National Estate Values in the Southern Forest Region of South-West Western Australia

4

- Volume Four -

Appendix 4

Australian Heritage Commission - Guidelines for Protection of National Estate Values

AUSTRALIAN HERITAGE COMMISSION

Department of Conservation and Land Management

NATIONAL ESTATE VALUES IN THE SOUTHERN FOREST REGION, SOUTH-WEST WESTERN AUSTRALIA

Volume Four

Joint Report by
the Australian Heritage Commission
and the Department of Conservation and Land Management, WA

February 1992

ISBN 0 642 17045 2

DRAFT REPORT

NATIONAL ESTATE VALUES IN THE SOUTHERN FOREST REGION, SOUTH-WEST WESTERN AUSTRALIA

APPENDIX 4

AUSTRALIAN HERITAGE COMMISSION - GUIDELINES FOR PROTECTION OF NATIONAL ESTATE VALUES

TABLE OF CONTENTS

This document was prepared by the Australian Heritage Commission in co-operation with the Department of Conservation and Land Management.

1. INTRODUCTION

In 1991 the Australian Heritage Commission and the WA Department of Conservation and Land Management (CALM) jointly carried out a regional study in the Southern Forest Region of south-west Western Australia. The study involved two main aspects: the assessment of places of national estate significance in the Region, and the development of guidelines for the regional protection of the places identified as being significant. The study is described in the draft report *National Estate Values in the Southern Forest Region, south-west Western Australia* ('the Report').

Many different attributes of national estate significance were identified throughout the southern forests. The occurrence of value within the forests may be either extensive or relatively site specific in character, e.g. extensive wilderness areas compared to smaller areas for rare plant species. Forty-four places in the Region, called 'indicative areas' in this Appendix, were assessed as having national estate values above the threshold of significance, while another 40 sites were identified as significant solely due to the presence of rare or endangered species.

The statutory functions of the Australian Heritage Commission include the identification of the National Estate and the provision of advice on its conservation. Part V of the *Australian Heritage Commission Act 1975* - Protection of the National Estate - places obligation on Commonwealth Ministers, department or agencies to take national estate values into account when making decisions affecting national estate places. In particular, when a decision will have an adverse effect on national estate values, consideration must be given to feasible and prudent alternatives and, where none exist, to minimising those adverse impacts.

State Governments and their agencies are not covered by the *Australian Heritage Commission Act 1975*. However, CALM considered that the provision of advice from the Commission concerning the protection of national estate values in the Southern Forest Region would be useful, as CALM has acknowledged the national estate values in the Region and has integrated the need to manage for the protection of national estate values within its forest management planning.

This Appendix contains the Commission's advice to CALM concerning principles for the protection of national estate values within the Region. The advice is based only on national estate considerations: the protection of each national estate value within time and space. Other considerations, such as human use of the forest, economic matters and the like are not the business of the Commission. It should be noted that this advice does not preclude the necessity for section 30 referrals on proposals requiring a Commonwealth decision.

The advice contained in this Appendix should not be taken as prescriptive guidelines or obligations. The Commission is not a land management agency, and it is not within its charter to develop management guidelines or prescriptions. The guidelines provided are, however, consistent with the Commission's statutory role of providing advice on the protection of the National Estate.

The Commission wishes to emphasise that this advice is the Commission's current views on the protection of various national estate values and notes that, particularly in relation to natural environment values, ongoing research and management activities are constantly improving understanding of national estate values.

2. CONTEXT OF ADVICE

The Commission's advice has been developed in relation to proposed timber production operations within the Southern Forest Region. The focus on timber production was in recognition that the only current, major Commonwealth involvement in the Southern Forest Region under section 30 of the *Australian Heritage Commission Act 1975* is in relation to the export of woodchips. As outlined in the Report, the Commission intends to use the outcomes of the joint assessment of the forests, and this advice, as the basis for drafting its advice to the Commonwealth Minister for Resources on the impact of export woodchip operations on national estate places in the Southern Forest Region.

The Commission fully recognises that attributes of national estate significance are sensitive to a wide variety of land use activities. Such activities include:

- roading, which can destroy site specific values, or have a significant adverse impact on more extensive values such as wilderness;
- the construction of dams, which can have a similar impact;
- the construction of power lines, which can also impact both site specific values as well as more extensive values like undisturbed forest, wilderness etc;
- mining, which can destroy site specific values, and have a significant adverse impact on extensive values;
- agricultural clearing, which may completely destroy natural environment values, with the likelihood that such values may never return; and
- urban expansion, which may have a similar impact.

In the event that such activities within the Southern Forest Region involve Commonwealth decision-making, the Commission will be developing similar advice, based on the values identified through the regional assessment process and their sensitivity to the specific types of activities proposed. Should other decision-makers, such as State Government agencies or private corporations, request such advice, the Commission will be pleased to provide it, again, based on the information and methodology of the work to date.

3. BASIS OF THE COMMISSION'S ADVICE FOR THE SOUTHERN FOREST REGION

The national estate values of the Southern Forest Region were identified jointly by the Commission and CALM using the Commission's criteria for significance. The methodology used for this identification is contained within Appendix 1 of the Report, while the values are listed in Appendix 2 of the Report.

Following the identification of attributes and assessment of national estate values, the Commission assessed the representation of each value firstly within the existing Nature Conservation Reserve System (NCRS), and then taking into account the

new reserve proposals contained within CALM's Draft Forest Strategy (see Appendix 5 of the Report). The results of this NCRS assessment are contained in Appendix 3 of the Report.

The Commission then analysed those values which were not well represented in reserves, to determine their resilience to timber production activities. This analysis was guided by the Commission's assessment of the sensitivity and resilience of each type of national estate value to timber production, as outlined in the document *Protecting the natural national estate values of forests* (AHC 1990), a part of the Commission's submission to the Resource Assessment Commission inquiry into Australian Forest and Timber Resources.

4. PRINCIPLES FOR REGIONAL PROTECTION OF NATIONAL ESTATE VALUES

As outlined in the Report of the assessment work in the Southern Forest Region, the Commission considers that protection of national estate values in the Region should be based on the following principles:

(a) protection should be focussed on the regional occurrence of each value, taking into account its abundance, spatial and temporal distribution, spatial characteristics, variation, and condition, rather than on individual locations of the value in isolation;

(b) for sensitive national estate values, the highest level of protection is obtained through reservation;

(c) all sensitive national estate values should have adequate representation in nature conservation reserves;

(d) management outside nature conservation reserves should be aimed at minimising the adverse impacts of management operations on national estate values which may be sensitive to disturbance.

In preparing advice on timber production proposals in the Region under section 30 of its Act, the Commission proposes to use the following general principles as the basis for its advice:

(i) for each national estate value, each listed place in the Region in which the identified value is present can be considered as an alternative location for the protection of that value in the Region;

(ii) all listed places in the Region can be considered as alternatives to each other for the location of proposed forest operations in the Region, although the specific values of each place, the level of protection of the values in the Region and their sensitivity/resilience need to be taken into account when considering alternatives;

(iii) the impact of proposed forest operations on identified national estate values in multiple use forests in the Region should be considered in relation to the distribution of those values in the Region, both spatially and over time,

including within the gazetted nature conservation reserves and within proposed nature conservation reserves managed for this purpose;

(iv) where forest operations may have a significant impact on the identified values of any single listed place, the operations will not be considered to have a significant impact on the regional occurrence of these values if, within the Region, the identified values are adequately protected in gazetted nature conservation reserves and/or in proposed nature conservation reserves managed for this purpose;

(v) the AHC principles for protection of identified national estate values outlined in chapter 6 of the Report and in this Appendix provide an appropriate framework, at a regional level, for protecting identified national estate values, and for minimising the adverse impacts on these values of forest operations during integrated management, including operations for timber production;

(vi) the CALM management practices detailed in Appendix 5 of the Report provide an appropriate means, at a local level, to minimise the adverse impacts on identified national estate values of forest operations during integrated management, including operations for timber production;

(vii) integrated management to minimise the impact of proposed operations for timber production on identified national estate values in multiple use forests should be considered in relation to the distribution of those values in the Region, both spatially and over time.

The Commission recognises that many expressions of value throughout the landscape are not discrete and that some areas are significant for a range of different values. For example, large areas of high quality wilderness may also have value for ongoing ecological processes and also be significant as areas of diverse ecosystems. The Commission also recognises that some of the advice offered in this Appendix concerning one particular value may be incompatible with advice concerning another value, even though both values may be located within the same area.

It is the Commission's view that decisions concerning which national estate value will have priority for protection must be made by the appropriate land manager. All forms of protection, not only reservation, involve costs and benefits to the community, and it is the role of the land managers to make such choices on behalf of, or, as is the case with CALM, in consultation with the community.

The Commission hopes that this advice, when used in conjunction with information on the identified national estate values of the Region, and the assessment of the representation of national estate values within the reserve system, will support good decision-making in the Southern Forest Region.

5. GUIDELINES FOR THE PROTECTION OF NATIONAL ESTATE VALUES IN THE SOUTHERN FOREST REGION

In the following sections, each type of national estate value identified in the Region has been considered separately to help decision-makers determine the most

appropriate form of management for any national estate area, depending on the particular values present and their priority for protection within the Region as determined by CALM.

The framework for comments under each criterion, for each type of value assessed as being significant, is as follows:

- sensitivity/resilience of the type of value to timber production operations (*Sensitivity/resilience*);
- extent to which the expression of values in indicative areas are located in existing reserves, including those proposed in the 1987 Management Plan for the Region (*NCRS Analysis (existing)*)
- extent to which the expression of values in indicative areas are located in proposed new reserves in the Region (*NCRS Analysis (proposed)*);
- where relevant, the extent to which expressions of values are located in reserves within sub-regions (*Sub-regional NCRS Analysis*);
- general guidelines to assist decision-making at the strategic/planning level (*Guidelines - Strategic/planning level*);
- general guidelines, where appropriate, to assist decision-making at the operational level in areas outside the reserve system (*Guidelines - Operational level*).

The sub-regions used for the assessment of some values are described in detail in Appendix 1 of the Report. They are based either on land systems and rainfall (after Finkl & Churchward 1973), or on the vegetation systems of Beard (1980, 1981).

Guidelines have not been provided for values where all the expressions are located within reserves, unless there is a possibility that timber production operations may cause indirect impacts.

In the followings sections, an "expression" of value refers to where a particular attribute is present in an indicative area above a threshold level of significance. There may be several expressions of a single value within one indicative area, e.g. where the attribute does not occur continuously throughout the area, or where the attribute does not meet the threshold for significance uniformly within the indicative area.

For those types of values which were not assessed systematically across the Region, and where the assessment of national estate significance was based largely on published and unpublished expert opinion, this has been noted in the following sections as an assessment on an 'opportunistic' basis.

As noted earlier, although the focus of the following advice is on timber production operations, attributes of national estate significance are also sensitive to a wide variety of other land use activities, but these have not been considered in this Appendix.

5.1 Importance in the evolution of Australian flora, fauna, landscapes or climate (criterion A.1)

The assessment identified ten types of value relating to this criterion:

- endemic fauna;
- endemic flora;
- Gondwanic fauna;
- biogeographic range of fauna species;
- biogeographic range of flora species;
- refugia for fauna;
- refugia for flora;
- relictual species;
- relictual communities; and
- geomorphological sites.

All of the biotic values above were identified and assessed on an opportunistic basis, and have been considered together in the following section.

5.1.1 Biotic values

Sensitivity/resilience

The values recognised under this criterion usually relate to specific species of flora and fauna whose natural abundance and distribution vary considerably, and which may respond in quite different ways to disturbance because of their particular habitat requirements and life cycle characteristics. The Commission considers that it is not possible to generalise about their resilience or sensitivity to timber production operations, and that the provision of general advice is therefore inappropriate. Management should however, take into account the specific habitat requirements of each species through all stages of its life cycle.

NCRS Analysis - Existing and proposed

The results of the analysis are shown in the table below. The number of expressions in reserves will increase with the proposed new reserves for five types of value.

Type of Value	No. of identified expressions	No. in existing reserves	With addition of proposed reserves
Endemic fauna	30	20	23
Endemic flora	24	15	17
Gondwanic fauna	31	20	21
Range, fauna	3	3	3
Range, flora	4	2	3
Refugia, fauna	2	2	2
Refugia, flora	4	4	4
Relictual species	5	4	4
Relictual communities	3	3	3

5.1.2 Geomorphological sites

Sensitivity/resilience

A number of places were identified as significant, largely for coastal values. It is the Commission's view that coastal geomorphological features would be sensitive to disturbance, but will not be affected by timber production operations.

NCRS Analysis - Existing
There were 13 expressions of this type of value identified , all but one of which were located within reserves.

5.2 Importance in maintaining existing processes or natural systems at the regional or national scale (criterion A.2)

This assessment involved two types of analysis, the first related to assessment of indicative areas for physical, abiotic processes, and the second related to assessment of indicative areas for biological ecosystem processes. As a result of this assessment, two major types of value were identified: abiotic and biotic.

5.2.1 Abiotic processes
Areas identified through this analysis were assessed using a simple classification of coastal and non-coastal processes.

5.2.1.1 Coastal
Sensitivity/resilience
These processes may well be sensitive to activities which accelerate, or retard erosional or depositional activities, but will not be affected by timber production operations.

NCRS Analysis - Existing
All 7 identified expressions of this type of value were located within reserves.

5.2.1.2 Non-coastal
Sensitivity/resilience
These processes may be sensitive to activities which accelerate, or retard erosional or depositional activities, and which may also affect hydrological and/or nutrient cycles.

NCRS Analysis - Existing
There were 22 expressions of this type of value identified, of which 14 were located within existing reserves.

NCRS Analysis - Proposed
The proposed new reserves include 3 additional expressions of this value.

Guidelines - Strategic/planning level
- Ecological processes are best protected in areas where natural perturbations continue unimpeded and where there is minimal human interference.
- Reservation would ensure the highest level of protection.
- Some replication of this value within the NCRS, preferably within different catchments, is desirable.
- If timber production is to occur within identified areas, an appropriate scheduling of harvesting activities, may be (in priority order): Below Threshold; Moderate significance; High significance; Very High significance.

Guidelines - Operational level

- If timber production is to occur within areas identified as significant, particular care should be taken to avoid soil compaction or erosion and stream siltation. Additional care should be taken to avoid long term alterations to stream flow.

5.2.2 Biotic processes

Areas identified through this analysis were classified into two categories: forest/woodland/non-forest ecosystems and fauna.

The Commission considers that sub-catchment units are viable ecological units for the purposes of this criterion.

5.2.2.1 Forest/woodland/non-forest ecosystems

Sensitivity/resilience

These processes are sensitive to activities which disturb the natural balance and relationship between flora and fauna species and their habitat.

NCRS Analysis - Existing

There were 42 expressions of this value identified, of which 31 were located within reserves.

NCRS Analysis - Proposed

An additional 4 expressions of this value would be encompassed by the proposed new reserves.

Guidelines - Strategic/planning level

- Ecological processes are best protected in areas where natural perturbations continue unimpeded and where there is minimal human interference.

- Reservation would ensure the highest level of protection.

- Some replication of this value within the NCRS, preferably within different catchments, is desirable.

- If timber production is to occur within identified areas, an appropriate scheduling of harvesting activities may be (in priority order): Below Threshold; Moderate significance; High significance; Very High significance.

The Commission advises that it is presently undertaking additional analyses to refine the assessment of significance for this type of value. This analysis may support more targetted advice at the strategic level.

5.2.2.2 Faunal processes

The Commission's assessment process was opportunistic. The values recognised under this criterion related to faunal species for which there was some knowledge of their habitat requirements. The natural abundance and distribution of species vary considerably, and the species may respond in quite different ways to disturbance because of their particular habitat requirements and life cycle characteristics.

Sensitivity/resilience
The Commission considers that it is not possible to generalise about the resilience or sensitivity of these species to timber production operations for this criterion, and that the provision of general advice is therefore inappropriate. However, this value is dependent upon the maintenance of the habitat features required for the particular species identified within the assessment.

NCRS Analysis - Existing
There were 41 expressions of this type of value identified, of which 32 were located within reserves.

NCRS Analysis - Proposed
An additional 2 expressions of this type of value would be encompassed by the proposed new reserves.

5.3 Importance in exhibiting unusual richness or diversity of flora, fauna, landscapes or cultural features (criterion A.3)

Three major categories of diversity were considered for this assessment: landforms/soils, fauna and forest types.

5.3.1 Landform/soil diversity
Sensitivity/resilience
This type of national estate significance is based on the variation, and juxtaposition, of soils and landforms throughout the landscape. The Commission considers that this type of value is relatively robust.

NCRS Analysis - Existing
There were 36 expressions of this value identified, of which 24 are located within reserves.

NCRS Analysis - Proposed
An additional 6 expressions of this type of value would be encompassed by the proposed new reserves.

Guidelines - Strategic/planning level
- The robust nature of this type of significance requires no particular protection activities.

5.3.2 Faunal diversity
The Commission's assessment of this value was opportunistic. The values recognised under this criterion related to areas for which there was some knowledge about faunal species diversity and/or the diversity of faunal habitat.

Sensitivity/resilience
Because of a lack of detailed knowledge about the habitat requirements of many faunal species, the Commission considers that it is not possible to generalise about the resilience or sensitivity of the species to timber production operations for this criterion, and that the provision of general advice is therefore inappropriate.

However, this value is dependent upon the maintenance of the habitat features required for the particular species identified within the assessment.

NCRS Analysis - Existing
There were 17 expressions of this type of value identified, of which 13 are located within reserves.

NCRS Analysis - Proposed
An additional 2 expressions of this type of value would be encompassed by the proposed new reserves.

5.3.3 Vegetation diversity
The limitations of data concerning vegetation necessitated three separate analyses:

- mapped vegetation communities with a structural bias (after Smith 1972);
- forest types (based on FMIS, i.e. CALM's Forest Management Information System); and
- floristic and structural vegetation patterns based on landform and soil types (after Churchward *et al.* 1988; Churchward 1990).

Ongoing research into floristics may be useful in assessing the impact of timber production on various ecosystems.

5.3.3.1 Forest type diversity, based on FMIS
Sensitivity/resilience
The major feature of this type of diversity is the balance and relationship between the various natural forest types in the landscape. The Commission considers that this type of diversity is sensitive to activities which alter the balance of dominant species in the vegetation and thus alter the natural balance of forest types.

NCRS Analysis - Existing
There were 27 expressions of this type of diversity identified, of which 14 are located within reserves.

NCRS Analysis - Sub-regional
A sub-regional analysis, based on Finkl & Churchward (1973), revealed that this value is located within 5 sub-regions and is reserved three of those sub-regions. Only one expression of this value was located in the Intermediate Rainfall Dombakup and Intermediate Rainfall Woljenup sub-regions; both expressions are unreserved.

Guidelines - Strategic/planning level

- Reservation would ensure the highest level of protection.

- The natural balance of communities within a range of identified areas, which capture the range of expressions of diversity of significance, should be protected.

- Some replication of this value within the NCRS, preferably within different catchments, is desirable.

Guidelines - Operational level

- The major sensitivity of this type of significance to timber production is at the post-harvesting stage. The key to the maintenance of this value within identified areas is careful regeneration.

- It is important to ensure that the regeneration of the forest replicates the original mix and relationship of forest types and that the same dominant species, in the same communities, in the same proportions are regenerated at each identified site.

5.3.3.2 Mapped vegetation communities with a structural bias, after Smith

This type of diversity is largely based on the natural structure of mapped vegetation communities. The Commission notes that within any forest with a given structural formation, the impact of timber harvesting will vary with the nature of the harvesting operations. Thus selective logging in Jarrah forest may have a limited impact on the overall structure of the forest, while clearfelling in Karri forest will initially result in the loss of that structure within logged coupes. Over time, the original structure will return where management strategies and prescriptions have that objective.

In forests subject to clearfelling, regeneration of varying ages will form a mosaic with unlogged patches of forest, and result in an overall localised increase in structural diversity. This localised increase in diversity is not in itself of national estate significance for criterion A.3 (diversity) as it is human induced and ephemeral. However, the Commission acknowledges that the mosaic is important for maintaining other forest values.

Sensitivity/resilience

The Commission considers that with appropriate management, mapped structural diversity will return over time following harvesting, and thus this type of value is resilient.

NCRS Analysis - Existing

There were 21 expressions of this type of value identified, of which 12 are located within reserves.

NCRS Analysis - Proposed

No additional expressions of this type of value would be reserved.

NCRS Analysis - Sub-regional

A sub-regional analysis, based on Finkl & Churchward (1973), revealed that the value is located within five sub-regions and is reserved within all of those sub-regions.

Guidelines - Strategic/planning level

- Reservation would ensure the highest level of protection.

- Some replication of this value within the NCRS, preferably within different catchments is desirable.

Guidelines - Operational level

- It is important to ensure that the regeneration of the forest replicates the original mix and relationship of dominant species, in the same communities, in the same proportions at each identified site.

- It is important that silvicultural operations do not prevent the re-establishment of the original structure of the forest type.

5.3.3.3 Floristic and structural patterns based on mapped landform and soil types - after Churchward

This type of diversity was identified using Churchward's landform/soil maps (Churchward *et al.* 1988; Churchward 1990) which also contain information on vegetation. The Commission's analysis aimed at capturing the full range of floristic variation within various types of forest and notes that landforms and soils correlate strongly with community variation.

Sensitivity/resilience

The Commission considers that this type of diversity is most sensitive to activities which alter the floristic composition of the vegetation and thus may alter the natural balance of vegetation communities in both overstorey and understorey.

NCRS Analysis - Existing

There were 27 expressions of this type of value identified, of which 13 are located within reserves.

NCRS Analysis - Proposed

An additional 7 expressions of this type of value would be encompassed in the proposed new reserves.

NCRS Analysis - Sub-regional

A sub-regional analysis, based on Finkl & Churchward (1973), revealed that this type of value is located within six sub-regions and is reserved in all six. The new reserve proposals would lead to additional expressions being reserved in both the Darling Faultline and Low Rainfall Woljenup sub-region where previously only one expression was reserved.

Guidelines - Strategic/planning level

- The occurrence of communities within different parts of the landscape (topography) or on different soils is an important component of this type of significance which needs to be incorporated into protection strategies.

- Reservation would ensure the highest level of protection.

- Priority for protection should be areas of highest significance.

- The range of diverse areas in terms of floristic and structural patterns as determined from mapped landform and soil units should be represented in the reserve system.

- Some replication of this value within the NCRS, preferably within different catchments, is desirable.

Guidelines - Operational level

- It is important to ensure that the regeneration of the forest communities replicates the natural floristic mix and relationship of species, in the same communities at each identified site, and with the same proportions of dominant species.

- It is important that silvicultural operations do not prevent the re-establishment of the original structure of the forest type, including the under-storey.

5.4 Importance for rare, endangered or uncommon flora, fauna, communities, ecosystems, natural landscapes or phenomena, or as a wilderness (criterion B.1)

A number of types of value were assessed under this criterion:

- rare, endangered or uncommon fauna;
- rare, endangered or uncommon flora;
- lakes and wetlands;
- monadnocks;
- undisturbed vegetation (including undisturbed forests, woodlands, and non-timbered vegetation); and
- wilderness characteristics (including forest, woodland and coastal types).

The first three types of the values above were identified and assessed on a generally opportunistic basis. For the purposes of this analysis, the first two are considered jointly.

5.4.1 Rare, endangered or uncommon species

The values recognised relate to specific species of flora and fauna which are rare, endangered or uncommon. While some species appear to be restricted to very specific and localised habitats, some other species are widespread in the Region although they may not be abundant. Although some species may be highly sensitive to disturbance (e.g. some rare plant species), others may be resilient to moderate forms of disturbance.

Sensitivity/resilience

Because the identified species respond in quite different ways to disturbance due to their particular habitat requirements and life cycle characteristics, the Commission considers that it is not possible to generalise about their resilience or sensitivity to timber production operations. Management should however, take into account the specific habitat requirements of each species through all stages of its life cycle.

NCRS Analysis - Existing and proposed

The results of the analyses are shown in the table below. The number of expression in reserves will increase with the proposed new reserves.

Type of Value	No. of identified expressions	No. in existing reserves	No. in proposed reserves
Rare, endangered & uncommon fauna	56	31	40
Rare, endangered & uncommon flora	39	25	28

It should be noted that identified species may occur in other parts of the Southern Forest Region for which information was not available at the same level of detail as for indicative areas.

Guidelines - Strategic/planning level

- For site specific values, the nature of their occurrence means that protection is feasible although these types of significance are sensitive;

- The identification of species with site specific habitats and the recognition that sites can be adversely impacted by timber production operations should be incorporated into harvesting plans;

- the identification of habitat requirements of widespread species and their sensitivity to disturbance should be incorporated into harvesting plans.

Guidelines - Operational level

- Forest block plans should be drafted to ensure that site specific values are protected from timber production operations.

- The Commission notes that CALM's Code of Practice and Hardwood Logging Manual require the protection of rare flora at the operational stage of timber production.

5.4.2 Lakes & wetlands

Sensitivity/resilience

Lakes and wetlands are likely to be highly sensitive to direct and indirect disturbance.

NCRS Analysis - Existing

All 4 identified expressions of this type of value were located within reserves.

Guidelines - Operational level

- timber production operations in any part of the catchments of the wetlands and lakes should be carried out to prevent indirect impacts on the hydrological qualities of these areas.

5.4.3 Monadnocks

Sensitivity/resilience

The granite outcrops themselves are resilient to disturbance, but the biological habitat associated with them may be sensitive.

NCRS Analysis - Existing

There were 22 expressions of this type of value identified, of which 13 are located in reserves.

NCRS Analysis - Proposed
A further 5 expressions of this type of value may be encompassed by the proposed new reserves.

Guidelines - Strategic/planning level
- Appropriate buffers should be retained around monadnocks.

5.4.4 Undisturbed vegetation as a rare phenomenon
Two major types of vegetation were considered for this assessment: forest and woodland. Some expressions of value for swamps, heathlands and wetland communities were also identified.

5.4.4.1 Undisturbed forest
It was recognised that a regional assessment by individual forest type was not possible due to the limitations of data. The assessment was based on the land system and rainfall sub-regions of Finkl and Churchward (1973) to capture appropriately the variation in the forests throughout the Region.

Sensitivity/resilience
The Commission considers that this type of significance is rare in the Southern Forest Region and that it is sensitive to timber production activities.

NCRS Analysis - Existing
There were 61 expressions of this type of value identified, of which 28 are within reserves.

NCRS Analysis - Proposed
An additional 6 expressions of this type of value will be encompassed by the proposed new reserves.

NCRS Analysis - Sub-regional
The expressions of this value are located within 9 sub-regions and are reserved in 6 of those sub-regions. The High Rainfall Balingup and the Darling Faultline sub-regions contain only one expression of this type of value, both are unreserved. The Intermediate Rainfall Woljenup Rainfall sub-region contains four unreserved expressions, one of which is encompassed by the proposed new reserves.

Guidelines - Strategic/planning level
- Areas of high significance are best protected through reservation.

- Some replication of this value, preferably within different catchments, is desirable.

- If timber production is to occur within identified areas, an appropriate scheduling of harvesting activities may be (in priority order): Below Threshold; Moderate significance; High significance.

5.4.4.2 Undisturbed woodland
It was recognised that a regional assessment by individual woodland type was not possible due to the limitations of data. Therefore, the assessment was based on the

land systems and rainfall sub-regions of Finkl and Churchward (1973) to capture appropriately the variation in the woodland throughout the Region.

Sensitivity/resilience
The Commission considers that this type of significance is rare in the Southern Forest Region and that it is sensitive to timber production activities.

NCRS Analysis - Existing
There were 19 expressions of this type of value identified, of which 10 are located within reserves.

NCRS Analysis - Proposed
Two additional expressions of this type of value will be encompassed in the proposed new reserves.

NCRS Analysis - Sub-regional
The expressions of this value are located within 5 sub-regions and are reserved in all of those sub-regions except the Intermediate Rainfall Woljenup sub-region. With the proposed new reserves, expressions of this type of value will be encompassed in all five sub-regions and will substantially increase the numbers of very highly and highly significant expressions reserved.

Guidelines - Strategic/planning level
- Areas of high significance are best protected through reservation.

- Some replication of this value, preferably within different catchments, is desirable.

- If timber production is to occur within identified areas, an appropriate scheduling of harvesting activities may be (in priority order): Below Threshold; Moderate significance; High significance.

5.4.4.3 Undisturbed swamps, heathlands and wetlands
The Commission's identification and assessment of this type of value was limited by the data available during the analyses. Further analysis will be undertaken in the future to better refine the analysis.

Sensitivity/resilience
The Commission considered that this type of value is potentially sensitive to timber production operations, largely through indirect impacts, e.g. on hydrological characteristics of swamps and wetlands.

NCRS Analysis - Existing
There were 42 expressions of this type of value identified, of which 17 are located within reserves.

NCRS Analysis - Proposed
An additional 5 expressions will be encompassed in the proposed new reserves.

Guidelines - Strategic/planning level

- Appropriate buffers should be retained around swamps, wetlands and heathlands.

- Timber production operations in any part of the catchments of the wetlands and swamps should be carried out to prevent indirect impacts on the hydrological qualities of these areas.

5.4.5 Wilderness characteristics

Three categories of place with wilderness characteristics were used for the assessment: forests, woodlands and non-timbered areas (mainly coastal). It should be noted that nearly all of the identified places with wilderness characteristics contain a mixture of vegetation types. The expressions identified below have attempted to count relatively 'pure' expressions of each type.

Sensitivity/resilience

It is the Commission's view that areas identified as significant for wilderness characteristics are sensitive to timber production. Timber production activities, including roading, harvesting and regeneration, have an adverse impact on wilderness characteristics. In particular, timber production adversely affects two attributes used to identify wilderness characteristics: remoteness from access and biophysical naturalness.

The Commission notes that significant opportunity may exist for enhancing wilderness characteristics through restoration work.

5.4.5.1 Forest with wilderness characteristics

NCRS Analysis - Existing

There were 13 expressions of this type of value identified, of which 9 are located within reserves.

NCRS Analysis - Proposed

An additional 3 expressions of this type of value will be encompassed in the proposed new reserves. All three of these expressions, are of very high significance. The Mt Roe expression, which is encompassed in a proposed new reserve, is possibly the largest identified expression of forest with wilderness characteristics identified in the Southern Forest Region.

Guidelines - Strategic/planning level

- Wilderness characteristics are best protected through the total exclusion of human disturbance activities, with the best protection afforded through reservation.

- Some replication of this value within the NCRS, preferably within different catchments, is desirable.

Guidelines - Operational level

- Timber production activities, including roading, harvesting and regeneration, have an adverse impact on wilderness characteristics.

- Areas identified as having very high significant wilderness characteristics should be scheduled at the end of the harvesting rotation so that if protection options become available through changes in production efficiencies, or community opinion, these places can be considered for protection.

- If indicative areas are scheduled for harvesting, operations should commence at the boundary and attempt to maintain an unfragmented shape with a low boundary:area ratio.

5.4.5.2 Woodland with wilderness characteristics

NCRS Analysis - Existing

There were 10 expressions of this type of value identified, of which 4 are located in reserves.

NCRS Analysis - Proposed

5 additional expressions of this type of value will be encompassed by the proposed new reserves, all of very high significance.

Guidelines - Strategic/planning level

- Wilderness characteristics are best protected through the total exclusion of human disturbance activities, with the best protection afforded through reservation.

- This type of significance should be included within the reserve system.

- Some replication of this value within the NCRS, preferably within different catchments, is desirable.

- Areas of very high significance should not be utilised for timber production if other alternatives are available.

Guidelines - Operational level

- Timber production activities, including roading, harvesting and regeneration, have an adverse impact on wilderness characteristics.

- Areas identified as having very high significant wilderness characteristics should be scheduled at the end of the harvesting rotation so that if protection options become available through changes in production efficiencies, or community opinion, these places can be considered for protection.

- If indicative areas are scheduled for harvesting, operations should commence at the boundary and attempt to maintain an unfragmented shape with a low boundary area ratio.

5.4.5.3 Coastal areas with wilderness characteristics

NCRS Analysis - Existing

There were 3 expressions of this type of value identified, all located within reserves.

5.5 Importance in demonstrating a distinctive way of life, custom, process, land use, function or design no longer practised, in danger of being lost, or of exceptional interest (criterion B.2)

The Commission was unable, within the timeframe of the project, to undertake a systematic identification and assessment of historic values. The only area included as significant for this type of value is already listed in the Register of the National Estate. It is located within a reserve.

5.6 Importance for information contributing to a wider understanding of Australian natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark site (criterion C.1)

Sensitivity/resilience
In general, only known places of current research activity were considered for this assessment. The Commission's view is that the sensitivity of each identified area depends upon the nature of the research activity.

NCRS Analysis - Existing
Only three expressions of this type of value were identified, all of which are located within reserves.

5.7 Importance in demonstrating the principal characteristics of the range of landscapes, environments or ecosystems, the attributes of which identify them as being characteristic of their class (criterion D.1)

Several types of value were considered for this assessment: fauna, geomorphology, lakes & wetlands, vegetation assemblages, and vegetation communities.

5.7.1 Fauna
The Commission's identification and assessment for this type of value was opportunistic. The values recognised related to areas for which there was relatively detailed knowledge about faunal species present. The species differ in their natural abundance and distribution, and may respond in quite different ways to disturbance because of their particular habitat requirements and life cycle characteristics.

Sensitivity/resilience
The Commission considers that the nature of this value is such that it is not possible to generalise about the resilience or sensitivity of each species/species assemblage to timber production operations, and that the provision of general advice is therefore inappropriate. However, the value is dependent upon the maintenance of the habitat features for the particular species through all stages of their life cycles.

NCRS Analysis - Existing
There were 3 expressions of this type of value identified, of which 2 are located within reserves.

5.7.2 Geomorphology

Sensitivity/resilience

The main attributes of significance under this criterion were monadnocks and coastal features. The Commission considers that coastal features are sensitive to disturbance, but will not be affected by timber production operations. Monadnocks are considered to be resilient to timber production operations.

NCRS Analysis - Existing

All 9 expressions of this type of value are located within reserves.

5.7.3 Lakes & Wetlands

Sensitivity/resilience

The Commission's identification and assessment for this type of value was opportunistic. The Commission considers that this type of value may be sensitive to the indirect impacts of timber production operations.

NCRS Analysis - Existing

All 6 expressions of this type of value are located within reserves.

Guidelines - Operational level

- Timber production operations in any part of the catchments of the wetlands and lakes should be carried out to prevent indirect impacts on the hydrological qualities of these areas.

5.7.4 Vegetation assemblages

Sensitivity/resilience

The Commission considers that this type of value is most sensitive to activities which may alter the mix of dominant species in different vegetation types.

NCRS Analysis - Existing

There were 39 expressions of this type of value identified, of which 23 are located within reserves.

NCRS Analysis - Proposed

An additional 5 expressions of this type of value will be encompassed by the proposed new reserves.

NCRS Analysis - Sub-regional

A sub-regional analysis, based on Beard (1980), revealed that this value is located within 12 sub-regions and is reserved within all except South-east Bridgetown and North-west Nornalup.

Guidelines - Strategic,/planning level

- The juxtaposition of communities within different parts of the landscape is an important component of this type of significance which needs to be incorporated into protection strategies.

- Reservation would ensure the highest level of protection.

- Priority for protection should be areas of highest significance.

- Some replication of this value within the NCRS, preferably within different catchments, is desirable.

Guidelines - Operational level

- It is important to ensure that the regeneration of the forest communities replicates the original mix and relationship of forest types and that the same dominant species, in the same communities, in the same proportion are regenerated at each identified site.

- It is important that silvicultural operations do not prevent the re-establishment of the original forest structure

5.7.5 Vegetation communities

The limitations of data available for vegetation communities necessitated two separate analyses:

- mapped vegetation communities with a structural bias (after Smith & Beard); and
- floristic and structural vegetation patterns based on landform and soil types (after Churchward).

Expressions of vegetation communities assessed as being good examples of their type were those expressions showing minimal disturbance and of sufficient extent to be ecologically viable over time. Major community types throughout the Region were identified for the both assessments.

5.7.5.1 Vegetation Communities, after Smith & Beard

Sensitivity/resilience

The Commission considers that this type of value is sensitive to timber production activities. Timber production activities such as harvesting and regeneration have the potential to adversely affect the value of an area as a representative community through alternation of the floristic composition of the vegetation and, in the short-term, through changed vegetation structure.

NCRS Analysis - Existing

There were 254 expressions of this type of value identified, of which 131 are located within reserves.

NCRS Analysis - Proposed

An additional 17 expressions of this type of value will be encompassed in the proposed new reserves.

NCRS Analysis - Sub-regional

An analysis, based on the Smith (1972) and Beard (1981) communities, showed that all vegetation communities are represented in the reserve system. The new proposed reserves will substantially increase the reservation of Jarrah communities (Open Forest and Woodland) and Jarrah-marri Open Forest.

Guidelines - Strategic/planning level

- Reservation would ensure the highest level of protection.

- Some replication of this value within the NCRS, preferably within different catchments, is desirable.

Guidelines - Operational level
- It is important to ensure that the regeneration of the forest communities replicates the natural floristic mix and relationship of species, in the same communities at each identified site, and with the same proportions of dominant species.

- It is important that silvicultural operations do not prevent the re-establishment of the original structure of the forest type.

5.7.5.2 Vegetation communities, after Churchward
Sensitivity/resilience
The Commission considers that this type of value is sensitive to timber production activities. Timber production activities such as harvesting and regeneration have the potential to adversely affect the value of an area as a representative community through alternation of the floristic composition of the vegetation and, in the short-term, through changed vegetation structure.

NCRS Analysis - Existing
There were 108 expressions of this type of value identified, of which 47 are located within reserves.

NCRS Analysis - Proposed
An additional 3 expressions of this type of value will be encompassed by the proposed new reserves.

NCRS Analysis - Sub-regional
An analysis, based on the Churchward communities (Churchward *et al.* 1988 and Churchward 1990), showed that all 4 derived community types are reserved.

Guidelines - Strategic/planning level
- Reservation would ensure the highest level of protection.

- Some replication of this value within the NCRS, preferably within different catchments, is desirable.

Guidelines - Operational level
- It is important to ensure that the regeneration of the forest communities replicates the natural floristic mix and relationship of species, in the same communities at each identified site, and with the same proportions of dominant species.

- It is important that silvicultural operations do not prevent the re-establishment of the original structure of the forest type, including understorey.

5.8 Importance for a community for aesthetic characteristics held in high esteem or otherwise valued by the community (criterion E.1)

The identification and assessment of landscape values was opportunistic, and largely based on the expert opinion of CALM officers.

Sensitivity/resilience
The Commission considers that the sensitivity/resilience of landscape features to timber production operations depends on the characteristics of the landscape features. For example, old growth forest is sensitive to disturbance, but waterfalls would be resilient.

NCRS Analysis - Existing
There were 35 expressions of this type of value identified, of which 27 are located within reserves.

NCRS Analysis - Proposed
An additional 3 expressions of this type of value will be encompassed by the proposed new reserves.

Guidelines - Strategic/planning level
- Reservation would ensure the highest level of protection.

Guidelines - Operational level
- Implement Visual Resource Management appropriate to the particular characteristics of each type of value.

6. REFERENCES

AHC (1990). *Forests and the National Estate. Part 4A. Protecting the natural national estate values of forests.* A submission to the Resource Assessment Commission inquiry into Australian Forest and Timber Resources. Australian Heritage Commission, October 1990.

Beard J.H. (1980). *1:1 000 000 SWAN - Vegetation Series Sheet 7.* University of Western Australia Press, Nedlands.

Beard J.H. (1981). *Vegetation survey of Western Australia. SWAN. 1:1 000 000 Vegetation Series, Explanatory notes to Sheet 7.* University of Western Australia Press, Nedlands.

Churchward H.M. (1990). Soils and Landforms of the Manjimup Area, Western Australia. Draft manuscript and 1:100 000 maps. WA Dept Agriculture.

Churchward H.M., McArthur W.M, Sewell P.L. and Bartle G.A. (1988). *Landforms and soils of the south coast and hinterland, Western Australia. Northcliffe to Manypeaks.* CSIRO Div. Water Resources Divisional report 88/1.

Finkl C.W. and Churchward H.M. (1973). The etched landsurfaces of south western Australia. *J. Geol. Soc. Aust.* 20(3), 295-307.

Smith F.G. (1972). *Vegetation survey of Western Australia: Vegetation map of Pemberton and Irwin Inlet.* WA Dept Agriculture.