that the current silvicultural practices are not having a significant nett impact on the beekeeping industry.

TABLE 5

BEEKEEPING STATISTICS FOR WESTERN AUSTRALIA

Item	1981	1982	1983	1984	1985	1986
Beekeepers (a)	158	132	138	169	164	153
Beehives (b) -						
Productive (c) ('000)	35.4	34.4	33.7	37.4	37.4	39.1
Unproductive (d) ('000)	9.2	8.4	7.4	7.6	7.6	3.7
Total ('000)	44.7	42.8	41.1	45.0	45.1	44.2
Production -						
Honey -						
Quantity (tonnes)	2,023.5	2,555.8	3,141.6	2,844.6	3,452.4	2,811.6
Average per productive hive (kg)	57.1	74.2	93.3	76.1	92.2	79.5
Gross value (e) ($'000)	1,473.7	1,745.9	2,243.9	1,823.6	2,179.6	2.251.4
Beeswax -						
Quantity (tonnes)	37.3	58.3	53.5	51.4	62.3	47.3
Gross value (e) ($'000)	138.2	216.0	251.7	170.0	224.8	164.6

(a) Beekeepers with 40 or more hives
(b) Number at 30 June
(c) Hives from which honey was taken
(d) Includes hives kept for production but from which no honey was taken, nuclei, pollination hives, etc.
(e) Value to the producer at point of sale

(Source: Australian Bureau of Statistics, Catalogue No. 7221.5)

5.13 VISUAL CONSIDERATIONS

Several submissions refer to the impact on landscape values or the adverse visual effects of timber harvesting activities, particularly clearfelling. There can be little argument with this and it was explicitly recognised in the ERMP/draft EIS (section 7.1.6).

There are, however, major differences between opinions given in some submissions and statements in the ERMP/draft EIS, relating to the appearance of regrowth areas of karri forest. In spite of the assertions contained in some submissions, it appears that many people have difficulty in distinguishing virgin forest from mature regrowth or cut-over forest. This contention is supported by the fact that areas nominated for National Estate listing, in which their "virgin" status is cited as a reason for nomination, have turned out on investigation to be areas which have been harvested in the past. Surveys carried out by CALM at Boranup and at Big Brook also found that 72 percent and 40 percent of the visitors, respectively, were unaware that they were in a regrowth forest (CALM, unpublished report). Similarly, Neville (1981) in classifying areas for various recreational purposes includes mature harvested areas in areas which he classifies as aesthetically "acceptable".

Neville does provide a very useful analysis of positive and negative visual attributes as perceived by visitors to the forest. The presence of water rated highly as did mature forest and absence of signs of human activity. All these desirable attributes are well represented in the National Parks, Nature Reserves and Conservation Parks and in the river and stream zones.

People seeking a positive aesthetic experience will be able to find numerous locations where these values are present in the South-west forests. CALM's reservation system will ensure that this situation continues for future generations.

5.14 TOURISM

Several submissions suggested that the topic of tourism was inadequately treated in the ERMP/draft EIS and that its importance had accordingly been underestimated.

The authors concede that the treatment given to tourism may have appeared to be deficient. This partly relates to the fact that much of the tourist and recreational usage of the forest tends to be informal. Many of the visitors are independent or largely independent of the services and facilities available in the towns. This type of tourism therefore generates less employment and less statistical information than more structured tourist activities which are reflected in usage of accommodation, restaurants and other facilities.

It was recognised in the ERMP/draft EIS that tourism and recreation are growing in the South-West in general and in the karri areas in particular. Whether or not this growth is "dramatic", as suggested in one submission, is debatable. However, if it is, then surely this confirms the conclusion of the ERMP/draft EIS that paperwood production which has been carried out continuously over the growth periods, does not adversely impact tourism and recreation in the region.

It is erroneous to consider tourism and recreation to be incompatible alternatives to timber production forestry in the forests of South-west Australia. The two types of land use need not, and usually do not, compete for the same areas of forest and therefore both can be readily accommodated. Obviously tourism and recreation are not compatible with all forest activities. It is necessary that tourists and recreationists be protected, to the greatest extent possible, from any dangerous operations such as harvesting and prescribed burning. However, the forests cover a vast area, the tourist pressures are relatively low by developed world standards and the forestry operations are widely dispersed in space and time. It is therefore possible - in fact given that tourism and recreation are concentrated mainly on the National Parks and reserve areas and that more than 98% of the forests within the current WACAP licence area are free of production activities in any one year, it is a relatively simple matter - to ensure that there is little interaction between tourists and recreationists on the one hand and forestry activities on the other.

In very few cases do tourist and recreational activities approach the capacity of the forest to support them. Consider camping as an example. There are only two times each year when there is any difficulty whatsoever in obtaining a good camping site in the South-west forest - Easter and the opening of the marron season. The same can certainly not be said of coastal areas or hinterland areas closer to Perth.

It should be recognised that the area of forest per head of population in Western Australia is one of the highest in the world. With no dramatic increase in population projected, it is unlikely that there will be a dramatic increase in tourist and recreational use of the forest. However, even if usage did increase dramatically, it would be a relatively simple matter to develop additional facilities to cater for the growth.

One submission cited damage to roads and increased road hazard as adverse impacts associated with the project. Interaction between haulage trucks and other forest users has been minimised by the use, where possible, of private haulage routes. As far as public road damage is concerned, log trucks comply with load regulations and are no more damaging than other trucks. The timber industry is responsible for construction and maintenance of major access roads in the forest. In addition, as with all trucking operations, licencing fees and fuel taxes paid by the operators more than pay for maintenance costs attributable to these users of public roads. It could be argued that increased numbers of buses and caravans associated with tourism pose a hazard to road users.

Many erroneous statements are made in the submission by the combined conservation groups. For example, the submission gives a value of $73 million as current expenditure by tourists "in the region", a predicted growth rate of 20% - 30% in the next five years, with consequent creation of up to 400 new jobs. These figures were ascribed to Horwarth HRC Services, 1985. What the submission fails to point out is that the study area to which these figures refer is the Great Southern Area which does not even overlap with the area addressed in the ERMP/draft EIS. To demonstrate the completely different natures of the two regions, "forestry is currently of little commercial significance" in the Great Southern, according to Horwarth HRC Services (Op. cit.).

Similarly, the submission claims that the ERMP/draft EIS "fails to provide data about the growth in Pemberton". In fact, the ERMP/draft EIS quoted the Pemberton Tourist Bureau as receiving a 17 percent increase in visitors over the last year.

On the recreational value of regenerated karri forest, the submission cites Neville (1981) for its contention that "regenerated forest has a greatly reduced value for all types of recreation" and that "even at 100 years old, there are still substantial differences from mature forests". Neville (1981), however, makes no such claims. Regrowth forest, in fact, includes some of the more popular recreational areas, such as the Rainbow Trail.

5.15 ESTABLISHMENT OF A PULPMILL

A number of submissions favoured the establishment of a pulpmill in Western Australia, rather than the current practice of exporting paperwood to overseas pulpmills. It was suggested that this would benefit the State economy in producing its own paper products.

As discussed in Section 8.8.1 of the ERMP/draft EIS, the establishment of a pulpmill in Western Australia has not proven economically feasible in the past. WACAP is reconsidering the feasibility of a pulpmill to ascertain whether financial and production considerations have altered.

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6.0 CONCLUSIONS

Analysis and consideration of submissions made by the public and by Government departments has not changed any of the main findings of the ERMP/draft EIS, which were:-

- The woodchip industry utilises wood residues which have no other practical or feasible beneficial use.
- The industry performs a vital function in overall forestry management, particularly in the karri forest, by removing residues which, if left, would inhibit regrowth and would be prohibitively expensive to remove by other means.
- Substantial payments are made by WACAP to Commonwealth, State and local Governments. These payments far exceed the costs incurred by Government in relation to WACAP's operations.
- WACAP's operations directly or indirectly provide employment for at least 353 people. This employment and the salaries and wages involved are highly important in maintaining the economic well-being of the Manjimup Shire and are also significant in the South-west region of Western Australia.
- Continuation of the project will have no serious long-term, adverse ecological impacts, and will not significantly impact soil or water resources.
- Continuation of the project has considerable community support, particularly at the local level.
- There are no practical and economically sound alternatives which would produce the same benefits with less environmental impact.
- If sawlog harvesting continued without integrated paperwood removal, it would result in unacceptable impediments to the preferred silvicultural management.

An additional finding reinforced by the investigations undertaken for this supplement is, that conservation needs and National Estate values are more than adequately catered for in CALM's existing reserves in the South-West. Recent nominations to the Register, if approved, would represent unnecessary replication, and if harvesting was to be excluded as suggested by the AHC, the result would be a drastic decline in the timber industry, with a consequent serious effect on the community as a whole.

In the light of these findings, it is concluded that the woodchip licences should be renewed.

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7.0 PROPONENT'S COMMITMENTS

7.1 INTRODUCTION

WACAP, the Proponent for this proposal, is an established forest industry leader, with 15 years of successful operating experience in the south-west forest region. WACAP is a progressive company with a strong sense of management responsibility for social and environmental issues, and is prepared to take a proactive role in ensuring that forest industry standards are met and, where possible, exceeded.

WACAP's commitments to protect and enhance the environment should be understood in terms of the definitions of "environment" and "conservation" which are stated on page 3 of the Conservation, Environmental Protection and Recreation Strategies of WA's Department of Conservation and Land Management (December 1987). It should be noted that the definition of environment has been adopted verbatim from The Western Australian Environmental Protection Act (1986) and The Commonwealth Environment (Impact of Proposals) Act 1974. The definition of conservation has been adopted verbatim from the National Conservation Strategy for Australia (1984) and the World Conservation Strategy of the United Nations (1980).

While not repeating these definitions in this document, it is considered worthwhile to highlight that the definition of the environment comprises not only the natural environment, but also the social environment of mankind, including "... his aesthetic, cultural, economic and social surroundings...". The definition of conservation embraces not only preservation and maintenance, but also "sustainable utilisation...and enhancement of the natural environment".

The remainder of this section discusses WACAP's commitments in relation to those of its activities which impact on the broader social environment and the natural environment.

7.2 WACAP'S COMMITMENT TO THE SOCIAL ENVIRONMENT

An Australian company, managed and staffed by Australian citizens who consider their work a worthy contribution to the "common wealth", WACAP is a corporate entity which perceives itself as operating within a framework of separate but overlapping responsibilities, and which holds itself accountable for its contribution in these several areas, namely industrial, economic, social, environmental, and public. These responsibilities give rise to appropriate commitments, as summarised below:

7.2.1 Industrial Responsibilities and Commitment

WACAP's raison d'être arises within the world's paper industry. The paper industry produces an essential commodity used by people, throughout all human society. Indeed, paper is pervasive and indispensible to modern civilised institutions, including government, education, communication and commerce. The short-fibred eucalypt paperwood produced by WACAP fulfills the specialised requirements for the manufacture of higher grade white papers, commonly known as "cultural" papers.

- **WACAP makes a firm commitment to continue supplying the world's paper industry with this specialised resource.**

7.2.2 Economic Responsibilities and Commitment

WACAP is fully aware of the important economic role it plays within the Regional, State and Australian economies. Through its operations in growing, harvesting, processing, and exporting paperwood, WACAP is generating income from overseas sources. This wealth is circulated back into the Australian economy as wages for WACAP employees, dividends to Australian investors, payments to farmers, small businesses, railways and to suppliers, tax payments into the public purse, investments into Australian industries, and savings for future investment. Most of the income remains in the local economy.

As a raiser of external monies (since WACAP's income is derived from overseas buyers sending foreign exchange to Australia) WACAP's economic role is all the more important within the current national economic situation of a chronic balance of payments deficit.

- **WACAP is committed to maintain and strengthen its contributions to the Regional, State and Australian economies.**

7.2.3 Social Responsibilities and Commitment

WACAP's contribution to its social environment relates very closely to its economic role. By providing employment for more than 550 individuals and generating cash flow to Government, WACAP contributes to the social development of the South-West, enhances the viability of other employment sectors, and enables government to redistribute income for many purposes, including social needs.

- **WACAP is committed to expanding its role in supporting the people of Australia, particularly those in the south-west region.**

7.3 WACAP'S COMMITMENT TO THE NATURAL ENVIRONMENT

Wood, when managed properly, is one of the few truly **renewable** and **environmentally benign** resources available to man. Trees require only **air, sun, soil and water** to produce this **renewable, recyclable** and **bio-degradable** resource. Wood has always been, and will continue to be, a basic commodity to man's domestic, business and cultural needs. Relatively few and simple tools are required to produce items of functional and aesthetic use. When properly managed, the cycle of growth, harvest and regrowth can continue un-abated in producing this basic commodity for mankind with minimal effects on the environment.

WACAP has an important role in the natural environment through the basic fact that the paperwood it utilises is a natural resource obtained only from harvested trees. While trees have traditionally been welcomed as a basic natural resource for mankind to utilise, they are also environmentally important, especially when growing in forests.

- **WACAP sees its role as including the task of educating the general public that its operations are carried out within a framework of environmentally protective regulations and practices. These are based on continuing scientific research into the environmental effects of modern forest management.**

WACAP plays only a subordinate role in the overall wood-harvesting industry of Western Australia. The sawn timber industry is the dominant force, as the quantum of harvesting is determined by the quotas of sawn timber, with WACAP utilising only forestry residues unsuitable for sawmilling. Nevertheless, WACAP has accepted the task of explaining its role in relation to that of other interests involved, through the ERMP/draft EIS and this supplementary document.

- **WACAP accepts a responsibility to continue to utilise the natural paperwood resource obtained from forest residue left behind from harvesting of sawable timber in the south-west forests, and to ensure that its activities and operations**

within the broader context are consistent with genuine conservation of that resource in terms of the definition of conservation referred to in Section 7.1, with respect to protection and enhancement of the forest environment.

Until 2005, WACAP proposes to harvest and process paperwood from trees grown on three distinct classes of land, as distinguished by their ownership:

- State forests (publicly-owned),
- WACAP forests (privately-owned by WACAP), and
- private forests (privately-owned by others).

All commitments which WACAP can make towards resource conservation and environmental protection necessarily depend upon the ownership of the forests involved. Only on one class of land (WACAP forests) does the company exercise the authority of management.

7.3.1 WACAP Environmental Commitments in State Forests

The State Government has complete authority over State forests. As has been reiterated in the ERMP/draft EIS and this Supplement, WACAP, being a private corporate entity, neither owns nor manages any part of State forests.

The **ownership** of State forests is vested in the Lands and Forest Commission (LFC), which was established pursuant to the Conservation and Land Management Act (1984). The **management** of State forests has been delegated by the State Government to the Department of Conservation and Land Management (CALM), and to other authorities. Pursuant to its role as principal manager of State forests, CALM has the sole responsibility for a number of management tasks. The creation and maintenance of the framework for a viable timber industry, including WACAP's paperwood industry, is but one area of CALM's managerial responsibilities. CALM's responsibilities include, amongst others:-

- o establishing production forestry policies,
- o formulating operating procedures to govern the activities of licenced private timber harvesters in State forests, and
- o inspecting forestry operations carried out by those private operators.

WACAP is subordinate to the authority and direction of CALM and other relevant government authorities, with regard to its activities within State forests. However, WACAP's lack of authority in State forest management does not imply that the company lacks concern for the well-being of the State forests. On the contrary, superimposed on its policy of sound conservation practices, WACAP has a commercial interest in sound management of State forests, so as to ensure their vitality on a sustainable basis. Accordingly, WACAP continually seeks to improve forest management and volunteers recommendations to this end whenever prospects for improvement become evident.

CALM controls WACAP's activites in the State forests through various published documents, including the following:

- Timber Production in Western Australia - A Strategy to Take WA's South-West Forests into the Twenty-first Century: Department of Conservation and Land Management (December 1987),

- Strategies for Conservation and Recreation on CALM Lands in Western Australia: The Conservation, Environmental Protection and Recreation Strategies of WA's Conservation and Land Management Department (December 1987),

- Southern Forest Regional Management Plan 1987 - 1997: Department of Conservation and Land Management (December 1987),

- Southern Forest Region Operations Manual: Department of Conservation and Land Management (April 1987),

- Manual of Hardwood Logging Specifications: Department of Conservation and Land Management (November 1987),

- The Code of Hardwood Logging Practice: Department of Conservation and Land Management (1986),

- Southern Forest Region Industry Control Specification: Department of Conservation and Land Management (April 1987),

Since commencing operations in 1975, WACAP has also been controlled through the terms and conditions of the licences issued to it by Government, and through the various Government Acts, including the following:

- Conservation and Land Management Act (1984),
- Environmental Protection Act (1987),
- Woodchip Industries Agreement Act, No 58 (as amended 1973),
- Forest Produce (Chipwood) Licence No. 1588,
- Commonwealth Government Export Licence (issued annually),
- Effluent Discharge Licence, and
- Marri Woodchip Industry EIS (1973),

The actual harvesting activities in State forests are carried out by independant harvesting contractors, whose employees are not directly employed by WACAP, and therefore, are not under the direct control of WACAP. The activities of all these harvesting contractors in State forests are subject to the comprehensive prescriptions contained in the Southern Forest Region Industry Control Specification, and all harvesting contractors employed directly by CALM are subject to the "Code of Hardwood Logging Practice", which is an integral part of the contract. All personnel working in the forest are licensed, and these licences can be revoked to forbid an individual from working in the forest. Revocation is normally only done when controls are deliberately broken.

The ERMP has presented all of the above mentioned controls, and commitments imposed on WACAP and other harvesters on State forests. The intent of the following sections is to reiterate the specific commitments which WACAP has made, and will continue to honour, in the context of its future operations in State forests. In general, these commitments can be summarised as follows:

- **WACAP will observe all controls and operating conditions imposed on it through the published codes, Acts and licences listed above.**

- WACAP will require that all its harvesting contractors engaged to harvest logs and deliver them to the Diamond Mill be familiar with the contents of CALM's management policies and regulations, and agree to abide by them.

- WACAP will report to CALM any incidences of malpractice that come to its attention. Penalties for breaches of regulations will be the responsibility of CALM.

- WACAP will monitor the effectiveness of the various management procedures and will, if necessary, make recommendations to CALM, the EPA or other relevent bodies, to further improve and strengthen the effectiveness of these documents in achieving their goals.

- WACAP will support the education and instruction of all forest workers in appropriate levels of conservation knowledge and skills.

7.3.1.1 Conservation of Ecological Values

WACAP's contribution to conserve ecological values in State forests will be achieved through the following commitments:

- WACAP will comply and co-operate with all authorities under the W.A. Government and will abide by the newly promulgated Timber Strategy and Regional Management Plans and any documents relating to them.

- WACAP will respect the annual harvest quotas from State forest established by CALM on the basis of sustainable yield.

- WACAP will respect the boundaries of the various kinds of forest areas (such as State Forest, Timber Reserves, National Parks, Nature Reserves and Conservation Parks) as demarcated by CALM or other government departments.

- WACAP will ensure that any permitted tree harvesting is confined within the boundaries laid down by CALM.

- **WACAP will adhere to CALM's directions with respect to harvesting operations for subsequent optimal forest re-growth.**

- **WACAP will avoid any forest practices contrary to sound forest development as specified by CALM.**

7.3.1.2 Water Quality

While WACAP has no jurisdiction over water quality protection in State forests, WACAP is nevertheless committed to continue its contribution to water quality policy formulation in State forests and generally throughout the south-west region by the following:

- **WACAP will continue its co-operative and cordial relations with the appropriate authorities - CALM and the Water Authority of Western Australia.**

- **WACAP will continue its corporate membership of the WAWA's Water Quality Research Committee initiated in 1986, or any replacement or similar committee.**

The principal aspects relating to water quality are salinity and sedimentation. CALM's established system of river and stream reserves and buffer zones along all recognised water courses comprise a vital part of the strategy to protect water quality. This helps to moderate water table fluctuations and also minimise soil disturbance near streams. WACAP is committed to strictly conform to CALM's specifications in the controlling documents, as follows:

- **WACAP will retain buffer zones demarcated by CALM.**

- **WACAP will observe proper management in all phases of operation to avoid excessive movement of soil (refer to section 7.3.1.8).**

- **WACAP will continue to be responsible for the construction and maintenance of the primary log haul routes, giving due consideration to factors such as:**
  - **topography,**
  - **drainage pattern,**
  - **slope,**

- erosion hazard,
- dieback hygiene, and
- safety

subject to CALM responsibility to approve location of the routes.

- o WACAP will continue to minimise soil erosion on road-ways in winter conditions by:
  - sealing major log road surfaces in susceptible flat areas, and
  - spreading ground cover on susceptible drainage gullies beside roads.

- o WACAP will continue to direct main road runoff into forest area to allow settlement of any dust or gravel carried by the water.

- o WACAP will continue to co-operate with CALM and all other relevant authorities in preventing and controlling bush fires. This will help minimise the turbidity of streams that can occur when wild-fires destroy vegetation and expose soils to erosion through wind and rain (refer to section 7.3.1.4).

WACAP accepts its obligation to control liquid outflow from the Diamond Mill, as follows:

- o WACAP will continue to recycle mill process water to the furthest practicable extent.

- o WACAP will continue to contain liquid outflow in storage dams.

- o WACAP will continue to ensure that periodic excess water discharge into nearby waterways is carried out in accordance with the provisions of the Effluent Disposal Licence granted by the Environmental Protection Authority of Western Australia.

- o WACAP will monitor potential leachates from the paperwood stockpile and take corrective action to mitigate water quality impact if required (refer to section 7.3.1.11).

7.3.1.3 Protection of Forest Productivity

WACAP's commitments aimed at maintaining forest productivity are:

- **WACAP will promote overall forest productivity by adhering to the recommended silvicultural management programme laid down by CALM.**

- **WACAP will minimise the erosion of forest soils by avoiding excessive movement of soil during harvesting and road construction (refer to section 7.3.1.8).**

- **WACAP will continue to coordinate the rehabilitation of compacted soil on behalf of the timber industry, by:**
  - **ripping landings and major snig tracks to a depth of approximately 0.5m,**
  - **arranging the bulldozer and driver,**
  - **servicing the machine, and**
  - **programming the sequence of operations.**

- **WACAP will employ forest hygiene procedures as recommended by CALM to minimise spread of diseases, weeds or pests.**

- **WACAP will monitor to avoid damage to retained trees during harvesting.**

- **WACAP will report known incidences of contractors violating the terms of the Code of Logging Practice, although the imposition of penalties will be the responsibility of CALM.**

- **WACAP will make recommendations to CALM for improvements which will lead to protection of forest productivity.**

7.3.1.4 Fire Prevention and Control

WACAP has a direct interest in the prevention and control of wildfires, as wildfires destroy resources and property, and threaten life. Recognising that fire prevention and control are a major area of responsibility within CALM's mandate, WACAP will actively assist CALM in its wildfire prevention activities when requested, and is committed to the following:

- **WACAP will retain appropriate buffers, as demarcated by CALM.**

- **WACAP will maintain contant vigilance for wildfire outbreaks, and alert appropriate authorities.**

- **WACAP will train company personnel in fire-fighting procedures and provide fire-fighting equipment in emergencies.**

7.3.1.5 Recolonisation by Flora and Fauna

WACAP is committed to help implement CALM's policy for recolonisation of regrowth forest areas by flora and fauna:

- **WACAP will respect the boundaries of forest reserves of all kinds as determined by CALM, including:**
  - **road reserves,**
  - **river and stream reserves,**
  - **National Parks, and**
  - **other classes of reserve.**

7.3.1.6 Genetic Diversity

WACAP is committed to co-operating with CALM in maintaining genetic diversity of the State forests. CALM is responsible for this through utilisation of seed trees, control of seed collection and planting, through its system of reserves and through its wood production and silvicultural practices.

7.3.1.7 Landscape Values

While questions of landscape aesthetics inevitably contain a subjective element, with regrowth and developed forests containing high landscape values in the eyes of many observers, WACAP recognises that landscape values are a factor that should be taken into account in timber harvest planning whenever reasonable.

WACAP endorses CALM's role in enhancing visual amenity through its system of reserves. WACAP also supports CALM's role in determining the size and spatial distribution of harvesting coupes, and the sequencing of coupes within forest blocks.

By removing forestry residues following CALM-directed harvesting for sawlogs, WACAP plays a crucial role in removing material that would otherwise, not only interfere with forest regrowth and pose a long range threat of fire damage to regrowth forests, but would also be less visually pleasing in the immediate post-harvesting phase.

Accordingly, WACAP is committed to help minimise the visual impact of harvesting operations through the following:

- **WACAP will retain appropriate buffer zones where required by CALM.**

- **WACAP will plan haulage road placement taking into consideration the visual aspects of the road (See section 7.3.1.9).**

- **WACAP will apply prescribed remedial treatments to aid forest regrowth.**

7.3.1.8 Soil Protection

WACAP has no jurisdiction over rules relating to soil protection in State forests, and the responsibility rests with CALM to inspect, monitor and approve any soil-disturbing activities associated with harvesting. Nevertheless, WACAP's future depends on optimal forest re-growth, and the Company therefore wishes to see good tree-growing soils maintained.

Soil erosion (and the consequent sedimentation of streams referred to in section 7.3.1.2) will be confined within acceptable limits using procedures which have been found to be effective. WACAP is committed to implementing these procedures, as follows:

- **WACAP will respect "Special Care Zones" comprising all slopes greater than 20 degrees or slopes exceeding 15 degrees if they border on recognised water courses.**

- WACAP will restrict harvesting activities in these zones to a narrow range of soil moisture conditions.

- WACAP will minimise machine movements.

- WACAP will avoid downhill snigging and scrub-rolling except where this is impractical.

- WACAP will complete soil rehabilitation prior to the first winter after regeneration burning.

- WACAP will locate log landing and loading areas more than 50m from recognised water courses, except where this is impractical.

- WACAP will lay snig tracks parallel to recognised water courses except where this is impractical, and will not cross them unless unavoidable.

- WACAP will not allow logging roads to enter stream reserves except where this is impractical and approved by CALM, in which case bridges or culverts will be installed.

- WACAP will apply stabilising treatments to minimise erosion of sites which may be at risk (those close to water courses), such as spreading bark on disturbed areas, and installing silt traps.

- WACAP will install cross drains across snig tracks and roads at the completion of harvesting, in accordance with the Industry Control Specifications.

CALM has developed additional specifications to limit the total level of disturbed soil to a maximum of 20 percent of the coupe at the completion of harvesting. Disturbance includes severe compaction, removal of the topsoil horizon or mixing of topsoil and subsoil. Surveys are carried out to measure the extent of disturbance in each fallers block, and the block is closed in the event of, or threat of, excessive disturbance.

- o WACAP will strive to minimise soil disturbance and will observe the specifications designed for this purpose, including cessation of activities during or immediately following heavy rain.

- o WACAP will ensure that contractors involved in falling and snigging trees in areas designated by CALM continue to obey the rules laid down by CALM in the Code of Hardwood Logging Practice.

7.3.1.9 Haulage Roads

Commitments in relation to planning, construction and maintenance of haulage roads include the following:-

- o WACAP will prepare plans for its haulage roads constructed by WACAP contractors with a view to safeguarding many factors, including:
  - public safety,
  - erosion avoidance, and
  - noise reduction.

- o WACAP will submit these plans to CALM for approval at least 2 months prior to clearing for in-coupe roads, and at least 3 months prior to clearing for major roads. These plans will show:
  - proposed road alignments or alternatives,
  - the differentiation between new clearing and upgrading of existing roads,
  - proposals for creek or river crossings,
  - location of proposed gravel pits with details of quantities to be extracted.

- o WACAP will mark the route in the field at least 6 weeks prior to clearing, following approval of these preliminary plans.

- o WACAP will locate the roads based on consideration of various factors, including:
  - disease,
  - erosion,
  - sedimentation,
  - safety, and
  - visual amenity.

- WACAP will observe CALM's specifications which include maximum clearing widths of 12m for major roads and 8m for in-coupe roads.

- WACAP will observe the detailed specifications for minimisation of erosion (see Section 7.3.1.8) and for installation of drains and silt traps to control runoff and sedimentation from roads and borrow pits.

- WACAP will maintain these roads by:
  - clearing culverts and silt traps, and
  - slashing scrub to maintain visibility.

- WACAP will minimise inconvenience and risks to other users of the forest by:
  - utilising the private timber road system to the maximum extent possible,
  - monitoring traffic control, and
  - installing hazard warning signs for the protection of the public.

7.3.1.10 Recreation

WACAP recognises that the southern forest areas represent an important resource for tourism and recreation and a number of the commitments referred to in previous sections will contribute significantly to the conservation of the recreational values of the southern forest region:

- WACAP will have regard for landscaping and visual amenity (section 7.3.1.7),

- WACAP will use private forest roads as much as possible to separate industrial traffic from tourist traffic.

- WACAP will contribute to maintaining ecological values (section 7.3.1.1),

- WACAP will provide and maintain appropriate safety direction and information signs.

- WACAP will contribute to enhancing water quality (section 7.3.1.2),

- **WACAP will contribute to the optimal growth of new forests (section 7.3.1.3),**

- **WACAP will co-operate in preventing and controlling wildfires (section 7.3.1.4), and**

- **WACAP will contribute to conserving the flora and fauna of the region (section 7.3.1.5) including genetic diversity (section 7.3.1.6)**

- **WACAP will continue to encourage the public to inspect its facilities at the Diamond Mill, which is a popular local tourist attraction in its own right.**

7.3.1.11 Mill and Port Operations

WACAP's Diamond Mill operations have been underway since 1975, and the Port of Bunbury stockpile and shiploading facilities have been operational for a similar period. Accordingly, the operations are well established, and no significant changes are envisaged during the licence renewal period. WACAP's various environmental commitments regarding its industrial facilities are listed below:

- **WACAP will continue to recycle liquid outflow to the maximum extent possible.**

- **WACAP will carry out discharge of excess quantities, when necessary, in accordance with the terms of the Effluent Disposal Licence issued by the Environmental Protection Authority.**

- **WACAP will minimise water quality impact in the unlikely event that leachate is detected from the paperwood stockpile.**

- **WACAP will continue to comply with applicable noise regulations.**

- **WACAP will continue to require employees exposed to potentially damaging noise levels to use hearing protection equipment.**

7.3.1.12 Utilisation Standards

A wide range of wood products are produced from State forests. These include first and second grade sawlogs, veneer logs, bridge timbers, poles, mining timbers, charcoal logs and paperwood logs. Each of these products must conform to specifications which are based on optimum utilisation of the resource and the requirements of the users. Prior to WACAP starting operations, residue wood was merely wasted through burning, either on forest sites after harvesting of millable logs, or at sawmills.

To ensure that only genuinely lower grade logs are used for paperwood, a trained Government officer inspects them, checks out their weaknesses and faults, and marks them with chalk. This is double checked by other Government officers. The timber sawmilling industry also checks the marked logs. Before the paperwood logs go to the chipmill, sawmillers are allowed to salvage them. Any sawmill owner may use them for sawmilling instead, if they think the logs are good enough for their purposes.

WACAP is committed to the fundamental philosophy of maximum utilisation of the forest resource, as follows:

- **WACAP will prevent logs or parts of logs being processed into paperwood, if they could be commercially utilised as sawn timber.**

- **WACAP will ensure that contractors on-site in forest coupes accurately separate logs into piles of either sawlogs or paperwood logs, according to the criteria laid down by CALM.**

- **WACAP will encourage sawmillers to reclaim logs from paperwood log piles in the forest landings, for production into sawn timber.**

- **WACAP will co-operate with CALM officers to ensure that paperwood logs delivered to the Diamond Mill are indeed below sawlog quality. WACAP will set aside any logs which WACAP consider to have saw milling potential for inspection by CALM officers and sawmillers.**

- **WACAP will utilise the new process developed at its own initiative which recovers sections of paperwood logs that contain potential "saw-wood", and will make this available to CALM at regular intervals, for auction to saw millers.**

- **WACAP will monitor the performance of its machinery to ensure that recovery of products is maximised.**

- **WACAP will continue its policy of full public disclosure of the log selection and utilisation procedures laid down by CALM. Public tours showing all aspects of the operation are available.**

- **WACAP will encourage all workers in the forest to take instruction on maximum utilisation procedures and will support such instruction.**

7.3.2 WACAP Environmental Commitments on Private Property Owned by WACAP

WACAP, in addition to encouraging other landowners to either establish trees or manage already growing trees, purchases freehold land for tree establishment and management purposes. The amount of land purchased by WACAP will vary according to the company's needs and abilities in the future. It is WACAP's policy for the purchase of land to be subordinate to the growing of trees on private land by other individuals or organisations.

WACAP acknowledges its legal obligations, and is committed to comply with the following Acts:

- **WACAP will comply with the requirements of the Country Areas Water Supply Act (1947-78) by:**
  - **obtaining licences to clear any land in declared water catchment areas,**
  - **abiding by the conditions of any licence, and**
  - **maintaining the trees in a responsible and professional manner.**

- **WACAP will comply with the Soil and Land Conservation Act (1945-82) by:**
  - **obtaining licences for clearing native trees covering an area greater than 1 hectare,**

- complying with the conditions of these licences,
- ensuring that its operations, even if not restricted by a licence, do not cause land degradation.

o WACAP will comply with the Bush Fires Act (1954-79) by:
- establishing firebreaks on external boundaries of at least the minimum width as specified in each Shire,
- establishing internal subdivision firebreaks as specified by the relevent Shire,
- obtaining necessary permits to light fires for whatever reason, and
- obeying the instructions of any duly authorised officer in the case of a bush fire.

Because WACAP, like any other freehold landowner, can control what happens on its land, the following additional commitments can be made:

o WACAP will continue to manage young regrowing native trees on land purchased by WACAP, should those trees, in WACAP's opinion, be of sufficient quality and quantity for retention as future sawlogs and paperwood trees.

o WACAP will develop a code of harvesting practice based on CALM's Code of Hardwood Logging Practice and its complementary Manual of Hardwood Logging Specifications and other similar codes in force in other parts of Australia. This code will include management practices for:
- river and stream crossings,
- road construction,
- road drainage,
- log storage and sorting area placement,
- snig track placement,
- soil disturbance during wet weather,
- rehabilitation of log storage and sorting areas,
- harvesting of steep slopes,
- maximum utilisation of each tree, and
- retention of vegetation alongside perennial and other recognised streams.

- o WACAP will ensure the maximum commercial utilisation of each tree by:
  - selling all sawlogs produced to sawmillers, be they general purpose or salvage quality,
  - holding auctions of any logs which WACAP considers to have sawlog potential but which are not taken by sawmillers from the land,
  - segregating the classes of logs at the storage and sorting areas so that accidental inclusions of sawlogs into paperwood is either nil or minimal, and
  - checking and segregating possible sawlogs or saw-wood sections after delivery to the Diamond Mill.

- o WACAP will ensure that its contractors conduct their business in a safe manner, whether they be conducting harvesting, routine management, or planting activities. Where there are potential hazards, contractors will be required to place notices of such where the public may be endangered (ie: signs warning of trucks entering the public road from private property).

- o WACAP will continue to take reasonable precautions to minimise fire damage by:
  - discussing with officers of the Bush Fires Board,
  - becoming financial members of the local fire brigade in each area where WACAP has a plantation,
  - liaising with Shire appointed fire officers, and
  - maintaining fire fighting equipment in its own right.

- o WACAP will continue to establish trial and demonstration plantings aimed at increasing the efficiency of tree establishment, growth and harvesting and will inform other landowners of such improvements.

- o WACAP will ensure the genetic diversity and integrity of the tree farms under its supervision by maintaining controls on the use of seed in regeneration.

7.3.3 WACAP Environmental Commitments on Private Property Owned by Others, Mainly Farmers

Neither WACAP, the Western Australian Government, nor the Commonwealth Government has the legislative authority to generally control tree harvesting operations by private landowners on their land.

Under the current system, there are two pieces of legislation which enable the Government to apply some specific control over the clearing of private land: the Soil Conservation Act (1945-82) and the Country Areas Water Supply Act (1947-78). However, in the case of both of these Acts, once a permit-to-clear has been granted, the government has no further control over harvesting operations, unless the landowner contravenes a condition of the licence.

While it is obvious that WACAP is not in a position to dictate a prescribed forest management scheme to private landholders, WACAP is committed to provide guidance and incentives to the private landowners to encourage adherence to its recommended forest management guidelines:

- **WACAP will continue to liaise with bodies such as the Western Australian Farmer's Federation (WAFF) to educate and motivate farmers into establishing tree plantations on private property.**

- **WACAP will develop a "Code of Harvesting Practice" for contractors harvesting wood from private property where the subsequent land use is tree farming, and will request that participants of WACAP's various Tree Farming Incentive Schemes adopt this code. The code will be similar to that being developed on WACAP's private land, based on CALM's Code of Hardwood Logging Practice and its complementary Manual of Hardwood Logging Specifications and other similar codes in force in other parts of Australia. The code will include management practices for:**
  - **river and stream crossings,**
  - **road construction,**
  - **road drainage,**
  - **log storage and sorting area placement,**
  - **snig track placement,**
  - **soil disturbance during wet weather,**
  - **rehabilitation of log storage and sorting areas,**
  - **harvesting of steep slopes,**
  - **maximum utilisation of each tree, and**
  - **retention of vegetation alongside perennial and other recognised streams.**

WACAP believes that it is in the company's best interests to conduct its operations safely and with responsible controls. Whilst WACAP is not empowered to enforce any direct penalties for unsound harvesting activities on private land, it does have considerable influence on harvesting contractors who wish to sell non-sawmillable logs to WACAP, and is committed to taking a proactive role in promoting good harvesting practice:

- **WACAP's supervisors will visit the site of harvesting operations on private property to monitor production.**

- **WACAP's supervisors will administer the code and enforce penalties to the extent of WACAP's authority.**

- **WACAP will reduce paperwood supply quotas of harvesting contractors who do not carry out the harvesting operation in an acceptable manner.**

- **WACAP will engage additional qualified staff as required.**

- **WACAP will continue to rigorously enforce safety rules and regulations covering private harvesting operations and road rules, including the compulsory wearing of:**
  - **hard hats,**
  - **safety boots, and**
  - **hearing protection.**

- **WACAP's supervisors will impose any penalties which are legally enforceable by WACAP along the lines of:**
  - **initial warnings,**
  - **suspensions, or**
  - **life time bans from working as a supplier to WACAP.**

WACAP will discourage the clearing of native trees on private property for non-treegrowing purposes. Specific commitments in this regard are as follows:

- **WACAP will continue to support afforestation of previously cleared land and reforestation of newly harvested areas, through differential incentive payments and technical assistance to landholders.**

- o **WACAP will not accept paperwood logs from private land unless the landholder demonstrates that the necessary Government permits-to-clear have been obtained.**

- o **WACAP will not solicit logs from private sources and will continue to pay only modest stumpage rates for the paperwood which it purchases from landowners clearing for agricultural purposes, thus minimising the incentive for the private landowner to clear native forest for agricultural purposes.**

- o **WACAP will continue to reduce air pollution and convert a residue product into a marketable resource, by encouraging private landowners to salvage cleared timber which would otherwise be burnt (once a decision to clear land has been made by the private landowner).**

- o **WACAP will furthur offset the impact of pasture clearing by establishing a minimum of 5ha of tree plantation for every 1000 tonnes of paperwood it receives from private property, including WACAP-owned land. These tree plantations will be established either on WACAP-owned land, or on other private land through one of it's private Forestry Incentive Schemes.**

7.4 ARCHAEOLOGICAL AND ETHNOGRAPHIC SITES

WACAP acknowledges its obligation to ensure protection of Aboriginal sites as outlined in the Western Australian Aboriginal Heritage Act (1972-80):

- o **WACAP will take measures to inform all personnel associated with the woodchipping activities of their obligations under the Act.**

- o **WACAP will modify its operations in accordance with CALM directions, if necessary, to avoid damage to Aboriginal sites.**

7.5 RESEARCH

WACAP will continue to undertake or sponsor research aimed at improving plantation yields, increasing utilisation of wood products, and field trials in support of its programme to encourage tree farming on private property.

- WACAP commits to continuing either sponsorship or self-conducted research aimed at, among other things:
  - improved tree establishment procedures,
  - improved tree protection procedures,
  - improved tree growth,
  - improved utilisation of timber produced,
  - improved harvesting techniques,
  - new products manufactured from trees,
  - new manufacturing processes,
  - establishing new markets for products,
  - maintaining existing markets for products, and
  - adjusting current practices if better management techniques are indentified and quantified.

- WACAP will encourage and agitate for more research effort by CALM into improving the growth, health and quality for sawlog and paperwood use of CALM's native trees and production forests.

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Figures

VALUES OF FOREST CATEGORIES
(Scale 1:50 000)

Dames & Moore

RIVER AND STREAM RESERVE

Values Protected:

- Old growth forest
- Wildlife habitat
- Flora
- Aesthetic values
- Recreation
- Hydrological values
- Water quality values
- Soil conservation values

NON-FOREST AREA

Values Protected:

- Wildlife habitat
- Flora
- Maintenance of habitat diversity
- Visual amenity
- Recreation

ROAD RESERVE

Values Protected:

- Visual Amenity
- Old growth forest
- Flora
- Wildlife habitat
- Recreation values

WITHIN HARVEST COUPE

Values Protected:

- Immediately post harvesting
  - Population of rare and endangered plants
  - Increase in habitat diversity
- Later in the rotation
  - Increasing visual amenity
  - Wildlife habitat

RESERVE SYSTEM

Values Protected:

- Old growth forest
- Wildlife habitat
- Aesthetic values
- Genetic diversity
- Recreational values

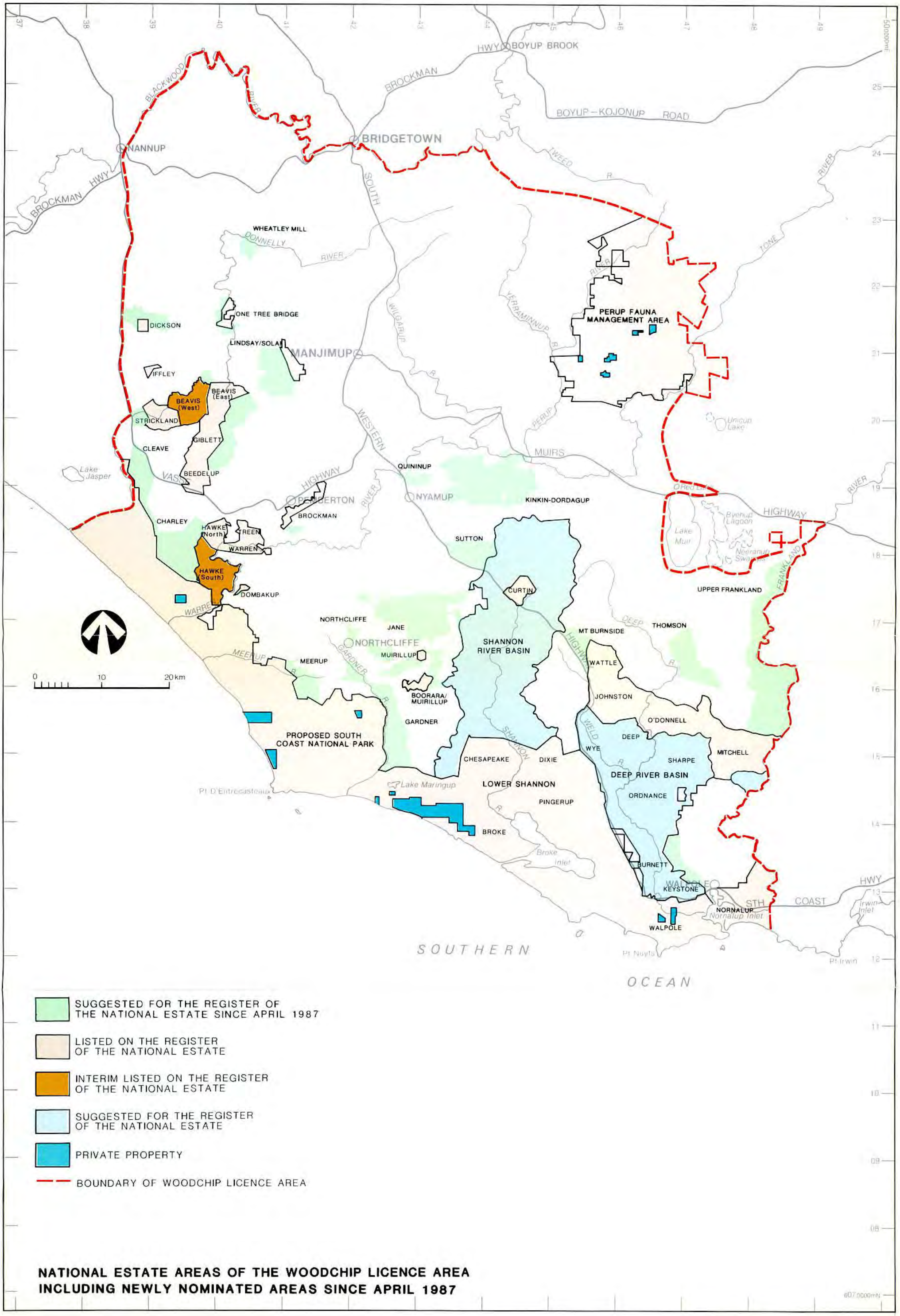
BURNING BUFFER

Values Protected:

- Old growth forest
- Aesthetic values
- Wildlife habitat

Figure 1

Dames & Moore



NATIONAL ESTATE AREAS OF THE WOODCHIP LICENCE AREA INCLUDING NEWLY NOMINATED AREAS SINCE APRIL 1987

Figure 2

Appendix A

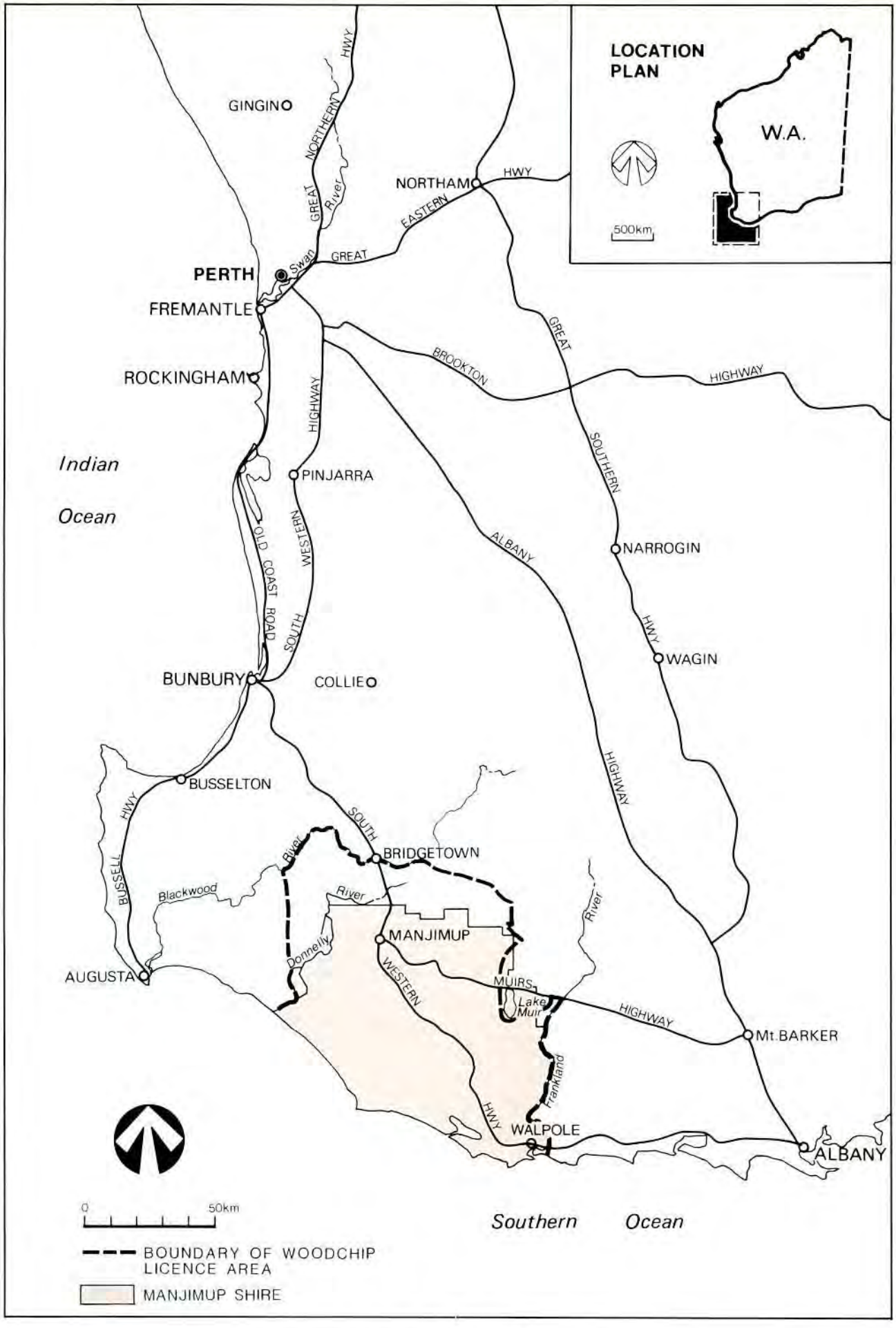
APPENDIX A

CORRECTIONS TO ERMP/Draft EIS

APPENDIX A

CORRECTIONS TO ERMP/DRAFT EIS

SECTION	PAGE	COMMENT
2.5	22	Sentence referring to Public Participation Programme should be deleted
3.1.3	24	Second last line - 'calander' should read 'calendar'
4.2.1	36	Table 1 - WACAP's quantity of woodchips sold in 1986 '637,240' should read '664,567'
4.2.3.2	40	Fifth paragraph - 'susceptable' should read 'susceptible'
4.2.4	43	Third paragraph - 'continous' should read 'continuous'
4.2.8.1	61	Last paragraph - 'presnce' should read ' presence'
4.3.2.1	73	Last paragraph - '25 licences' should read '26 licences'
4.3	77 + 82	Tables 10 + 13 - Clarification of the assumed $50m^3$/ha private property forest yield figure (Appendix F) Total yield all sources of private property over period 1976-86: 517,887 tonnes chiplogs converts to $426,221m^3$ chiplogs using $0.8230m^3$/tonne conversion factor. From Table 13 ERMP/draft EIS approximately 7,910ha has been cleared over the period therefore the yield per hectare is around $54m^3$/ha. Therefore the assumption of a $50m^3$/ha yield from private property is somewhat conservative.
4.3.5.1	83	Third paragraph - '1,000ha' should read '800ha'
4.3.5.3	84	First paragraph - '9,900ha' should read '6,600ha'
5.2	101	Table 19 - column of figures for Private Property (1996 - 2000) reading 30 / 0 / 10 / 785 should read 30 / 51 / 10 / 836 column of figures for export chip tonnes (1996-2000) reading 691 / 86 / 777 should read 736 / 86 / 822 This error was due to the omission in the ERMP/draft EIS of the 51,000 tonnes/year expected to come on stream from WACAP's early plantations
6.6.2	150	Last paragraph - sentence referring to attitudinal survey should be deleted
7.2.11.3	211	First paragraph - 'dependents' should read 'dependants'
-	-	Figure 1 - incorrect Manjimup Shire Boundary, see Figure A1 for correction



LOCALITY PLAN

Dames & Moore

Figure A1

Appendix B

APPENDIX B

SUMMARY OF MAIN ISSUES RAISED IN PUBLIC SUBMISSIONS

B.1 CONTENT OF PROFORMA SUBMISSIONS

Approximately 5,600 submissions were received of the following form:-

I urge the continuance of this industry which:-

- *earned over $38-million in export dollars for Australia last year alone;*
- *brings more than 500 steady jobs to Australia's South West;*
- *helps re-grow new Karri forest to replace all harvested trees;*
- *works under strict Government controls to minimise environmental effects;*
- *uses low-grade wood unsuitable for saw-milling, which must be harvested to ensure good Karri re-growth, and would otherwise be burnt as waste.*

I also urge that:-

- *new forest always continue to be re-grown after harvest;*
- *timber harvesting continues to be monitored to minimise environmental effects;*
- *Australia's economic need for wood products (including paper), jobs, and export dollars, continues to be given due priority.*

Approximately 3880 submissions were received of the following form:-

I support:-

- *greater EPA efforts to protect WA's unique native forest heritage;*
- *an inquiry into WA's woodchip/timber industries and forest management;*
- *restructuring of WA's export woodchip industry so that it uses only saw-mill residues and resources from plantations established on already cleared land;*
- *there should be no permanent allocation of native forest to wood production until it has been fully assessed for its biological, recreational and heritage values.*

Approximately 30 submissions were received of the following form:-

I oppose the renewal proposal for the WA woodchip industry in its present form. I support:-

- *the restructuring of the woodchip industry so that it uses only saw-mill waste and logs from private plantations on already cleared land;*
- *logging of State forests only to supply WA's properly assessed needs;*
- *a substantially reduced woodchip renewal period and chipwood quota;*
- *full investigation of alternative uses for the chipwood resource.*

3 submissions were received of the following form:-

- *in Western Australia we have only a very small amount of forest area in the South West. It is about 3% of total area;*
- *only timber used for natural clearing of farming areas, which is only being wasted by burning, should be used for wood-chipping;*
- *we need the forests for our good health and well-being. As well, they are a tourist attraction and a natural habitat for our W.A. wildlife;*
- *please help us protect our environment and heritage.*

APPENDIX B.2

CONTENT OF SUBSTANTIVE SUBMISSIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
General or Partial Opposition to Proposal	*	*	*	*		*	*		*	*	*	*	*	*	*	*	*	*	*	*
General Support for Proposal					*			*												
Conflict with National Estate Areas																				
Need for Additional Conservation Reserves																				
Erosion and Siltation Effects			*						*											
Increased Salinity of Surface Waters			*																	
Loss of Nutrients from Forest Soils																				
Potential to Increase Pests & Diseases																				
Specific Opposition to Clearfelling						*														
Opposition to Thinning of Stream Reserves									*											
Loss of Genetic Diversity																			*	
Effect on Fauna Requiring Tree Hollows		*																		
Need for More Ecological Research			*									*	*						*	
Effects on Rare Species			*																	
Opposition to Clearing of Private Property																				
Need for Controls on Clearing of Private Forest																				
Adverse Impacts from Exotic Eucalypts		*															*			
Adverse Visual Impact																				
Competition for Timber Resources				*												*				
Effect on Beekeeping Industry			*																	
Additional Plantations May Adversely Effect Agriculture								*												
Should Establish Pulp Mill in South West																				
Economic Aspects Questioned																				
Importance of Tourism Understated			*																	
Conflict With Tourism						*													*	
Traffic Should Avoid Public Roads								*												
Should Recycle Paper or Obtain from Different Source		*																		
Impact on Cottage Industries																				

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
General or Partial Opposition to Proposal	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
General Support for Proposal																				
Conflict with National Estate Areas					*			*												
Need for Additional Conservation Reserves										*		*			*					*
Erosion and Siltation Effects														*						
Increased Salinity of Surface Waters														*						
Loss of Nutrients from Forest Soils	*															*				
Potential to Increase Pests & Diseases																				*
Specific Opposition to Clearfelling			*																	
Opposition to Thinning of Stream Reserves				*										*		*				
Loss of Genetic Diversity																				
Effect on Fauna Requiring Tree Hollows																				
Need for More Ecological Research	*						*			*	*				*		*			
Effects on Rare Species																				
Opposition to Clearing of Private Property														*		*				
Need for Controls on Clearing of Private Forest														*						
Adverse Impacts from Exotic Eucalypts					*			*												
Adverse Visual Impact																				
Competition for Timber Resources																*	*			
Effect on Beekeeping Industry																				
Additional Plantations May Adversely Effect Agriculture																				
Should Establish Pulp Mill in South West																				
Economic Aspects Questioned						*														
Importance of Tourism Understated																				
Conflict With Tourism																				
Traffic Should Avoid Public Roads																				
Should Recycle Paper or Obtain from Different Source																*	*			
Impact on Cottage Industries																				

	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
General or Partial Opposition to Proposal	*	*	*	*	*	*	*		*	*	*	*		*	*	*	*	*	*	*
General Support for Proposal								*					*							
Conflict with National Estate Areas																				
Need for Additional Conservation Reserves		*	*	*		*														
Erosion and Siltation Effects				*																
Increased Salinity of Surface Waters				*																
Loss of Nutrients from Forest Soils				*																
Potential to Increase Pests & Diseases		*																		
Specific Opposition to Clearfelling										*										
Opposition to Thinning of Stream Reserves													*							
Loss of Genetic Diversity																				*
Effect on Fauna Requiring Tree Hollows																				
Need for More Ecological Research				*											*					
Effects on Rare Species																				
Opposition to Clearing of Private Property																				
Need for Controls on Clearing of Private Forest																				
Adverse Impacts from Exotic Eucalypts																				
Adverse Visual Impact																				*
Competition for Timber Resources					*				*											
Effect on Beekeeping Industry																				
Additional Plantations May Adversely Effect Agriculture																				
Should Establish Pulp Mill in South West																				
Economic Aspects Questioned																				
Importance of Tourism Understated											*					*				
Conflict With Tourism																				*
Traffic Should Avoid Public Roads																				
Should Recycle Paper or Obtain from Different Source																				
Impact on Cottage Industries																				

	61	62	63	64	65	66	67
General or Partial Opposition to Proposal	*	*	*	*	*	*	
General Support for Proposal							
Conflict with National Estate Areas					*	*	*
Need for Additional Conservation Reserves		*		*	*	*	
Erosion and Siltation Effects					*	*	*
Increased Salinity of Surface Waters					*	*	*
Loss of Nutrients from Forest Soils				*	*	*	
Potential to Increase Pests & Diseases				*	*	*	*
Specific Opposition to Clearfelling			*		*	*	
Opposition to Thinning of Stream Reserves				*	*	*	*
Loss of Genetic Diversity			*	*	*	*	*
Effect on Fauna Requiring Tree Hollows						*	
Need for More Ecological Research				*	*	*	
Effects on Rare Species				*	*	*	
Opposition to Clearing of Private Property						*	*
Need for Controls on Clearing of Private Forest					*	*	
Adverse Impacts from Exotic Eucalypts	*			*		*	
Adverse Visual Impact					*	*	*
Competition for Timber Resources				*		*	
Effect on Beekeeping Industry	*					*	
Additional Plantations May Adversely Effect Agriculture							*
Should Establish Pulp Mill in South West						*	
Economic Aspects Questioned		*			*	*	
Importance of Tourism Understated					*	*	*
Conflict With Tourism	*				*	*	
Traffic Should Avoid Public Roads							
Should Recycle Paper or Obtain from Different Source						*	
Impact on Cottage Industries						*	

Appendix C

APPENDIX C

NATIONAL ESTATE LISTINGS

APPENDIX C

NATIONAL ESTATE LISTINGS

This appendix provides an analysis of the National Estate areas reviewed in the Australian Heritage Commission's (AHC) submission for the WACAP ERMP/draft EIS.

The appendix comprises:

- Table C1, the August 1987 listing of areas nominated for National Estate listing, from the Shires of Manjimup, Denmark, Boyup Brook, Nannup, Bridgetown, Greenbushes and Plantagenet.
- Table C2, an example of an AHC Listing Sheet.
- Table C3, an example of an AHC Preliminary Analysis Sheet for National Estate values.
- The bulk of the appendix which analyses current National Estate places on the basis of information provided on the summary sheets (Appendix 3, AHC submission) for those places for which these were provided. Other places are assessed on the basis of the listings sheets (Appendix 2, AHC submission). The analysis of the AHC's assessment of National Estate places has been undertaken by independent consultants in the course of producing this Supplement.

In the analyses section of this Appendix, information provided from the AHC submission is presented in small type, for example

> 1.1.3 Significance for richness or diversity

whereas this document's analyses are presented in standard type, for example

> COMMENT ON THE AHC ASSESSMENT
>
> (1) Repeat of Shannon/D'Entrecasteaux and Wattle-Soho reserves.

TABLE C1

AREAS NOMINATED FOR NATIONAL
ESTATE LISTING (AUGUST 1987) IN SELECTED SHIRES

Thomson Forest Area
Quininup Forest Area
Kinkin-Dordagup Area
Mt Burnside & Adjacent Forest Area
Sutton Forest Area
Brockman MPA & Adjacent Forest
Charley Forest Block
Dombakup MPA & Adjacent Forest
Northcliffe Forest Area
Meerup Forest Area
Wheatley MIll & Adjacent Forest
Dickson MPA & Adjacent Forest
Strickland MPA & Adjacent Forest
One Tree Bridge
Beavis, Giblett MPA's & Adjacent Forest
Lindsay/Solai Forest Area
Cleave Forest Area
Boorara & Muirillup MPA's & Adjacent Areas
Collis Forest Block
Gardner River Area
Upper Frankland River Area
Jane Forest Block
Ficifolia Nature Reserve
Perup Fauna Management Area
Shannon River Basin
Wattle, Johnston, O'Donnell, Mitchell
Proposed South Coast National Park
Lower Shannon
Deep River Basin
Milyeannup

TABLE C2

EXAMPLE OF AHC LISTING SHEET

LISTING FOR NANNUP SHIRE

NAME OF PLACE:

Karri Management Priority Areas
Shannon R. Drainage Basin & Res of Karri
009563 502054000501
Registered

LOCATION/BOUNDARIES:

58,000ha Located throughout the karri region
Comprises State forest Management Priority Areas: 6.3, 6.5 to 6.10, 11.1 to 11.6 and 13.1 to 13.5, being:

6.3	One Tree Bridge (forest block Gordon, Lewin)
6.5	Dickson (Easter, Iffley)
6.6	Iffley (Iffley)
6.7	Strickland (Strickland, Beavis)
6.8	Giblett (Giblett, Carey, Court)
6.9	Beavis (Graphite, Beavis)
6.10	Lindsay (Lindsay, Solai)
11.1	Hawke-Treen (Hawke, Treen)
11.2	Dombakup (Warren, Dombakup)
11.3	Brockman (Brockman)
11.4	Boorara (Boorara)
11.5	Muirillup (Muirillup)
11.6	Curtin (Curtin)
13.1	Lower Shannon (Chesapeake, Dixie, Broke, Pingerup)
13.2	Wattle (Mattaband, Wattle, Thomson)
13.3	Johnston-O'Donnell (Johnston, O'Donnell)
13.4	Mitchell-Crossing (Mitchell, Crossing)
13.5	Soho (Soho, Collis)

PROPERTY INFORMATION:

MPA's: 6.3, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 13.1, 13.2, 13.3, 13.4, 13.5

STATEMENT OF SIGNIFICANCE

This group of Management Priority Areas is of significant conservation value due to the presence of unmodified forest types including karri forest, tall jarrah forest, marri-jarrah forest, karri-marri forest and a number of other vegetation types. The MPA's are also of significance both for their diverse range of vegetation and representations of landscape and soil types.

A number of the MPA's contain rare or restricted plant species including the red flowering gum (Eucalyptus ficifolia) and rates tingle (Eucalyptus brevistylis)

DESCRIPTION:

The area is geomorphologically diverse with granite hills and laterite mantles separated by broad sandy valleys and younger incised valleys. Karri forest occurs on the younger soils of the hills and dissecting valleys. Jarrah forest and woodland occur on the lower slopes and laterites. The broad sandy valleys support sedgeland and heathland. The MPA's include a range of soil types including Pemberton, Balbarrup, Boorara, Quagering, Chudalup and several undescribed soil associations.

The vegetation type range from the virgin tall open jarrah and marri-jarrah forest in Dickson MPA, and the tall open karri in Strickland to other types such as Banksia and Casuarina shrublands in Johnston-O'Donnell. Rates tingle and the red flowering gum are recorded from Soho MPA and the yellow tingle from Mitchell Crossing MPA.

TABLE C3

EXAMPLE OF AHC PRELIMINARY ANALYSIS OF NATIONAL ESTATE VALUES
DEEP RIVER BASIN NATIONAL ESTATE VALUES

CRITERION NO.	CRITERION	VALUE
1.1.2	Significance to natural systems or processes (including genetic diversity)	(1) Undisturbed catchment of lower parts of Weld and Deep Rivers (2) Mosaic of different landforms, soils and associated vegetation types
1.1.3	Significance for richness or diversity	(1) High diversity of vegetation types: overlap between mountain, riverine and sandy upland communities, and N-S variation in vegetation (2) Rich fauna habitat for fish and amphibians (3) Diversity of old growth forest types: karri, rates tingle, yellow tingle, jarrah
2.1	Rarity or scarcity value	(1) Restricted fauna species: Geocrinea lutea (2) Rare/restricted/uncommon flora species: Reedia spathulata, Eucalyptus guilyfolei, E. brevistylis
3.1	Representative communities, ecosystems or landscapes	(1) Undisturbed old growth forests of karri, jarrah (at southern limits), rates tingle and yellow tingle (2) One of few remaining ± undisturbed wild river systems in south west Australia
5.1	Aesthetic significance	(1) Wild river with waterfalls (2) Diversity of landscape types, including incised valleys with outcropping granite area
8.1.3	Significance for benchmark or reference	(1) Undisturbed part of catchment (2) Fauna habitats, especially fish, amphibians (3) Undisturbed old growth forests (karri, jarrah, rates tingle, yellow tingle) ((4) Geomorphic gradients and changes in regional climate

ANALYSIS OF CURRENT NATIONAL ESTATE LISTINGS

(A) NAME OF PLACE DEEP RIVER BASIN

STATUS: Nomination.

(B) STATEMENT OF SIGNIFICANCE

The Deep River basin is one of the finest wild river systems in South West Australia. The basin area contains the almost undisturbed catchments for the lower parts of the Deep and Weld rivers. The area exhibits a high diversity of vegetation types with overlap between mountain, riverine and sandy upland communities and a north-south variation in vegetation. Existing within the area are a diversity of predominantly undisturbed old growth forests of karri, jarrah (at its southern limits) and Rates and yellow tingle. It is rich in fauna habitats, particularly for fish and amphibians. The frog Geocrinea lutea is restricted to an area between the Deep and Frankland rivers. Restricted flora species include Reedia spathulata, Eucalyptus guilfoylei and Eucalyptus brevistylis. All of these features make the area an important scientific reference site. The Wild river with its waterfalls, together with outstanding landscape values, including incised valleys with outcropping granite areas, makes the area an important tourist and recreational resource.

(C) ANALYSIS OF VALUES (From AHC "Summary of Current Information Sheets" Appendix 3 AHC Submission)

AHC CRITERION NO.	CRITERION	VALUE
1.1.2	Significance to natural systems or processes (including genetic diversity)	(1) Undisturbed catchment of lower parts of Weld and Deep rivers. (2) Mosaic of different landforms, soils and associated vegetation types.

COMMENT ON AHC ASSESSMENT

(1) Extensive harvesting operations have previously taken place in the Weld and Deep Forest Blocks. In addition smaller scale operations have taken place in Sharpe, Ordnance and Keystone Blocks. On this basis the statement that the catchments are undisturbed is rejected.
(2) The mosaic repeats that found in existing reservations including: Shannon, D'Entrecasteaux to the west and Johnston-O'Donnell-Mitchell to the north.

1.1.3	Significance for richness or diversity	(1) High diversity of vegetation types: overlap between mountain, riverine and sandy upland communities, and N-S variation in vegetation. (2)Rich fauna habitat for fish and amphibians. (3) Diversity of old growth forest types: karri, rates tingle, yellow tingle, jarrah.

COMMENT ON AHC ASSESSMENT

(1) Repeat of Shannon/D'Entrecasteaux and Wattle-Soho reserves.
(2) Rich fauna habitats for fish and amphibians are well protected by the river and stream reserves. In addition the extensive areas of wetland and flats will not be affected by future timber harvesting operations.
(3) The greatest diversity of old growth forest in the region is found in the adjacent Wattle-Soho and Walpole-Nornalup National Parks. These secure reserves contain all the types mentioned with the addition of red tingle and red flowering gum.

Timber harvesting will affect the old growth status of the forest types in the Deep river nominated place but not the diversity.

2.1	Rarity or Scarcity Value	(1) Restricted fauna species: Geocrinea (sic) lutea. (2) Rare/restricted/uncommon flora species: Reedia spathulata, Eucalyptus guilyfolei (sic), E. brevistylis.

COMMENT ON AHC ASSESSMENT

(1) Geocrinia lutea is a species of frog found in riparian environments. It would therefore not be affected by the proposal as these are protected in river and stream zones. Adequate representation occurs in adjacent areas including Walpole-Nornalup National Park.
(2) The uncommon species Reedia spathulata occurs in swamps and as such would not be affected by the proposal. Eucalyptus guilfoylei (yellow tingle) and E. brevistylis (rates tingle) are well represented in reserves (ref 7.1.4.3 WACAP EIS). There are no records held by CALM or the State Herbarium indicating the occurrence of E. brevistylis in the Deep River area.

3.1	Representative communities ecosystems or landscapes	(1) Undisturbed old growth forests of karri, jarrah (at southern limits), rates tingle and yellow tingle. (2) One of few remaining ± undisturbed wild river systems in south-west Australia.

COMMENT ON AHC ASSESSMENT

(1) See 1.1.3 above.
(2) The river and associated riparian vegetation will not be significantly affected by the proposal. The Shannon River basin was set aside to cover this aspect. See also comments on 1.1.2 above regarding previous harvesting history.

5.1	Aesthetic significance	(1) Wild river with waterfalls. (2) Diversity of landscape types, including incised valleys with outcropping granite area.

COMMENT ON AHC ASSESSMENT

(1) The "wild" river with waterfalls will not be affected due to the river zone protection.
(2) The diversity of landscape types, including incised valleys with outcropping granite area will be protected by existing CALM prescriptions covering landscape management. Better examples such as the Mt. Johnston granite peaks, Mt Mitchell, Woolbale rocks, Mt Pingerup and Mt Frankland areas have been retained in the existing reserve system. These areas together with adjacent flats and rivers exhibit equal or higher diversity.

8.1.3	Significance for benchmark or reference	(1) Undisturbed part of catchment. (2) Fauna habitats, especially fish, amphibians. (3) Undisturbed old growth forests (karri, jarrah, rates tingle, yellow tingle). (4) Geomorphic gradients and changes in regional climate.

COMMENT ON AHC ASSESSMENT

(1) See 1.1.2 (1) above
(2) See 1.1.3 (2) above
(3) See 1.1.3 (3) above
(4) The geomorphic gradients and changes in regional climate are better represented in the combined Shannon-D'Entrecasteaux reserves because together they sample a more extensive range. The extensive reserve systems of the Shannon-D'Entrecasteaux reserves represent a superior benchmark or reference area which will not be impacted by the proposal.

Conclusion: The paucity of the AHC information has led to an overstatement of the area's significance as an undisturbed catchment and wild river. The AHC has also misrepresented the information at its disposal by omitting the qualifying adjective 'almost' which was used by the nominator in describing the condition of the catchment as 'almost' undisturbed.

Most of the values of the area can and will be protected by CALM using established prescriptions. Included in this category are those values associated with the river and riparian vegetation and rare, restricted and uncommon flora and fauna.

All other values are better represented in the many, extensive adjacent reserves.

* * *

(A) NATIONAL ESTATE PLACE CHARLEY FOREST BLOCK

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

A range of landforms, soils and associated vegetation communities. Classic example of migratory dune system encroaching on wetlands. Representative of south coastal heathland and swampland vegetation types. Pristine condition. Highly aesthetic and attractive for tourists and recreators; important education site. A range of adjacent land systems - mobile dunes, swamps, stabilised dunes and lateritic uplands.

(C) ANALYSIS OF VALUES

The unique values nominated in the statement of significance are confined to the southern half of the block which contains the migratory dune system, wetland, heaths and associated drainage systems. Due to the nature of the landforms in this area, no harvesting activities are planned, however burning will occur in the future. As such these values will be unaffected by the proposal.

* * *

(A) NATIONAL ESTATE PLACE CLEAVE FOREST AREA

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Supplements D'Entrecasteaux National Park. Improves management. Has been subjected to little human interference.

(C) ANALYSIS OF NATIONAL ESTATE SIGNIFICANCE

The statement of significance has little to do with National Estate values. It concentrates more on changes to land use and management which are not the concern of the AHC. The information on which the nomination is based is incorrect. The area was lightly cut over initially before the impact of dieback was fully understood. As a result the area was badly infected and was then salvage harvested. It is highly doubtful if the site retains any National Estate values.

* * *

(A) NATIONAL ESTATE PLACE BEEDELUP NATIONAL PARK AND ADJACENT AREAS

STATUS: Beedelup National Park; Registered
Adjacent Areas; Interim list - objection outstanding

(B) STATEMENT OF SIGNIFICANCE

The Beedelup National Park and adjacent areas contain good examples of uncut old growth eucalypt forests. These include pure stands of karri, mixed karri-marri forest, pure marri and some stands of jarrah forest. The vegetation is representative of the western ecotypes of the karri belt, and contains some of the best examples of the taller karri forests in the region. The area includes ancient sandy deposits, in restricted upland locations, which support heath vegetation. The diversity of old growth forest types and heath vegetation give the area a high habitat diversity, and make it an important area for scientific benchmark studies. The diversity of vegetation types, the occurrence of extensive areas of the Crowea wildflowers, Crowea dentata and C. Augustifolia, and features such as the Beedelup falls, give the area high aesthetic and recreational significance. The area also contains the geographically restricted plant Choretrum lateriflorum.

(C) ANALYSIS OF VALUES (From AHC "Summary of Current Information Sheets" Appendix 3 AHC Submission)

AHC CRITERION NO.	CRITERION	VALUE
1.1.2	Significance to natural systems or processes (including genetic diversity)	(1) River systems and catchment areas. (2) Variety of landforms and associated ecosystems. (3) Karri, karri-marri and marri old growth forests.

COMMENTS ON AHC ASSESSMENT

(1) The Donnelly River and associated tributaries have been protected from significant impacts by the river and stream zone system. Outside of the riparian vegetation there have been extensive areas selectively harvested during and after the second world war in both the jarrah and karri forests. More recently clearfelling operations have been conducted in parts of Beavis and Graphite Blocks and in a limited area of Strickland Block. On the basis that these extensive operations have taken place, and that other harvesting operations are planned to take place in the catchment (both within and outside the place) the significance to natural systems and processes must be compromised. The whole Shannon River catchment was reserved for the purpose of providing a place where natural systems and processes could operate with minimal human interference. The Shannon therefore represents an area of considerably greater significance than that proposed.

(2) The variety of landforms and associated ecosystems are well sampled and represented by the existing reserve system including Beedelup National Park, proposed Strickland Nature Reserve and the road, river and stream zones which are all largely virgin forest. In view of the extent of harvesting operations that have taken place outside of these reserves the contribution of the 'adjacent areas' towards satisfying the requirements of this criterion must be in doubt because: "All values are diminished by human induced disturbance: The greater the magnitude of disturbance the greater the loss of significance" (AHC submission Section 2.1.2 p. 13).

(3) The full range of high forest types, representative of this part of the region are contained within the existing reserve system (Beedelup N.P. and proposed Strickland Nature Reserve). The best representation of pure marri occurs in the Beedelup National Park. Existing reserves contain the best and least disturbed old growth forests.

1.1.3	Significance for richness or diversity	(1) Examples of taller karri forests. (2) High habitat diversity.

COMMENT ON AHC ASSESSMENT

(1) The taller karri forests occur in the existing reservations and as such will not be affected.
(2) The greatest range of habitat diversity is found in the west Beavis Block which includes heath and stunted jarrah ranging through to tall open pure karri. (It is of interest that this area has been excluded from the more recent Beavis/Giblett maps and adjacent forest nomination because it has been "subjected to extensive clearfelling operations"). Clearfelling has not decreased the habitat diversity, instead it will increase with the added range of regrowth forest age classes. The heath and stunted jarrah forests would not be affected and substantial areas of old growth forests will be retained within the harvested area as road, river and stream zones (approximately 20%). On this basis the value for habitat diversity would be at least maintained.

2.1	Rarity or scarcity value	(1) Restricted plant species Choretrum lateriflorum

COMMENT ON AHC ASSESSMENT

(1) The status of this plant is discussed in Appendix B p. 3 of the WACAP ERMP/draft EIS. In essence the plant is widespread (including eastern Australia), has been recorded in regrowth karri stands and is likely to occur in Beedelup National Park. On this basis no significant impacts are anticipated from the proposal.

3.1	Representative communities, ecosystems or landscapes	(1) Old growth forests, mainly karri, karri-marri and marri. (2) Upland ancient sand deposits and associated heath.

COMMENT ON AHC ASSESSMENT

(1) See 1.1.2 (3) above.
(2) See 1.1.3 (2) above.
On this basis adequate representative communities will either be protected in reserves (old growth forests) or will not be affected (heaths), hence no significant impacts on this value are expected.

5.1	Aesthetic significance	(1) Beedelup Falls (2) Crowea wildflowers (Crowea dentata, C. angustifolia (3) Old growth forests.

COMMENT ON AHC ASSESSMENT

(1) The falls are wholly contained within the National Park therefore no impact will occur.
(2) Crowea wildflowers are abundant in the region including the reserves. Both species have been recorded in the regrowing forests.
(3) The existing reserve system includes "prime examples of high quality stands of virgin karri, karri-marri, jarrah-marri and marri forest types" (Pemberton National Parks Nomination - AHC Submission) and "tall virgin karri and karri-marri forest, together with sweeping landscapes create high aesthetic values" (proposed Strickland Nature Reserve and adjacent forest nomination - AHC submission). Other areas of virgin forest, and some of the selectively cut forest, in the remaining 'adjacent areas' of State forest have high aesthetic values. However access to these areas is very limited when compared with the existing reserves which are located in close proximity to high class bitumen roads. This enables the high aesthetic values of these forests to be appreciated by the many visitors drawn to the reserves.

8.1.3	Significance for benchmark or reference	(1) Range of old growth forests

COMMENT ON AHC ASSESSMENT

(1) Old growth forests. The existing reserve system has been designed to provide viable, representative samples of virgin, old growth forests. As discussed in 1.1.2 (3) above, the reserves are the only areas known to encompass the full range of forest types.

The 'adjacent areas', while including most of the forest types, have significant areas which have been harvested, thereby diminishing their value for benchmark studies.

The security of purpose and tenure for the reserve system will ensure their value for this purpose is maintained.

Conclusion: The use of incomplete and out of date information has led to an overstatement of the National Estate values of the 'adjacent areas' of State forest outside the reserve system. These areas do not contribute significantly to the values attributed to the place, all of which are adequately embodied in the existing reserve system.

The major recreational areas developed to enable visitors to appreciate the forests are also contained within the National Park. Other main recreational pursuits are centred around the river which is protected by the river and stream zones system. Hence no significant impact on these uses will occur.

* * *

(A) NAME OF PLACE WARREN NATIONAL PARK AND ADJACENT AREAS

STATUS: Warren National Park; Registered Adjacent areas; Interim list - objection outstanding

(B) STATEMENT OF SIGNIFICANCE

The area is significant for its excellent stands of uncut karri forest some of which have not been burnt for a long time. The forest is a good representative example of the western karri forest ecotype, with its distinctive associated understorey of Bossiaea laidlawiana. The area also contains stands of karri-marri forest, marri forest, and jarrah forest toward the southern limits of its range. The area contains the best known stands of the relatively rare potato orchid, and populations of the geographically restricted plant Choretrum lateriflorum. It also contains a wide range of native flowering plants that are significant in attracting tourists to the area. The Warren River is an important recreational area used as a fishing and canoeing site by visitors. The Hawke Block contains fine karri forest that is considered to be of particular importance in preserving the long term conservation values of the small Warren National Park and the adjacent Hawke-Treen MPA.

(C) ANALYSIS OF VALUES (From Summary of Current Information AHC Submission Appendix 3)

AHC CRITERION NO.	CRITERION	VALUE
1.1.2	Significance to natural systems or processes (including genetic diversity)	(1) River system and catchment areas (2) Variety of landforms and associated vegetation types (3) Old growth forests of karri, karri-marri, marri and jarrah

COMMENT ON AHC ASSESSMENT

(1) The Warren River its tributaries and adjacent riparian vegetation will be protected by river and stream zones. The remaining catchment areas have been, and are continuing to be harvested. As such, significance to natural systems or processes must be diminished. These values are provided for in the Shannon, D'Entrecasteaux and Wattle-Soho areas.
(2) Landforms and associated vegetation types typical of the western ecotype of the karri forest are well represented in the existing reserve system. The addition of south Hawke Block further replicates landform and associated vegetation types that are already sampled and replicated in the proposed Strickland Nature Reserve, Beedelup, Warren and D'Entrecasteaux National Parks and the proposed Hawke-Treen addition to Warren National Park.
If the objective of National Estate listing is to identify viable representative areas sampling the full variation of vegetation types in an undisturbed state then the existing reserve system more than meets this objective.
(3) As discussed above the 'adjacent area' in Hawke Block merely adds 'more of the same'. All the old growth forest types are well sampled and replicated in the existing reserve system. Clearfelling harvesting operations have been underway in the Hawke Block since 1985. These operations would diminish the value of these additional areas in terms of the stated criteria.

1.1.3	Significance for richness or diversity	(1) Variety of old growth forest types

COMMENT ON AHC ASSESSMENT

(1) See (3) above

2.1	Rarity or scarcity value	(1) Rare/restricted plant species: Potato Orchid, Choretrum lateriflorum

COMMENT ON AHC ASSESSMENT

(1) Choretrum lateriflorum (see Beedelup National Park and adjacent areas above)
(2) Potato orchid (Gastrodia sesamoides). The potato orchid is found throughout the karri forest and the eastern states of Australia.
Neither plant has any status as rare or restricted species (Appendix H, WACAP ERMP/draft EIS).

3.1	Representative communities, ecosystems or landscapes	(1) Old growth forests of karri, karri-marri, marri and jarrah (2) River system

COMMENT ON AHC ASSESSMENT

(1) The existing reserve system provides replicated areas with security of tenure and purpose which collectively are adequate to meet this criterion.
(2) The river system and associated riparian vegetation will be protected by the river and stream zones.

5.1	Aesthetic significance	(1) Warren River (2) Uncut old growth forests

COMMENT ON AHC ASSESSMENT

(1) The aesthetic values of the Warren River are protected within the National Park. Outside the park these values are protected by the river and stream zones within harvested areas. A tourist drive highlighting the aesthetic values of the river has been established within the Warren National Park. In addition the Bibbulmun walking track follows this alignment for part of its length. Both well marked and maintained alignments are designed to facilitate access for the many visitors to the park enabling them to appreciate the beauty of the place. Vehicular access to the river outside of the park is limited to a number of crossing points along log haulage roads. No access along the river is provided.
(2) The existing reserve system provides well established and marked access to prime stands of high aesthetic value in secure reservations. Public access to these areas is encouraged. It enables many visitors to appreciate the beauty of the forest.

Additional stands of high visual quality exist within the Hawke Block. Where these are judged to be significant (mainly in terms of height) they are reserved, where possible in conjunction with the river and stream zones. Hence while stands within the Hawke Block have undoubted high aesthetic quality the reserve system has stands of equal quality with good access for visitors. Significant stands within the Hawke Block will be protected through inclusion in the reserve system.

8.1.3	Significance for benchmark or reference	(1) Range of old growth forest types (2) Variation of karri vegetation in western part of its range

COMMENT ON AHC ASSESSMENT

(1) & (2) Both values are adequately sampled in the existing reserve system. The Hawke Block adds nothing to the range of old growth types. The existing reserve system has sufficient geographic spread to sample the full variation of the western karri ecotype.

Conclusion: The addition of the whole of the Hawke (south) Block does not significantly add to the National Estate values already recognised for the Warren National Park and the proposed Hawke-Treen additon to it. Values associated with the aesthetics of the Warren River will be protected within harvested areas by the existing reserve system as will stands of prime aesthetic value.

* * *

(A) NAME OF PLACE JANE FOREST BLOCK

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

One of the most extensive areas of virgin (unlogged) old growth forest remaining in the region. Contains a diversity of soil types and vegetation types. Of outstanding recreational value due to extent and high aesthetic qualities. Contiguous with Shannon proposed National Park representative of central part of karri region. Important area for maintenance of native ecosystem.

(C) ANALYSIS OF STATEMENT OF SIGNIFICANCE

The size and integrity of the Block is less than the Wattle-Soho reservation or the nearby Shannon River Basin.

The diversity of soil types is the same as that found in the adjacent Shannon River basin. The vegetation is characterised by a lack of diversity due to the absence of larger river systems, significant rock outcrops or wetlands, all of which support characteristic vegetation.

Because of the lack of diversity and a lack of significant permanent streams, the recreation opportunites cannot compare with those available elsewhere. The Block contains no significant features likely to attract recreation. Other nearby areas have been set aside for this purpose which contain significant features for example,

- Proposed Muirillup Conservation Park - Muirillup Rock
- Proposed Boorara Conservation Park - Lane-Poole Falls on the Canterbury Brook

The karri forest on parts of Jane Block is considered to be of high but not outstanding aesthetic quality. Stands of outstanding quality have been set aside in the existing reserve system with the appropriate infrastructure to allow visitors the opportunity to view the karri forest at the peak of its development.

The central karri vegetation type is well sampled and replicated by three adjacent reserves - Shannon, Muirillup and Boorara.

The native forest ecosystem will not be destroyed by present forest management. CALM management plans call for the block to be regrown, not cleared, as such the forest ecosystems will remain.

Conclusion: Jane Forest Block is not recognised as having any outstanding values that distinguish it from adjacent existing reserves.

* * *

(A) NAME OF PLACE BOORARA AND MUIRILLUP MPA's AND ADJACENT AREAS

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Representative of local variants of the soils, landforms and vegetation of the karri region. A range of landforms and vegetation types, including Muirillup rock outcrop, Ethel Gardner river valley. Aesthetic qualities include diverse scenery, rapids, virgin forest. Extensive areas are virgin (unlogged). Scientific studies are being conducted in the region. Tourist and recreational value.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The existing Boorara and Muirillup MPA's are proposed for classification as Conservation Parks zoned to preclude timber production. The reserves contain all the specific values forming the basis of the nomination.

These include the highly aesthetic Muirillup rock outcrop and the east Gardner River (not Ethel Gardner as per AHC statement of significance).

The adjacent areas contain a substantial area of even-aged karri regrowth resulting from previous harvesting operations (the complete Northcliffe Block). In addition Muirillup Block contains repurchased farmland which has been replanted with native and introduced eucalypts (research plots). The scientific studies being conducted in this area centre on establishment thinning and silviculture of a range of species.

Conclusions: The existing MPA's (proposed Conservation Parks) contain all of the unique values for which the place was nominated. These will not be affected. Inclusion of the adjacent areas conflicts with the AHC's statements concerning National Estate values of old growth forests (AHC submission P. 13).

* * *

(A) NAME OF PLACE BROCKMAN MPA AND ADJACENT FOREST

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Typical vegetation of central portion of karri region. Virgin (unlogged) karri forest. Forest stream and rapids highly aesthetic. Historical fire-lookout-tree. Extensive views. Important tourist and recreational ara.

(C) ANALYSIS OF STATEMENT OF SIGNIFICANCE

Most of the forest within the nominated place is not virgin. Selective harvesting took place in the 1930-40's. This previous harvesting is in evidence in historic photos of the Gloucester tree C. 1946.

CALM management plans nominate the existing MPA (plus a small extension to the north) for National Park status. Therefore these areas will be unaffected.

The southern extension into the 'adjacent forest' part of the nominated area does not contain any outstanding features, nor does it sample vegetation types not well represented in existing reserves. In addition it has also been selectively harvested in the past.

Conclusion: The values for which the place was nominated are all contained within the existing reserve which will not be affected by timber production.

The adjacent forest does not contribute to these values.

* * *

(A) NAME OF NATIONAL ESTATE PLACE DICKSON MPA AND ADJACENT FOREST

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Range of vegetation types, representative of west end of main karri belt. Virgin karri, jarrah and blackbutt forest. Range of landform and soil types and associated flora and fauna. High aesthetic values give the area high tourist and recreational pressure. The presence of Dickson fire tower enhances this potential. The area provides an important site for scientific study of regional variations in vegetation composition.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The high aesthetic values of the area are located in the western third of the nominated area. This centres around the picturesque valley of the Barley Brook and the lower reaches of the Big Easter Brook.

Under normal prescriptions (road, river and stream zones, avoidance of steep slopes and a small buffer around the Dickson tower) more than half the area between the proposed Dickson Nature Reserve boundary and the Vasse Highway would remain uncut. The highly aesthetic parts of this place would be protected by these measures. There are no current plans to develop the Dickson fire tower as a tourist facility (CALM 1987). In any case tourist use is not a recognised National Estate criterion.

No existing tourist pressure has been detected in the area. Recreational use appears to be concentrated on marron fishing along the streams. These places and the marron habitat would be protected by the stream zones and water quality protection measures employed by CALM.

The high quality jarrah forest in Dickson MPA (proposed to become a Nature Reserve), was selected on the basis that it reserved an outstanding example of very high quality, high jarrah forest.

The proposed Dickson Nature Reserve represents an opportunity for study of jarrah at the height of its development. Adjacent areas do not offer unique opportunites for this type of study.

Conclusion: The proposed Dickson Nature Reserve together with the reserved areas on the western end of the 'adjacent forest' define areas with possible National Estate values. These values would be protected by routine prescriptions and the tenure accorded to the proposed Dickson Nature Park.

The remaining eastern part of nominated area does not contain any unique National Estate values.

* * *

(A) NAME OF NATIONAL ESTATE PLACE GARDNER RIVER AREA

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Representative portion of karri region, landforms, soils and vegetation. Extensive areas of unlogged (virgin) karri and jarrah forest communities. Contiguous with D'Entrecasteaux National Park. Southern portion recommended for inclusion in National Park. Aesthetic landscape is important for tourism and recreation.

(C) ANALYSIS OF RECOMMENDATIONS

The nominated area is a very important fire buffer on the western flank of extensive, newly established karri regrowth in Boorara and Gardner forest blocks. As such, continued prescribed burning of this area is considered to be essential for the protection of the regrowth. The place contains no vegetation associations not already extensively conserved in the D'Entrecasteaux, Boorara and Shannon reserves. Land use recommendations in the statement of significance have relevance to the National Estate.

Only limited conservation values could be accorded to small unbuffered parts of the nominated place which are surrounded by cleared grazing and agricultural land.

Conclusion: No unique National Estate values have been identified for this area. Its continued use as a burning buffer will be required for at least 15 years, further limiting its value according to the AHC matrix. Its use as a burning buffer will preclude harvesting, at least in the major southern block for the duration of the time it is required as a buffer.

* * *

(A) NAME OF NATIONAL ESTATE PLACE KINKIN - DORDAGUP

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

An extensive area of high open forest and open forest, predominantly jarrah, but includes limit of karri forest. The karri forest is in a virgin (unlogged) condition. Area representative of local variant of vegetation assemblages. Contains a range of landforms and soils. The jarrah forest, although selectively logged, retains its native floristic assemblege. Area includes complete catchments of a number of tributaries of the Warren River, particularly Timbers Brook. Native forest types are very aesthetic and important for recreation.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The place is immediately adjacent to the northern extent of the Shannon River Basin. The values attributed to the nominated area are better represented in the Shannon which is substantially virgin in its northern end.

It is of interest that the nomination addresses the issue of the impact of harvesting on National Estate values and attributes values to previously harvested areas.

Conclusion: No unique values have been described for this area; the values that have been described are better represented in the adjacent Shannon River Basin.

* * *

(A) NAME OF PLACE LINDSAY/SOLAI FOREST AREA

STATUS: Significant portion already Registered, remainder; Nomination

(B) STATEMENT OF SIGNIFICANCE

Area comprises a number of catchments, Four Mile Brook, Record Brook and Scabby Gully; the latter being a harnessed water supply. Contains a range of vegetation types, characteristic of the region, including stands of virgin karri forest.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The virgin stands, if present, would be limited due to the close proximity of the Dean Mill. All stands of karri were selectively harvested from the 1930's onwards. More recent clearfelling operations have been undertaken and more are scheduled. Thinning operations in regrowth stands are planned.

The block is a good example of a production forest under intensive management for both timber and water.

The statements concerning the catchments contained within the place are misleading. Only the very upper reaches of the Record and Four Mile Brooks are within the place. The upper catchment of Record Brook also contains cleared private property.

Conclusion: The area has a long history of forest management. The nomination does not attribute any specific National Estate values to the place and none are immediately apparent.

* * *

(A) NAME OF NATIONAL ESTATE PLACE MEERUP FOREST AREA

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Representative of local variants of the landforms, soils and vegetation communities of the karri region. Comprises a diversity of vegetation communities, including virgin karri and jarrah forest and sedgelands. Contiguous with and proposed for inclusion in D'Entrecasteaux National Park. Aesthetic landscape of value for tourism and recreation.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The landforms, soils and associated vegetation types are well represented in the adjacent D'Entrecasteaux National Park. There have been no unique values identified for the place.

Proposals for a change in land use are of no concern to considerations of National Estate significance.

Recreation use is catered for in the adjacent park.

Importance to tourism is not a National Estate value.

Conclusion: Representative areas of the vegetation types are adequately represented in the adjacent park.

* * *

(A) NAME OF PLACE MT BURNSIDE AND ADJACENT FOREST AREAS

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Expansive views from Burnside fire tower over virgin karri and jarrah forest is of high aesthetic value. Proximity to highway increases its importance for tourism. High degree of naturalness. Logical extension to Wattle-Soho proposed forest reserve. Diverse vegetation especially on Mt Burnside. Representative of landforms, vegetation of eastern karri region.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The value of Mt Burnside as a lookout is being rapidly negated by the regrowth of surrounding trees. The tower is no longer open to the public and cannot be considered as a recreation facility. Importance for tourism is not a National Estate value.

Views of Mt Burnside from the Shannon River basin are insignificant; however no visual impact would occur because the western aspects are included in the reserve.

Visual management planning will be undertaken prior to any harvesting operations on the eastern faces of the hill. The proximity to the Shannon reserve and its highway frontage would be considered as part of this process.

The high degree of naturalness accorded to the area is not supported by fact. The jarrah forest in the northeast corner has been selectively cut.

The karri forest is well represented in large viable representative reserves to the east and west.

Land use recommendations to connect the Wattle-Soho and Shannon reserves through this place are not a National Estate consideration.

Conclusion: The aesthetic values of the place will be protected through visual management planning and inclusion of parts of the place in existing reserves.

No other values have been identified that are not extensively sampled to the east and west.

* * *

(A) NAME OF PLACE NORTHCLIFFE FOREST AREA

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Remnant stands of native forest within agricultural area. Virgin (unlogged) forest of outstanding aesthetic value, important for tourism and recreation. One area immediately adjacent to townsite represents local variant of regional landforms, soils and vegetation. Provides protection of water resouces.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The statement of significance overstates the aesthetic recreation and conservation values of the northern site. The site is small, irregularly shaped and surrounded by cleared farmland. It contains no vegetation which is not well represented in other adjacent reserves. It is not a known recreation site. The importance to tourism is not a National Estate value.

The southern portion is proposed for National Park status. As such, it would not be affected by the proposal.

* * *

(A) NAME OF PLACE TONE-PERUP RIVER AREA

STATUS: Registered

(B) STATEMENT OF SIGNIFICANCE

The Tone-Perup river area contains 5 rare or restricted mammal species, viz. the woylie (Bettongia penicillata), the tammar wallaby (Macropus eugenii), the numbat (Myrmecobius fasciatus), the chuditch (Dasyurus geoffroii) and the western ringtail possum (Pseudocheirus peregrinus), and is thus of very high faunal conservation significance. The area contains a diversity of ecosystems, including significant stands of jarrah old growth forest, jarrah-marri old growth forest and wandoo woodland. The area is part of the catchment for the Perup river and contains regions of wetlands. It is rich in plant species, some of which are uncommon, and in mammals. The latter include 18 species of marsupials, 2 native rodents and 7 bat species. The area is of scientific and educational importance as a research centre for fauna ecology and management. The gently undulating terrain, occasional granite outcrops and the river also give the area high aesthetic value.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The value of this area as a wildlife habitat has been recognised and is the reason for its status as a Nature Reserve. CALM's management of the area will not include any timber harvesting operations.

The area has a long history of forest harvesting and burning while retaining its aesthetic and natural values.

* * *

(A) NAME OF PLACE THOMSON FOREST AREA

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Inland limit of range of karri forest. Range of landforms and associated vegetation types. Forest has not been subjected to logging or other human pressure. Aesthetic and wilderness values are an important recreational resource.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The values for which the place has been nominated are all better represented in the nearby Wattle-Soho National Park. The limited size of the area and the presence of numerous tracks and roads means that the area cannot be considered to have any value as a wilderness. No obvious recreational uses nor evidence of existing demand for such uses exist.

The area is partially used as a prescribed burning buffer.

Conclusion: The area has no values not better represented in the nearby Wattle-Soho National Park.

* * *

(A) NAME OF PLACE DOMBAKUP MPA AND ADJACENT FOREST

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Virgin (unlogged) mature karri forest covers almost all of area. Highly aesthetic, important for tourism and recreation. Characteristic of Pemberton soil and landform association.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

Under the new management system the nominated area will be proposed as a Conservation Park (CALM, 1987). As a consequence the area will be excluded from harvesting.

No values have been put forward that are not better, more appropriately represented in the Pemberton and Warren Hawke-Treen National Parks. No obvious recreational opportunities exist nor are there signs of any demand for this area.

* * *

(A) NAME OF PLACE DONNYBROOK SUNKLANDS

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Conservation and preservation of Blackwood river between Augusta and Nannup, the islands and foreshore.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The area is proposed as a Conservation Park and will not be affected by harvesting.

* * *

(A) NAME OF PLACE QUININUP FOREST AREA

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

A discrete area of karri and jarrah forest amongst rural land. Represents dry margin of central portion of karri region. Virgin (unlogged) karri forest, with highly aesthetic character. Comprises a National Park and adjacent forest. Situated adjacent to highway, so of value for tourism.

(C) ANALYSIS OF THE STATEMENT OF SIGNIFICANCE

The National Park contains the elements of high aesthetic character including: mature forest and the Warren river frontage with steep banks down to the river. The park is managed for recreational uses taking advantage of its proximity to the highway.

The area has limited conservation value because of its small size, irregular shape and it is largely surrounded by private property, hence no buffering.

No differences between vegetation in this place and large viable reserves such as Wattle-Soho and Shannon would be expected.

Approximately half of the area is a prescribed burning buffer.

Conclusion:

No values identified in the nomination warrant registration. Tourism is not a National Estate Value.

* * *

(A) NAME OF PLACE ONE TREE BRIDGE

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Medium size perennial stream suitable for fishing; historical bridge; outstanding examples of karri trees; areas of karri and jarrah forest. Representation of a range of soils and landforms and associated vegetation and fauna characteristic of the western portion of the karri forest region; important recreational and tourist site.

(C) ANALYSIS OF STATEMENT OF SIGNIFICANCE

The nominated place is proposed as a Conservation Park. CALM intends to thin existing regrowth to enhance its aesthetic appeal for recreators. No conflicts are anticipated with any National Estate values.

* * *

(A) NAME OF PLACE WHEATLEY MILL AND ADJACENT FOREST

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Northwest representation of karri forest and associated vegetation communities; important forest recreational site centred on old mill and townsite; virgin karri and marri-jarrah forest.

(C) ANALYSIS OF STATEMENT OF SIGNIFICANCE

The recreational and historical values of the area have been recognised and provided for by CALM. Included in this category is the Bibbulmun trail which passes close to the old settlement.

The jarrah forest has been cut-over previously, some of it heavily. The karri forest in the vicinity of the township is a young mature stand of high aesthetic quality. The remaining areas have been cut over and regenerated by selective harvesting.

Continued harvesting in an appropriately sensitive manner would be in accordance with the historic values of the area.

The northwest karri forest communities are represented in the Dalgarup Nature Reserve which is further to the north.

Conclusion: The values of the area lie in its historical association with sawmilling and managed forests, and its aesthetic and recreational uses.

Sensitive harvesting operations would not adversely affect these values.

* * *

(A) NAME OF PLACE UPPER FRANKLAND RIVER AREA

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Area contains strip of vegetation across climatic gradient valley of upper Frankland river, contrasts with poorly drained plateau. Characteristic of dryer part of southern jarrah forest. Level of human interference low. Therefore high wilderness and aesthetic values. Important potential recreational area. Entire catchments of tributary streams.

(C) ANALYSIS OF STATEMENT OF SIGNIFICANCE

The natural values of the Frankland river have been compromised by its salination following extensive agricultural clearing in the upper catchment. The vegetation is sampled by Lake Muir nature reserve to the north and Wattle-Soho to the south. The riverine vegetation would be protected by the river and stream zones.

The southern half of the place includes jarrah forest considered to be more productive and hence atypical of the drier jarrah type.

The more productive forest is well sampled in the Wattle-Soho National Park which abuts to the south.

The area is an important burning buffer and CALM would seek to continue this function irrespective of tenure or purpose.

The area conforms to no known wilderness criteria because of its narrow linear shape and the presence of numerous roads and tracks through the area.

During harvesting, recreational use of the river would be protected by the river and stream zones, as would the scenic amenity of this part of the area including features such as Mt Roe.

Conclusion: The proposal would not significantly enhance National Estate values not represented elsewhere on the register.

* * *

(A) NAME OF PLACE COLLIS FOREST PARK

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Contains a range of landforms, soils and vegetation communities characteristic of eastern extremity of karri region. Virgin (unlogged) forest with little disturbance. Within viewshed of Mt Frankland which has important values for tourism. Inherently aesthetic contiguous with Frankland and Soho MPAS.

(C) ANALYSIS OF STATEMENT OF SIGNIFICANCE

A high proportion of the nominated area supports non-forest vegetation and forest at sub-commerical value. Karri forest is largely confined to the river corridor. The forest is outside the woodchip licence area.

* * *

(A) NAME OF PLACE SUTTON FOREST AREA

STATUS: Nomination

(B) STATEMENT OF SIGNIFICANCE

Represents local expression of karri region landforms, soils and vegetation, contains extensive areas of virgin karri and jarrah forest. Includes headwater tributaries of Quininup Brook. Contiguous with Shannon basin proposed national park. Highly aesthetic forest scenery, important for tourism and recreation. 1969 clearfell coupe of scientific value in monitoring regeneration after logging.

(C) ANALYSIS OF STATEMENT OF SIGNIFICANCE

The nominated area is adjacent to the Shannon Basin and does not differ from that area. No values can be attributed to Sutton Block that are not better represented in the larger secure reserve in the Shannon River Basin.

The block is being used as a hydrological study area. This work is partially complete as one out of three small catchments has been cut to date with another to be harvested shortly. A considerable amount of research has been undertaken to date and CALM intends to complete the experiment. The area is partially prescribed burnt as part of a burning buffer.

The roadside protection zones will preserve the aesthetic values of the forest adjacent to the main road.

Recreational use of this forest type will be directed towards forests in the Shannon River Basin where no conflict with harvesting activities will occur and where facilities exist to handle this use.

Conclusion: The adjacent Shannon River Basin exhibits the same values attributed to this place with the added benefits of being a larger reserve to be managed as a National Park.

* * *

Appendix D

APPENDIX D

PRIVATE PROPERTY STATISTICS

APPENDIX D

PRIVATE PROPERTY STATISTICS

TABLE D1

WACAP PRIVATE PROPERTY
AREA OF SUPPLY

SHIRE	RURAL RATEABLE LAND (ha)	TOTAL NON RATEABLE LAND (ha)	TOTAL AREA (ha)
ALBANY*	283,300	158,700	442,100
AUGUSTA/MARGARET RIVER	86,300	142,400	237,000
BOYUP BROOK	205,200	74,500	283,600
BRIDGETOWN/GREENBUSHES	65,300	70,100	135,500
BUSSELTON	89,300	42,300	131,600
CAPEL	37,100	11,500	55,400
COLLIE	42,100	124,100	166,200
DARDANUP	29,500	22,300	52,900
DENMARK*	50,000	133,700	184,300
DONNYBROOK-BALINGUP	71,300	82,500	154,000
HARVEY	93,400	83,200	176,600
MANJIMUP*	107,000	576,800	689,400
NANNUP	51,400	241,900	295,300
PLANTAGENET*	306,800	175,700	482,700
TOTAL	1,518,000	1,939,700	3,486,600

Source: WA Local Govt. Grants Commission 1984-85 Figures

* The total area of these 4 shires is the base project area (1,802,200ha) studied in the McLean Forest Project

TABLE D2

WACAP PRIVATE PROPERTY HARVESTING 1987

SHIRE	FARMS	PAPERWOOD (tonnes)	PAPERWOOD+ (m^3)	AREA* (ha)
MANJIMUP	47	42,728.8	35,165.8	703.3
MARGARET RIVER	12	4,222.1	3,474.8	69.5
BUSSELTON	9	10,325.1	8,497.6	170.0
BUNBURY	5	901.1	741.6	14.8
DONNYBROOK	9	5,574.6	4,587.9	91.8
BOYUP BROOK	9	3,774.2	3,106.2	62.1
BRIDGETOWN	7	1,262.6	1,039.1	20.8
PLANTAGENET	3	5,517.8	4,541.1	90.8
ALBANY	3	806.0	663.3	13.3
DENMARK	3	3,791.2	3,120.2	62.4
COLLIE	2	6,860.5	5,646.2	112.9
HARVEY	1	59.3	48.8	1.0
NANNUP	1	1,538.9	1,266.5	25.3
TOTAL	111	87,362.2	71,899.1	1,438.0

\+ Conversion factor 0.8230m^3/tonne PAPERWOOD

* Average removal 50 tonnes/ha

Appendix E

APPENDIX E

RARE AND ENDANGERED FAUNA SPECIES IN THE LICENCE AREA

APPENDIX E

RARE AND ENDANGERED FAUNA SPECIES PRESENT IN THE LICENCE AREA

Species:	Woylie (Bettongia penicillata ogilbyi)
Habitats:	Open forests and woodlands with clumps of low tussock grasses or low woody scrub (Christensen, in Strahan 1983)
Distribution:	Formerly ranged widely across most of the drier areas of southern Australia. Now survives only in two pockets in Queensland (the subspecies B.p. tropica) and small areas in south western Western Australia (the subspecies B.p. ogilbyi). The nominate subspecies which occurred in south-eastern Australia is now extinct
Likelihood of Impact:	Unlikely as it is not known to occur outside the above mentioned areas (Christensen, in Strahan, 1983)
Occurrence in Reserves:	Tuttaning Reserve, Dryandra State forest and the proposed Perup Nature Reserve

* * *

Species:	Numbat (Myrmecobius fasciatus)
Habitats:	Its present habitat is eucalypt forest, particularly areas dominated by wandoo or jarrah (Friend and Kinnear, in Strahan 1983)
Distribution:	Formerly ranged widely across southern Australia. Currently only known from the south-west of Western Australia
Likelihood of Impact:	Unlikely as the species prefers the drier, more open forests to the north of the licence area. In fact W.A. Museum records show that only one specimen has ever been collected within the licence area, a skin and skull from Manjimup in 1935
Occurrence in Reserves:	Proposed Perup Nature Reserve, Dryandra State forest and Lane-Poole Reserve

* * *

Species: Tammar Wallaby (Macropus eugenii)

Habitats: "The Tammar Wallaby requires dense low vegetation for daytime shelter and open grassy areas for feeding. It inhabits coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland" (Smith, in Strahan 1983)

Distribution: South-western W.A. including Abrolhos Islands and Recherche Archipelago. Also Eyre Peninsula and nearby islands including Kangaroo Island in Souther Australia.

Likelihood of Impact: Unlikely as species does not enter the high forest formation on which the project is centered

Occurrence in Reserves: In the South West it is known from Fitzgerald National Park, Proposed Perup Nature Reserve, Tuttaning, Dryandra and Boyagin Reserves. Since 1970 it has been recorded from the above localities plus the Ravensthorpe-Esperance Road, Abrolhos Islands, Recherche Archipelago, Garden Island and Cocanarup Spring. Status is listed as "common, limited" (Smith, in Strahan 1983)

* * *

Species: Western Quoll (Dasyurus geoffroii)

Habitats: Little is known what determines its local distribution but it does not seem to be restricted by narrow botanical, geological or climatic factors. Within the jarrah forest it appears to be more common on ridge tops where it shelters in hollows beneath laterite boulders

Distribution: Formerly occurred over much of southern Australia. Currently restricted to Papua New Guinea and the south-west of W.A.

Likelihood of Impact: The removal of large areas of forest within the licence area could have a deleterious effect on local populations. However, the species occurs widely within the South West forests (mostly already heavily harvested), wheatbelt reserves (Bendering), and in the goldfields (Bungabbin area), so consequently the project does not pose a serious threat to the survival of the species.

Occurrence in Reserves: Its status is recorded as "sparse to rare, scattered in southwestern Australia (Arnold, in Strahan 1983). Due to the inadequate amount of survey work carried out on reserves in the south-west of W.A. it is difficult to assess populations on reserves, though local naturalists have reported a general increase in its numbers in recent years. Consequently it is fair to suggest that it would probably occur on most larger reserves. Known from the Proposed Perup Nature Reserve

* * *

Species: Western Ringtail Possum (Pseudocheirus occidentalis)

Habitats: Mainly found in association with Peppermint woodland (Agonis flexuosa), especially where mature, with hollows and interlocking branches.

Distribution: Data in McKay (in Strahan, 1983) indicates a range throughout the south-west from about Perth in the north to about Bremer Bay in the south-east. However W.A. Museum records suggest a more limited distribution, being confined to coastal and near coastal country and the deep south-west with few inland records, i.e. Tuttaning Reserve (1961), Collie, (1975), Gracefield (1909) and Cranbrook (1905 and 1908), although it is not known if these populations are still extant.

Likelihood of Impact: It must be stressed that the Western Ringtail Possum is still poorly known in terms of distribution in the South West and is considered to be "particularly rare" (McKay in Strahan, 1983) and its numbers although fluctuating, are considerably reduced and that some range contraction is still occurring (Christensen et al 1985). Despite extensive fieldwork in the south-west How et al (in press) only found apparently viable populations in the towns of Busselton, Quindalup, Dunsborough, Augusta and Albany. It is also known from the Two Peoples Bay Reserve (Hopper, 1981) and a few forest locations (Christensen et al 1985). The preferred habitat of mature peppermint woodland, while it occurs throughout the South West forest, is confined almost entirely to valleys and gullies and is therefore protected in river and stream zones. On this basis, there should be little impact on this species. However, in view of the lack of knowledge about the species, further research is warranted.

Occurrence in Reserves: Proposed Perup Nature Reserve, Tuttaning Reserve (1961), Porongorup National Park (1977), Two People Reserve and the Leewin - Naturalist National Park. It still occurs at Albany, Augusta and the Busselton - Dunsborough area, though numbers in the latter locality have suffered a decline since the early 1970's.

* * *

Species:	Crested Shrike-tit (Falcunculus frontatus)
Habitats:	"Favouring the lighter timbered wandoo, salmon gum and jam country, but not venturing far into the heavy jarrah forest areas". (Serventy and Whittell, 1967)
Distribution:	In W.A. - South-west corner of State from about Kalbarri in the north to Israelite Bay in the east. Also for north Kimberley. Occurs widely in the eastern states
Likelihood of Impact:	Probably little (see Habitats)
Occurrence in Reserves:	Probably occurs from time to time in most reserves with suitable habitat, especially in the drier areas of the South West

* * *

Species:	Peregrine Falcon (Falco peregrinus)
Habitats:	"Coastal or inland cliffs and gorges, timbered water courses, generally near rivers and swamps, plains, open woodlands" (Pizzey 1980)
Distribution:	Australia wide and indeed nearly world wide
Likelihood of Impact:	Due to its preference for more open habitats and its widely ranging distribution, it is not expected that the project will have any significant effect on this species
Occurrence in Reserves:	Probably occurs in most reserves in the South West due to its mobile nature

* * *

Species:	Red-eared Firetail (Emblema oculatum)
Habitats:	"Mostly restricted to undergrowth of heavy forests, heavy vegetation along creeks and gullies in ranges, dense coastal scrubs, wet coastal heaths, paperbark swamps" (Pizzey 1980)
Distribution:	Coastal and near coastal WA from Mundaring Reservoir to Manjimup - Pemberton and to the country east of Esperance
Likelihood of Impact:	Little due to its preference for watercourses and gullies
Occurrence in Reserves:	Probably occurs in most reserves within its distribution which have suitable habitat

* * *

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Christensen, P., Annels, A., Liddelow, G. and Skinner, P. (1985). Vertebrate Fauna in the Southern Forests of Western Australia, a Survey. Forests Dept. of Western Australia, Bull. No. 94. Perth.

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Strahan, R. (ed.) (1983). Complete Book of Australian Mammals. Sydney: Angus and Robertson, 530 pp.

Pizzey, G. (1980). A Field Guide to the Birds of Australia. Sydney: Collins.

Kitchener, D.J. and Vicker, E. (1981). Catalogue of Modern Mammals in the Western Australian Museum, 1895 to 1981. A Western Australian Museum Publication.

* * *

Appendix F

APPENDIX F

AHC COMPATIBILITY MAXTRIX:
NATIONAL ESTATE VALUES BY FORESTRY PRACTICE

(Source: AHC Submission on the WACAP Towards 2005 ERMP/draft EIS, 1987)

APPENDIX 4

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]

Appendix G

APPENDIX G

LIST OF SUBSTANTIVE AND PROFORMA SUBMISSIONS RECEIVED BY THE ENVIRONMENTAL PROTECTION AUTHORITY AND BY THE DEPARTMENT OF ARTS, HERITAGE AND ENVIRONMENT

APPENDIX G

LIST OF SUBSTANTIVE AND PROFORMA SUBMISSIONS RECEIVED BY THE ENVIRONMENTAL PROTECTION AUTHORITY AND BY THE DEPARTMENT OF ARTS, HERITAGE AND ENVIRONMENT

NAME OF AUTHOR(S)	AREA
Aldridge, C.D.	Nannup
Anderson, R. & J.	Yallingup
Andrade, M.	Hilton
Australian Heritage Commission	Canberra
Barber, P.M.	Attadale
Bartrop, R.	Nannup
Berry, C.	Craigie
Butler, G.	Mt. Lawley
Carlia, J.	Claremont
Chandler, R.	Fremantle
Chapman, L.	Chidlow
Chappelle, C.	Denmark
Chidgey, P.	Lesmurdie
Churchward, B.	Floreat Park
Clark, K.	Denmark
Coalition for Denmark's Environment (Chapelle, C.)	Perth
Collinson, G.	Wembley
Cownie, J. and Friends	Capel
Cross, D.	City Beach
Darbyshire, J.	Neerabup
Department of Primary Industry (Allan, P.B.)	Perth
Department of Transport	Perth
Doncaster, A.	Cowaramup
Duncum, S.	Balingup

NAME OF AUTHOR(S)	AREA
Ewing, P. & Pickford, M.	Cottesloe
Fenbury, H. & Friends	Subiaco
Flood, R.	East Fremantle
Forest Products Association (Kneen, C.)	West Perth
Forests First (Sharp C.)	Bridgetown
Forests First (Wallman & Friends)	
Funck, A.	Denmark
Great Southern Wilderness Expeditions, (Crowe, C.)	Denmark
Hall, R.	Mt. Lawley
Handcock, B.	Bunbury
Hanson, M.	Denmark
Harman, A.	Denmark
Harries, M.	Subiaco
Harwood, D.	Denmark
Hawke, J.	South Fremantle
Hawken, K. & P.	Margaret River
Hay, M.C.	Dalkeith
Hill, A.	Pep. Grove
Hiller, J.M.	Nedlands
Hook, N.	Denmark
Hook, P.	Denmark
Humphries, R. & Keys, N.	Graylands
Hunter, R.C. & K.E.	Manjimup
Irving, C.J.	East Fremantle
James, C.G.	Crawley
Johnston, P.	Palmyra
Keynes, L. & A. & Friends	Cloverdale

NAME OF AUTHOR(S)	AREA
Ladwig, B.	Denmark
Lalor, A.	Denmark
Lantzke, I.R.	Perth
Lindsey, C.P.	Albany
Lodge, K. & R.	Denmark
MacDonald, B.	Orelia
Mairata, A.	South Perth
Mawson, G.B.	Esperence
Merrilees, D.	Manjimup
Middlesex Mill (Drake, A.F.)	Manjimup
Milne, K.	Walpole
Monier Roofing (Johns, T.R.)	Belmont
Neville, S. & Duxbury, L.	Denmark
Nordon, M.	Strathfield South, NSW
Nowak, R.	Witchcliffe
Oldfield, S.	Lesmurdie
Oliver, D.	Denmark
OSEC Coalition for Sensible Environment Conservation (Omodei, P.)	Manjimup
Palmer, S.R.	Busselton
Pearce, J.	Walpole
Perth Bushwalkers Club (Amey, L.D. & DaCosta, S.)	Perth
Rankin, D.	Margaret River
Ranzetta, P. & G.	City Beach
Redapple, S.	Ardross
Richter, M.	East Fremantle
Riney, T.	Denmark
Saddleton, D.S.	Donnybrook

NAME OF AUTHOR(S)	AREA
Sammut, V.	Leederville
Shultz, B.	Nedlands
Shultz, R.	Nedlands
Schur, B.	Cottesloe
Sheils, B.H.	Mt. Hawthorn
Shire of Bridgetown/Greenbushes	Bridgetown
Shire of Manjimup (Jorgensen, M.A.)	Manjimup
Sinclair, H.	South Perth
South-west Alternative Network	Bridgetown
South-west Forest Defence Foundation	Perth
Spurge, K.C.	Coolup
Stanley, R.	Nannup
Stanton, J.	Shenton Park
State Planning Commission	Perth
Stretch, W.N. (MLC)	Wagin
Sturcke, M.	Morley
Sundstrom, P.	Nornalup
Switzer, C.	East Fremantle
The Inst. of Foresters of Australia (Keene, D.J.)	Perth
The National Trust of Australia (WA) (Feilman, M.A.)	West Perth
The Tree Society (Hooper, C.)	Mt. Lawley
The Wilderness Society (Fraser, M.)	Perth
Thomson, J.A.	South Perth
Time for Change - Joint Submission by:	
Australian Conservation Foundation	
Campaign to Save Native Forests	
Conservation Council of WA (Inc.)	
Coalition for Denmark's Environment	Perth

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OUR REF: PBG:jm
YOUR REF:

February 19, 1988

Enviromental Protection Authority,
1 Mount Street,
PERTH, W.A. 6000

ATTENTION: Mr. C. Murray

Dear Sir/Madam,

In April of this year you received at least one copy of the WACAP Enviromental Review and Management Programme/Draft Enviromental Impact Statement titled "WACAP TOWARDS 2005".

"WACAP TOWARDS 2005" was produced by WACAP to meet the requirements of the Western Australian Enviromental Protection Act 1986 and the Commonwealth Enviromental Protection (Impact of Proposals) Act for WACAP to extend all State and Federal Government licenses under which WACAP converts residue eucalypt paperwood to woodchips for export from their current expiry in 1991 to 2005.

"WACAP TOWARDS 2005" has been reviewed by the public, and by both State and Commonwealth Government agencies who have since made submissions to the State or Federal Governments. These submissions have been reviewed and the responses are included in the attached "Supplement".

Please place this "Supplement" with "WACAP TOWARDS 2005" because, when combined, they form the final Enviroment Impact Statement with which WACAP's operations will comply together with conditions imposed by Government Authorities to the year 2005.

We request that you immediately place both documents in a prominent position in your establishment where they can be accessed and read by the Public.

Thank you for your co-operation in this matter.

Yours faithfully,

P.B. GEORGE,
Commercial Manager.

Enc.

NAME OF AUTHOR(S)	AREA
Townley, J.	Denmark
Van Hooft, F.	Albany
Wallent, E.	Manjimup
WAFF - Beekeepers Section (Pollard, R.)	Perth
Water Authority of Western Australia	Perth
West Australian Wildflower Society (Welsh, C.)	Nedlands
Western Australian Department of Agriculture (Halse, N.)	Perth
Western Australian Tourism Commission	Perth
Whittakers Ltd.	Welshpool
Williams, P.C. & La Brooy, S.R.	Leeming
Wylie, A.	Trigg
Zlatnik, D.	Darlington

1 year old treefarm near Manjimup

12 year old treefarm near Nannup

WACAP

TOWARDS 2005