

Proposed Forest Management Plan (2004-2013)

Conservation Commission of Western Australia

**Report and recommendations
of the Environmental Protection Authority**

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Summary and recommendations

The Conservation Commission of Western Australia has prepared through the agency of the Department of Conservation and Land Management, a Proposed Forest Management Plan to apply to the Swan, South West and Warren Regions of the Department of Conservation and Land Management during 2004-2013. This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the environmental factors relevant to the proposed plan (the proposal).

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

Relevant environmental factors

The EPA decided that the following environmental factors relevant to the proposal required detailed evaluation in the report:

- (a) biodiversity; and
- (b) ecologically sustainable forest management.

Consideration by the EPA of these environmental factors was undertaken through an examination of how the Proposed Forest Management Plan addressed the Ecologically Sustainable Forest Management (ESFM) principles related to sustainability, precautionary approach, intergenerational equity, biodiversity conservation and pricing and valuation.

Conclusion

The EPA has considered the Proposed Forest Management Plan (Proposed FMP) prepared by the Conservation Commission, to apply to the Swan, South West and Warren Regions of the Department of Conservation and Land Management during 2004-2013.

The EPA acknowledges that considerable work, including scientific reviews lead by Burrows (Burrows *et al* 2001, 2002) and Ferguson (Ferguson *et al* 2001, Ferguson *et al* 2003, Ferguson 2003), has been carried out since 2000 to establish a sound basis for implementing ESFM in Western Australia. This work has guided the Conservation Commission's preparation and EPA's assessment of the Proposed FMP. Ferguson *et al* (2003) have acknowledged that components of the plan with regard to their application to sustained yield are conservatively based.

The EPA also recognises that the Conservation Commission has made substantial effort to address the issues, advice and recommendations that have followed from that work and other inputs to ensure that the Proposed Forest Management Plan achieves Ecologically Sustainable Forest Management.

When assessing the Proposed FMP, the EPA was aware that the ESFM principles apply at the whole of forest level and to the period of the plan and beyond. How these principles will be met will vary across the forest, depending on current and previous management, especially disturbances such as timber harvesting. It is also relevant that none of the ESFM principles can be met in isolation from the other principles.

There are a number of aspects of the Proposed Forest Management Plan that are of concern to the EPA. Two primary concerns relate to compliance matters. The first is that the actions in the plan do not have any timetable for completion and implementation attached to them. Similarly, the key subsidiary management guidelines that support the implementation of the plan do not have timelines, especially for those guidelines that do not currently exist. The EPA has recommended that actions and key guidelines have timelines assigned to them, with a number of them needing to be prepared as soon as possible.

The second matter relates to ensuring that the Proposed FMP is implemented as approved. At issue is the ability of the proponent, the Conservation Commission, to have any control over how the Department of Conservation and Land Management (DCLM) and the Forest Products Commission (FPC) meet the requirements of the plan during implementation of the plan. While their respective legislation indicates that the DCLM and FPC must operate in accordance with the plan and that the Conservation Commission will audit compliance with the plan, the capacity of the Conservation Commission to deal with breaches or non-implementation is very limited. The EPA has recommended that the Minister for the Environment consider whether the legislation should be amended to improve this situation.

While considerable research has been carried out in the forest areas to map vegetation, considerably less is known about forest fauna. Knowledge about the effects of disturbance in forest ecosystems on vegetation and fauna is being improved. However, there remain significant areas where information is inadequate to predict impacts confidently or even reasonably. The EPA has, for some time, encouraged a very precautionary approach to human-induced disturbances such as timber harvesting operations. This plan promotes precaution and adaptive management to address adverse outcomes. Underlying the plan's ability to deliver on these is a well designed monitoring regime, supported by specific research programmes to continue to build our basic knowledge of forest ecosystems. The EPA emphasises the importance of precaution, adaptive management, and adequate monitoring and research through the life of this plan.

The EPA supports the initiatives in the Proposed Forest Management Plan to provide improved protection of fauna values within State forest and timber reserves. This includes the system of fauna habitat zones distributed through the forest, and the increased retention of habitat trees and other vegetation (such as Balga's and Banksia's) important to fauna. Monitoring of the effectiveness of these initiatives, and modification of practices and guidelines through adaptive management, will be essential to the success of this plan.

A fundamental part of the achievement of ESFM is the establishment of a protected system of forest reserves. There has traditionally been an understandable focus on this aspect of planning in the forests over many years, while the length of time taken for reserves in previous forest management plans to be implemented has caused some frustration. With the implementation of additional reserves in the Government's *Protecting our old-growth forests* policy, the majority of the forest will be protected and managed for conservation purposes. The EPA has recommended that at least seventy percent of the reserve proposals contained in this plan be fully implemented by the end of this plan period, i.e. by 2013.

The EPA supports the expansion of the reserve system as a key part of ecosystem protection. For forest areas outside reserves, there remains the need to ensure that the forest ecosystem values are protected. Informal reserves, fauna habitat zones, retained habitat trees and temporary exclusion areas all contribute to achieving the protection of forest ecosystem values over the timber production cycle.

Notwithstanding the reserve proposals in the plan, there remain forest areas that some in the community believe have values that should be better protected. The existing and proposed forest reserve system, including their boundaries, has generally developed on a fairly ad-hoc basis at times and at other times has been based on more systematic reviews. The EPA has suggested under Other Advice that the Minister for the Environment request the Conservation Commission to review the forest ecosystem values in existing and proposed reserves not subject to the Government's *Protecting our old-growth forests* policy and areas outside of existing and proposed reserves through a public process, with a view to ensuring that areas of significant value, are protected. Such a review would take much of the plan period and should be based on improved information following additional surveys.

In suggesting such a review, the EPA believes that any change of reserve boundaries should be subject to several crucial caveats including that there be no loss of total area of forest reserves, no diminution of forest values in reserves, and no change in the non-declining sustained yield resulting from this review. Given the scale of the task, the EPA believes that this review should be completed by the end of this plan period.

One priority area where the EPA considers this review of forest values should be undertaken is in the Greater Kingston area. The EPA acknowledges that a substantial portion of the Greater Kingston area is proposed to be set aside as national park in the Government's *Protecting our old-growth forests* policy. However, on the basis of the research undertaken through the Kingston Project, the remaining portions of Warrup, Corbal, Mersea, Dudijup and Kingston blocks not subject to reservation are likely to possess significant ecological values. As timber harvesting operations in these blocks would affect forest ecosystem values, the EPA considers that such operations in these blocks should be avoided until the Conservation Commission has completed its review and provided its recommendation, consistent with the caveats mentioned above. The review of this area may require additional surveys but should be undertaken within two years and should meet the caveats identified above.

The EPA has considered a number of threats to forests ecosystem values. The incorporation of an allowance for dieback in the sustained yield calculation has

highlighted the implications of the spread of this pathogen. While the predicted impact on sustained yield has been quantified, the consequences of loss of habitat to fauna remain of considerable concern.

Another threat arises from climate change. The effects of climatic variation and change needs to be incorporated explicitly into forest monitoring. There also needs to be improved and transparent provision of parameters affected by climate change in the sustained yield. The EPA recognises that there are difficulties of measuring the extent of change in the short term but emphasises the importance of detecting and allowing for effects over time.

Logging of the forest, especially with the increasing application of clearfelling, gap and shelterwood treatments, has led to an increasing proportion of the forest comprising young trees. This has implications to the ability of the forest to support the full range of ecosystem values, especially those associated with fauna.

A consistent theme reflected in submissions on the Draft Forest Management Plan and in previous forest reviews by the EPA has been a lack of confidence by key stakeholders in the information used to support forest management plans. This is a critical issue in satisfying the community that ESFM has been met. The EPA has provided comment encouraging improved transparency of processes used to define key aspects of the FMP, including information and methods related to the calculation of sustained yield.

Achievement of ESFM through implementation of the Proposed Forest Management Plan will only occur through adequate resourcing. Unless resourcing is sufficient to meet the commitments and obligations of the approved plan, the plan will not satisfy the ESFM principles. The Government will need to ensure that the pricing of timber products covers the full costs of forest management in State forest and timber reserves while additional funding of the Conservation Commission and the DCLM provides for adequate management of dedicated reserves.

While the Conservation Commission has an important role in auditing implementation of the FMP, the EPA has recommended that the EPA continues to have a role in reviewing the achievement of environmental conditions determined by the Minister for the Environment. However, the EPA's involvement should focus on the mid-term and an additional end-of-term audits undertaken by the Conservation Commission.

The EPA has recommended a number of improvements to the Proposed FMP. These are considered to be refinements to the plan rather than major changes of emphasis to that proposed by the Conservation Commission.

The EPA has concluded that the EPA's objectives can be achieved provided there is satisfactory implementation by the Conservation Commission, DCLM and FPC of the proposal, including commitments and actions, and the recommended conditions set out in Appendix 2 and summarised in Section 5.

A summary list of recommendations by the EPA to the Minister for the Environment in this report follows:

- The EPA supports the advice from the Burrows Panel (Burrows *et al* 2001) and recommends a trial of both forest monitoring approaches (i.e. FORESTCHECK and species targeted surveys)
- The EPA considers that thinning is critical and recommends that the timing of thinning be scheduled and completed in accordance with the jarrah and karri silvicultural guidelines. Failure to comply with the guidelines, particularly in the case of jarrah, will result in the sustained yield not being achieved.
- The EPA recommends that the Government establishes mechanisms aimed at protecting sufficient area of forest ecosystems to meet the JANIS criteria, including where these forest ecosystems occur on private land.
- The EPA suggests that the Minister for the Environment request the Conservation Commission to review the forest ecosystem values in existing and proposed reserves not subject to the Government's *Protecting our old-growth forests* policy and areas outside existing and proposed reserves, with a view to ensuring that areas of significant ecological value are optimised and protected. There should be no loss of total area of forest reserves, no diminution of forest ecological values in reserves, and no change in the non-declining sustained yield resulting from this review.
- The EPA recommends that the performance target in Key Performance Indicator 1 be amended to at least seventy percent of the reserve proposals contained in this plan be fully implemented by the end of this plan period, i.e. by 2013.
- The forest monitoring system needs to be designed so that it can provide data on the effects of climatic variation and change. Also, the way in which climatic variation and change is allowed for in the calculation of sustained yield needs to be improved. This process should be transparent to increase public confidence.
- The EPA recommends that all management costs in forest areas available for timber production should be covered by FPC pricing in production contracts to ensure that there is adequate resourcing to deliver on the management obligations as set out in the FMP.
- The EPA recommends that each of the actions and key subsidiary management guidelines should have a defined timeline to assist in identifying priorities where necessary and to facilitate compliance auditing by the Conservation Commission.
- The EPA recommends that the following key subsidiary guideline documents be completed within one year as a high priority:
 - Guidelines for Selection and Management of Fauna Habitat Zones
 - Guidelines for the Management of Informal Reserves
 - Goals for Understorey Structural Diversity
 - Jarrah Silviculture Guidelines
 - Karri Silviculture Guidelines
 - Wandoo Silviculture Guidelines
 - Soil and Water Conservation Guidelines
 - *Phytophthora cinnamomi* and Disease Caused by it – Volume 1. Management Guidelines
 - Guidelines for the Preparation of Area Management Plans For Conservation Reserves
- The EPA recommends that the words 'has regard to', 'have regard to' or 'having regard to' be replaced with 'is consistent with' in Action 2.1.1, 3.1, 6.1,

6.2.1, 6.3.1, 7.2, 16.1.3, 17.2, 17.6, 17.6.3, 19.1.1, 19.5.1, 20.1.1, 20.5.1, 24.2 and 24.3.1.

- The EPA recommends that the Minister for the Environment consider whether the Conservation and Land Management Act and the Forest Products Act should be amended to permit the Conservation Commission to require compliance with the approved plan where there has been a breach of compliance.
- The EPA recommends that the Conservation Commission amend Action 31.3 to also provide for a end-of -term review in the penultimate year of the plan.
- The EPA recommends that it review and provide public advice to the Minister for the Environment on compliance with the environmental conditions following the Conservation Commission's mid-term and end-of-term audits.
- The EPA recommends that a programme of improved information sharing with the public by the Conservation Commission, DCLM and FPC be adopted and expanded.
- The EPA recommends that the Minister ensure that the Jarrah, Karri and Wandoo Silvicultural Guidelines has been updated to be consistent with the Forest Management Plan prior to the plan's implementation.

Recommendations

The EPA submits the following recommendations in relation to the Proposed Forest Management Plan to apply to the Swan, South West and Warren Regions of the Department of Conservation and Land Management during 2004-2013, to the Minister for the Environment:

1. That the Minister considers the report on the relevant environmental factors as set out in Section 4;
2. That the Minister notes that the EPA has concluded that the EPA's objectives can be achieved provided there is satisfactory implementation of the proposal by the Conservation Commission, DCLM and FPC, including commitments and actions, and the recommended conditions set out in Appendix 2 and summarised in Section 5.
3. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report and requires that the Proposed Forest Management Plan be amended by the Conservation Commission to incorporate the conditions and procedures in Appendix 2, prior to transmittal to the Minister for approval.
4. That the Minister considers the matters and recommendations provided as Other Advice in section 6 of this report.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that it recommends be imposed if the proposal by the Conservation Commission of Western Australia, for a Forest Management Plan to apply to the Swan, South West and Warren Regions of the Department of Conservation and Land Management during 2004-2013, is approved for implementation. These conditions are presented in Appendix 2. Matters addressed in the conditions include the following:

- (a) that the proponent shall amend the Proposed Forest Management Plan in accordance with the recommended conditions in Appendix 2 prior to transmittal to the Minister for approval
- (b) that the amendments to the Proposed Forest Management Plan relate to
- forest monitoring incorporating FORESTCHECK and specific species sampling approaches
 - timelines for actions and key subsidiary guideline documents
 - amending actions with ‘regard to’ to ‘consistent with’
 - amend the Key Performance Indicator 1 performance target to 70 per cent
 - include in Action 31.3 an end-of-term audit by the Conservation Commission
 - a programme for improved transparency and public information by the Conservation Commission, DCLM and FPC.

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal by the Conservation Commission of Western Australia (the Conservation Commission) to obtain approval for a Forest Management Plan to apply during 2004-2013 (the proposal). This replaces the Forest Management Plan 1994-2003 (Land and Forest Commission 1994) and those parts of the 1987 Regional Management Plans (Department of Conservation and Land Management 1987a, 1987b and 1987c) current during the Forest Management Plan 1994-2003.

The Proposed Forest Management Plan (the Proposed FMP) addresses:

- the reservation of land for conservation purposes;
- management of State forest for the protection of forest values and the production of timber;
- the sustained yield of principal timber species within State forest; and
- monitoring the effectiveness of management, within the context of the principles of ecologically sustainable forest management (ESFM).

The EPA determined in November 2001 that the Forest Management Plan being prepared by the Conservation Commission should be assessed under Part IV of the *Environmental Protection Act 1986*. There were no appeals on the level of assessment of Formal under Part IV.

Discussions with the Conservation Commission lead to an agreed approach to the assessment, whereby some aspects of the assessment of this Forest Management Plan have been undertaken in parallel with the statutory process required for the Conservation Commission. This process, which was outlined in *A new forest management plan for Western Australia – a discussion paper* (Conservation Commission 2002) lead to a combined public review period for the Draft Forest Management Plan under both the *Environmental Protection Act 1986* and the *Conservation and Land Management Act 1984* (the CLM Act). The remainder of the environmental assessment process has followed normal process, with some refinements to cater for the evolution of the proposal throughout its preparation.

The Conservation Commission published the Proposed Forest Management Plan on its web site for public information on 31 July 2003, at the same time that it was provided to the EPA.

The Conservation Commission will provide advice to the Minister for the Environment during the appeal period on the EPA report, on changes that it will make to the Proposed Forest Management Plan to meet the recommendations of the EPA. As a consequence, the Conservation Commission will continue to refine and, where necessary, revise the Proposed FMP prior to transmittal to the Minister for the Environment for approval.

Further details of the proposal are presented in Section 2 of this report while Section 3 outlines the EPA's involvement in consultation. Section 4 discusses the environmental factors relevant to the proposal and details the EPA's assessment of the

Proposed FMP under the ESFM principles. The Conditions and Commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 5. Section 6 provides Other Advice by the EPA, Section 7 presents the EPA's conclusions and Section 8, the EPA's Recommendations.

A summary of submissions and the Conservation Commission's response to submissions has been published concurrently with this report as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process and which the EPA has taken into account appear in the report itself.

2. The proposal

The Proposed Forest Management Plan (the plan) applies within the geographic area of the Swan, South West and Warren Regions of the Department of Conservation and Land Management (the DCLM), other than marine waters (Figure 1).

The Forest Management Plan covers the management of the following land categories:

- Indigenous State forest and timber reserves, including State forest to be classified as a forest conservation area through section 62(1) of the CLM Act (see Map 2 existing, Map 3 proposed in the Proposed FMP).
- Freehold land held in the name of the Department’s Executive Director that contains indigenous vegetation which, while not vested in the Conservation Commission, is taken into account in the plan because its productive capacity contributes to the sustained yield of native timber.
- The plan recognises the whole of forest context and the role of the formal reserve system in the development of the management proposals, hence covers nature reserves, national parks, conservation parks and other land referred to in section 5(1)(g) and (h) of the CLM Act that has a conservation purpose (see Map 2 existing, Map 3 proposed in the Proposed FMP). However, more detailed management actions on these land categories may flow from:
 - the requirements of the CLM Act, the *Wildlife Conservation Act 1950*, and other relevant State and Commonwealth legislation;
 - existing area management plans or those developed in the life of the plan applicable to the particular area; and
 - relevant policies of the Conservation Commission and the Department (see Appendix 7 in the Proposed FMP).
- State forest and timber reserves planted with exotic species (see Map 4 in the Proposed FMP). The application of the plan to these areas is limited to specific actions labelled for plantations.

The land categories and areas to which the plan applies is indicated in Table 1.

Table 1: Area of land categories covered by the FMP (as at June 2003)

State forest (ha)	Timber reserve (ha)	Freehold land held by the Department’s Executive Director and miscellaneous reserve (ha)	State forest planted with exotic species (ha)	Existing and proposed nature reserves, national parks, conservation parks, CLM Act section 5(1)(g) and 5(1)(h) lands, and State forest classified as forest conservation area (ha)
1,166,300	44,400	6,800	50,300	1,259,900
1,217,800				1,259,900

For the first time, the formal conservation estate exceeds the area of forest available within State forest and timber reserves. With the inclusion of informal reserves and fauna habitat zones, approximately 52 percent of jarrah forest type and 66 per cent of karri forest type on land vested in the Conservation Commission is protected or unavailable for timber harvesting.

The Proposed FMP defines objectives and related actions associated with each of the seven criteria of sustainable forest management identified through the Montreal Process (Commonwealth of Australia 1998). The criteria agreed by the Montreal Process cover:

- Conservation of biological diversity
- Maintenance of productive capacity of forest ecosystems
- Maintenance of forest ecosystem health and vitality
- Conservation and maintenance of soil and water resources
- Maintenance of the forests contribution to global carbon cycles
- Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies; and
- Legal, institutional and economic framework for forest conservation and sustainable management.

There are a number of important components which form part of the Proposed FMP's response to these criteria. These include:

- a substantial expansion of the dedicated forest reserve system;
- proposed sustained yields of jarrah and karri first and second grade sawlogs and other bole logs made available as part of the harvesting of sawlogs and thinnings;
- identification of areas within State forest and timber reserves protected from timber harvesting, including informal reserves and fauna habitat zones;
- identification of a large number of actions in relation to the above and to management of forest operations;
- preparation and implementation of revised key management guidelines;
- monitoring of environmental, silvicultural and other effects resulting from the range of management operations in forest areas;
- continuous improvement and adaptive management of forest in response to monitoring of effects; and
- auditing of compliance with the Proposed FMP.

The non-declining sustained yields for jarrah and karri in the Proposed FMP are presented in Tables 2 and 3

Table 2: Sustained yield of first and second grade sawlogs for principal timber species

Species	Log grade	Average annual yield for 10 years (m ³)	Approximate level of woodflow by forest region (m ³)		
			Swan	South West	Warren
Jarrah	First and second	131,000	39,000	73,000	19,000
Karri	First and second	54,000		2,000	52,000

Table 3: Availability of other bole volume

Species	Log grade	Average annual availability for 10 years (m³)
Jarrah	Bole logs other than first and second grade sawlog	534,000
Karri	Bole logs other than first and second grade sawlog	117,000
Marri	All bole logs	196,000
Wandoo	Sawlog	1,300
Blackbutt	Sawlog	1,600
Sheoak	Sawlog	1,900

The Proposed FMP contains 37 objectives related to the Montreal Criteria, and a considerable number of actions associated with these objectives. The responsibility for the actions is variously assigned to the Conservation Commission, DCLM and FPC. These actions, along with the guiding documents and rules set out in Appendices 1-7 and 13, form the basis of the Proposed FMP. A consolidated list of objectives and actions is provided in Appendix 3 of this report.

A detailed description of the proposal is provided in the Proposed Forest Management Plan (Conservation Commission, 2003).

Since release of the Draft Forest Management Plan the Conservation Commission has made a number of modifications to the proposal. These include:

- specification of the sustained yields for the primary timber species;
- a change of name of mature habitat zones to fauna habitat zones and a reduction in the total area and distribution through the forest from that proposed in Scenario A;
- a smaller increase in the number of retained primary habitat trees in forest subject to timber harvesting;
- a reduction in the nominal minimum harvest rotation length for jarrah from 200 years to 175 years; and
- a significant reduction in the sustained yield resulting from modelling the autonomous spread of dieback.

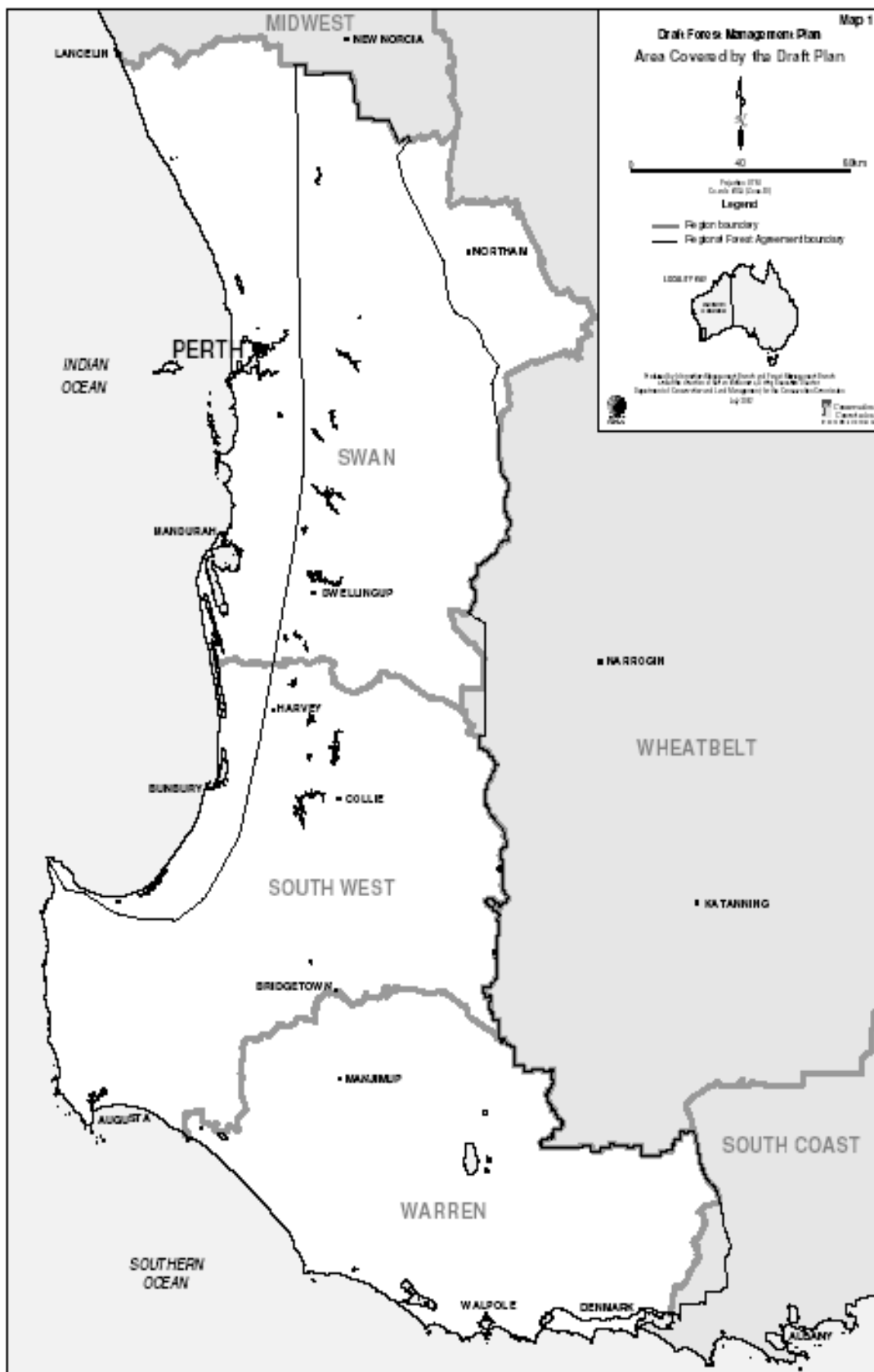


Figure 1: Area covered by the Proposed Forest Management Plan

3. Consultation by the EPA

The Forest Management Plan preparation has involved extensive stakeholder and wider community consultation. Two documents prepared by the Conservation Commission, *A new forest management plan for Western Australia – a discussion paper* (January 2002) and Draft Forest Management Plan (July 2002), have been subject to public review and comment.

In accordance with an agreement with the Conservation Commission, the public review period on the Draft Forest Management Plan required under the CLM Act and that required by the EPA as part of the assessment of the proposal was run concurrently, with submissions being received by the Commission. The EPA was subsequently provided with a full set of submissions.

As part of the Conservation Commission's consultation process, the EPA participated in a number of the public forums through the South West that outlined the Draft Forest Management Plan and explained the involvement of the EPA.

The Conservation Commission placed the Proposed Forest Management Plan on its web site for public information on 31 July 2003, when it provided the Proposed FMP to the EPA.

On 13-15 August, the EPA met with members of the Forests Round Table and other key stakeholders to provide them with an opportunity to make comment directly to the EPA in relation to the Proposed Forest Management Plan. The EPA met with the representatives of the following groups and agencies:

- Forests Products Commission
- Conservation groups (Conservation Council of Western Australia, Western Australian Forest Alliance)
- Department of Industry and Resources
- Chamber of Minerals and Energy
- Royal Society of Western Australia
- Department of Environment
- Forest industry (Forest Industries Federation (WA) Inc, Timber Communities Australia (WA Branch), Shire of Bridgetown-Greenbushes, Australian Workers' Union (WA Branch) and Hamilton Sawmillers)

Issues raised with the EPA by these groups and agencies included:

- provision in the FMP for the sale of logs salvaged from mining and other approved operations on Crown land
- questions about the adequacy of the mapping of forest areas, growth plots
- public availability of data used in forest management and sustained yield calculations
- the extent to which the implications of climate change have been incorporated in the FMP
- the definition of boundaries of proposed reserves to ensure that all areas of old-growth or other high conservation values are protected
- the need to improve knowledge of forest fauna through research and monitoring

- the need for improved protection of fauna through increased retention of trees and logs in areas subject to timber harvesting
- the importance to ensure that forest areas remain available for other resource values, including minerals, basic raw materials and water supply.
- recognition of the social and cultural values of forest areas to South West communities

In addition to this process of consultation, the EPA has received representations from various groups about aspects of the Plan, mainly in relation to the adequacy of the reserve proposals in the Draft Forest Management Plan. The EPA has also received pro-forma submissions by email (68) or postcard (1357), with the following text:

You are currently assessing the proposed new Forest Management Plan. Below are key recommendations the EPA must make to ensure a secure future for WA's unique forests.

- *The conservation reserve system is still inadequate. Central and Northern jarrah forests are poorly reserved. The EPA must recommend the protection of ALL old growth and high conservation value forest, as per the Gallop Government's policy.*
- *All logging must be conducted according to the principles of Ecologically Sustainable Forest Management (ESFM), as per the Gallop Government's forest policy. The EPA must recommend there be NO MORE clearfelling in the karri forest, or gap clearfelling in the jarrah forest; NO MORE woodchipping of native forests; and IMPROVED PROTECTION for mature fauna habitat and for streams and rivers.*
- *The EPA must recommend that ESFM prescriptions be made LEGALLY BINDING on CALM and logging contractors.*
- *WA's forests have been severely overcut for at least 80 years. The EPA must recommend annual sawlog volumes that are clearly ECOLOGICALLY SUSTAINABLE, as per the Gallop Government's policy. Industry must be forced to greatly increase the amount of sawn timber produced from EVERY TREE felled, instead of just felling more forest.*

4. Principles used by the EPA to review the Proposed Forest Management Plan

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that the following environmental factors relevant to the proposal require detailed evaluation in this report:

- a) Biodiversity; and
- b) Ecologically sustainable forest management

The above relevant factors were identified from the EPA's consideration and review of all environmental factors generated from the Proposed FMP document and the submissions received, in conjunction with the proposal characteristics. These two factors, biodiversity and ecologically sustainable forest management, encompass many of the more specific factors and issues of interest to the EPA.

4.1 Overview

The EPA has determined the following environmental objectives for the two relevant factors of biodiversity and ecologically sustainable forest management::

- To avoid adverse impacts on biological diversity, comprising the different plants and animals and the ecosystems they form, at the levels of genetic diversity, species diversity and ecosystem diversity.
- To ensure, as far as is practicable, that the proposal meets or is consistent with the principles of Ecologically Sustainable Forest Management (ESFM).

Rather than following the approach used in the Proposed FMP, the EPA has approached this assessment by reviewing the plan against each of the principles of ESFM. These principles are stated in the *Conservation and Land Management Act 1984*. The Conservation Commission has a responsibility to advise the Minister on the application of these principles in the management of State forest and timber reserves and of forest produce throughout the State.

The EPA has assessed this Proposed FMP with the knowledge that the Government has made a number of decisions, primarily through its *Protecting our old-growth forest policy*, that significantly influence how the ESFM principles will be applied in the SW forests.

The Government has also made the key decision to support the non-declining sustained yield of the principal timber species recommended by the Conservation Commission.

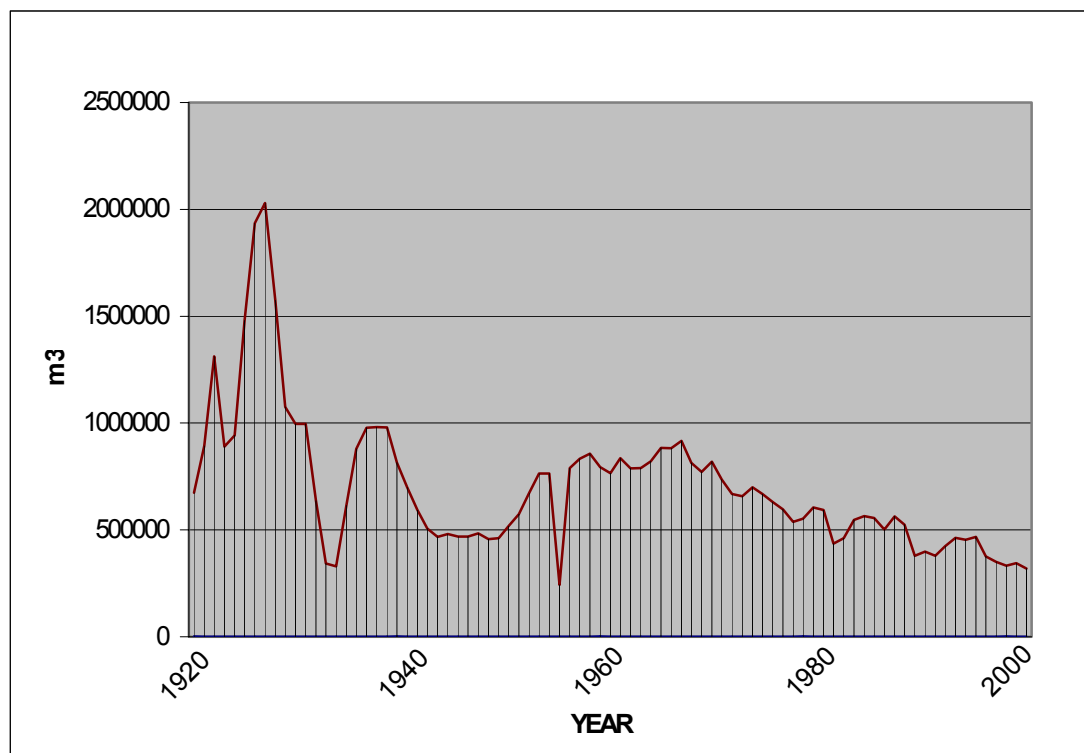
It is important to recognise that the principles of ESFM do not prescribe a particular set of solutions to demonstrate their attainment. The Conservation Commission has adopted a particular suite of actions, rules and settings that it considers achieves

ESFM. The Proposed Forest Management Plan defines those actions, rules and settings under the structure of the Montreal Protocol criteria.

The EPA has heard from people, either directly or through submissions, who believe that the suite of ESFM actions, rules and settings proposed by the Conservation Commission should be changed to achieve their view of ESFM. Some suggest that it does not give enough balance to biodiversity protection. Others suggest that it does not give sufficient weight to social and economic considerations.

The Proposed FMP has been prepared in the context of a number of decisions by State Government's over the past thirty years which have lead to a significant reduction in the area of forests available for timber harvesting and, conversely, to a progressive increase in the area of forest in dedicated reserves. This change of allocation of forested Crown land has been the major reason for the decline in the volume of logs removed from State forest. This is illustrated in Figure 2, which shows estimated removal of jarrah logs from Crown land since 1920.

Figure 2: Estimated removal of jarrah logs from Crown land (1920-2002)



(Source: Forest agency annual reports)

A key issue for the EPA is the means of implementing the approved FMP. While the CLM Act places the responsibility for preparing and reviewing a forest management plan with the Conservation Commission, implementation of the plan will primarily rest with the DCLM and the Forest Products Commission (FPC). It is the EPA's understanding that DCLM's management of CLM Act land subject to an approved FMP shall be carried out in accordance with that plan. Where permits and licences are issued by DCLM, they must also be in accordance with the plan. The FPC is required to ensure that a production contract relating to forest products in a State forest or timber reserve is in accordance with a relevant management plan.

The implications of this are discussed further in Section 4.7 of this report.

It is important to recognise that the ESFM Principles apply primarily at the whole of forest level and to the period of the plan and beyond. However, how these principles will be met will vary across the forest, depending on current and previous management, especially disturbances such as timber harvesting. It is also relevant that none of the ESFM principles can be met in isolation from the other principles.

One aspect of management of the forest ecosystems that is not addressed in this report relates to fire. The EPA has been requested by the Minister for the Environment under section 16(e) of the EP Act to review and provide advice on the DCLM's fire management policies and practices within the area subject to this plan. This review is in its early stages and the EPA expects to publicly report to the Minister by April 2004.

4.2 Sustainability principle

Description

This ESFM principle states “that the decision-making process should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.”

The Proposed FMP indicates that this principle was addressed during the formulation of the plan by a process of quantitative and qualitative testing of the impact of proposed amendments to management practice on socio-economic outcomes. Depending on the outcome, proposals were modified and the impact on socio-economic outcomes retested until, in the Conservation Commission's view, a balance was reached.

Submissions

Many submissions on the Draft FMP pointed to the inclusion of large areas of regrowth jarrah and karri forest in proposed reserves, which was considered to reduce potential social and economic benefits from timber production

Assessment

The area of State forest and timber reserves in the three forest regions has been progressively declining over the past thirty years as increasing areas of forest have been placed into protected reserves, with more substantial changes in recent times. For example, approximately 1 419 800 hectares of forest were available for timber production in 1987 but this was reduced to 1 205 100 hectares in the 1994 FMP and is proposed to be approximately 810 000 hectares in this Proposed FMP.

In the context of the EPA's objective for sustainability, this principle cannot be treated separately from the other ESFM principles. The decisions of the State Government in relation to protection of all old-growth forest areas in dedicated reserves or informal reserves, a non-declining sustained yield for the major timber species that required a change to a number of settings supporting the sustained yield,

and financial support for those leaving the industry as well as promotion of new native timber opportunities, are all components related to sustainability.

As with all other ESFM principles, there will be debate and disagreement about the consequences of the determined set of outcomes. The EPA has received comments during its consultation on the one hand that the outcomes and consequences of the Proposed FMP are not acceptable because it has promoted the timber industry too far, and on the other that it has excluded too much forest from timber production.

One of the consequences of logging, and especially the use of clearfelling, gap and shelterwood prescriptions, is that a larger proportion of the forest is young. This juvenescence of the forest has implications on the ability of the forest to support forest values, and particularly fauna values.

Summary

The EPA considers that the Proposed Forest Management Plan has addressed the ESFM principle of sustainability.

4.3 Precautionary principle

Description

The CALM Act defines the precautionary principle as follows:

“That if there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation”

The 1997 assessment of ESFM in the south-west forests by the Independent Expert Advisory Group (Ferguson *et al* 1997) indicates that the application of the precautionary principle should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and an assessment of the risk-weighted consequences of various options.

Submissions

The proposal for mature habitat zones in the Draft FMP generated considerable comment, with considerable support for them as well as considerable opposition to the zones.

A number of submissions commented that the Draft FMP did not address concerns about climate change adequately. Comment was made about the impact resulting from the reduction in canopy cover, reducing rainfall on tree growth and the effect on regeneration.

Assessment

The need for caution and the application of adaptive management in the forest were key thrusts of the EPA's report and recommendations on the Forest Management Plan 1994-2003 (EPA 1992). The nature of these has been subject to review since 1994, with particular emphasis on Ministerial Condition 11. This condition states that:

“The proponent shall implement the jarrah silvicultural prescription so that monitoring of environmental impacts on a representative range of treated sites and localities in the forest can be carried out to the requirements of the Minister for the Environment. This shall include long-term monitoring which quantifies the impacts of silvicultural practices on environmental elements and values and provides bases to adjust management”

Several reviews were carried out to address this condition (Codd 1999 and Burrows *et al* 2001). The second of these reviews identified regeneration adequacy and methods of assessment, salinity constraints, habitat provision for the maintenance of biodiversity and maintenance of ecological processes as issues requiring further review prior to finalisation of the next FMP (Burrows *et al* 2001)

The EPA has considered how the Proposed FMP addresses several of these issues.

Fauna protection

While there has been extensive and progressively more detailed mapping of vegetation within the forest areas to ensure that there is good representation in protected reserves, there is significantly less knowledge covering the range of fauna in the forests. This has been acknowledged in many reviews. One of the most important reviews was that undertaken by the expert panel reporting on the implementation of Ministerial Condition 11 related to the 1994-2003 FMP (Burrows *et al* 2001).

The Burrows Panel review in 2001 pointed out that “there was limited research activity focussed specifically on the ecological effects of timber harvesting in jarrah forests prior to 1994, beyond hydrological and silvicultural studies.” (Burrows *et al* 2001, p14). In order to address this, the DCLM commenced a major scientific investigation into the impacts of timber harvesting on jarrah forest ecosystems centred on Kingston State forest, between Bridgetown and Manjimup. The object of this study (the Kingston Project) was to investigate the acute (ie. five years following logging) impacts of timber harvesting on a jarrah forest ecosystem.

Burrows *et al* (2001) provides a summary of the key research findings associated with the Kingston Project. It also provides the following set of observations and recommendations in relation to management of habitat for arboreals and hollow dependent fauna:

“The studies carried out as part of the Kingston Project have shown that ground dwelling fauna (invertebrates and vertebrates) appear little affected by logging and associated burning activities. However, logging has had some short-term adverse impacts on some arboreal fauna.

Observations and Recommendations:

- *Retained forest (reserves and TEAS) are important for buffering vertebrate fauna (birds and mammals particularly) against the acute impacts of logging and associated burning. There is merit in retaining a proportion of mature forest, or forest with old growth attributes, on forest blocks (see below).*
- *Logging (and associated burning) predisposes Western Ringtail Possums to predation by foxes and feral cats because a) it enhances access for predators and b) possums spend longer periods on the ground when trees*

are removed, so are vulnerable to predation. Current fox control measures need to be reviewed.

- *Radio tracking data show Western Ringtail Possums utilise more 'habitat' trees than first thought. There is a good basis for increasing the number of retained habitat trees on logged coupes.*
- *There is now better information available for the selection of appropriate habitat trees. This should be incorporated into the guidelines.*
- *Balga, or grass trees, are an important refuge for Western Ringtail Possums so should be protected during logging operations and subsequent silvicultural burns where possible.*
- *Brushtail Possums also declined following logging but not to the same extent as Western Ringtail Possums. Measures taken to provide for the Western Ringtail Possums should also benefit Brushtail Possums and other arboreals.*
- *Understorey trees such as *Banksia grandis* are a seasonally important food source. Scattered mature individuals should be retained.*
- *There is good evidence for retaining a portion of the forest block as uncut, or with mature characteristics to provide refuge for birds and mammals that require this type of habitat. Retained, uncut patches of mature or old growth forest are important sources of recolonisation for some species. The extent of retention of uncut forest should be determined on the basis of the condition and tenure of adjacent forest. The literature on viable populations for forest fauna is limited. Alliances with island and remnant habitat studies suggest retaining 50-200 individuals for mammals (e.g., see Main 1971, Bennet 1987, Friend 1987). Western Ringtail Possums have a home range of about 3-5 ha, and using this species as an indicator, retaining mature (or old growth) patches of about 200 ha (minimum) in a matrix of regrowth forest on a forest block, preferably continuous or connected (eg, creek lines), should be considered until better information is available.*
- *Silviculturalists and field officers involved with coupe management should be trained in basic biology and ecology of hollow users and arboreal fauna particularly, and in recognising the best habitat trees for retention." (Burrows et al 2001, p 19)*

The forest habitat refuges recommendation was explored further in Burrows *et al* (2002). This review recommended the following:

"Mature forest habitat refuges: *Consistent with ESFM and with the forest conservation objectives proposed in section 3.3.1 above, mature forest habitat refuges should be retained at the forest management unit scale in forests available for timber harvesting in addition to habitat trees retained in logged and regenerated forests. These should be incorporated into the stream reserves or as viable strips linking stream reserves. The area and distribution of mature forest habitat refuges needs further discussion and analysis incorporating the latest biological knowledge, the proximity and extent of mature forest in reserves and the impacts of retention on timber supply and other components of ESFM such as socio-economic factors. Consistent with adaptive management, a range of options should be trialed over the life of the New Forest Management Plan." (Burrows et al 2002, p 27)*

In a report to the Conservation Commission on Maps and Data, Professor Ian Ferguson also pointed to the paucity of data in relation to fauna in the central areas of the forests, as observations were largely opportunistic (Ferguson 2003). Professor Ferguson advised that:

“The Department of Conservation and Land Management and other relevant agencies should review and expand their databases on fauna habitat during the next Plan period to ensure that the existing gaps in data do not represent a major source of bias. While this issue potentially has some implications for sustained yield, the current processes do take account of the local occurrences and informal reserves in the course of pre-logging surveys and the extent of those informal reservations is taken into account in calculating the sustained yield.” (Ferguson 2003, p 4)

As a consequence of this issue, Professor Ferguson recommended (Recommendation 2.4) that the “Conservation Commission should ensure that, in the next Plan period, more specific attention is given by the relevant agencies to the development of better and more representative databases on fauna habitat and heritage matters”.

The Conservation Commission has responded to these reports and recommendations in the Proposed FMP in a number of ways. For example, increased retention of Balga’s, *Banksia grandis* and the exclusion of timber harvesting in areas of State forest for fauna protection purposes have been incorporated into the Proposed FMP. To improve further the level of knowledge about forest fauna and the effects of forest management on fauna, the Proposed FMP establishes an action (Action 8.1) in the FMP to undertake biological surveys targeted to areas of high priority to improve the knowledge of, among other things, the distribution of fauna and its associated habitat.

The Proposed FMP has incorporated the recommendation from the Burrows Panel (2001) related to retained mature patches in the form of fauna habitat zones. The criteria to be used in the identification and management of fauna habitat zones, modified from those suggested by Burrows *et al* (2001), are outlined in Appendix 4 of the Proposed FMP. Fauna habitat zones will be applied to all areas subject to timber production from the commencement of the approved FMP, in 2004.

It is apparent that relatively little information is known about the fauna of the SW forests. While some species are known from specific studies and specific locations, this is not the case with the majority of vertebrate fauna and even more so for invertebrate fauna.

The fauna protection approach outlined in Burrows *et al* (2001) and implemented in the Proposed FMP advocates a hierarchy, from dedicated reserves through informal reserves and other protected areas within the forest to specific management strategies such as retained habitat trees and logs within harvest areas. Linkages between these elements of the forest ecosystem, within and outside of reserves, are important.

The EPA supports the approach taken by the Conservation Commission in responding to the scientific knowledge about requirements to improve the protection of fauna. It also points to the need to establish and undertake monitoring of disturbance activities and also forest values to determine the effectiveness of guidelines and practices, and to promote changes in forest management to respond to adverse impacts.

Monitoring

The need for effective monitoring of the impacts of forest management across the jarrah forest was a key aspect of the EPA's 1992 review of the then proposed forest management plan, and this was reflected in Ministerial Conditions 3, 5, 11 and 12. When the EPA reported in 1997 on the implementation of the ministerial conditions, monitoring remained a major concern. Burrows *et al* (2001) reported after a specific examination of the monitoring in the jarrah forest, including the FORESTCHECK programme developed by DCLM to monitor responses to forest management activities and also natural variation. Burrows *et al* (2001) acknowledges that, while the Kingston Project has provided valuable information about the impacts of timber harvesting at a particular site, it does not represent the diverse range of jarrah forest sites that have been logged since 1994, or that will be logged beyond 2003.

During the DCLM's consultation as part of the development of FORESTCHECK, two broad approaches were considered. One approach was to target a broad range of organisms for initial monitoring at a few sites in the logged jarrah forest. Another approach was to target a small number of species, or guilds, over a wider range of sites across the jarrah forest. FORESTCHECK adopts the first of these approaches.

In relation to the FORESTCHECK approach, the Burrows Panel expressed concern *“that such a strategy overlooks a fundamental biogeographical attribute of the less fragile components of the jarrah forest biota – a relatively high rate of geographical replacement of species across the landscape. Indeed, this is a pattern for which the whole south-west botanical province is world-renowned.”* (Burrows *et al* 2001, p23)

This concern was also reflected in some of the comments received by the Conservation Commission and the EPA. It is noted that the Burrows Panel provides the following advice on resolving this concern:

“Consequently, the Panel considers that a more strategic approach to monitoring after timber harvesting would be to target a smaller number of species, or guilds, and achieve greater geographical replication across the jarrah forest. The choice of species should focus on a) threatened and listed taxa, and b) those whose life histories and reproductive biology suggest low resilience to the impacts of timber harvesting based on the best available biological knowledge (indicator species). While such a strategy has the advantage of focussing effort on taxa most vulnerable to timber harvesting, there is a risk that present biological knowledge is insufficient to identify some such taxa at risk. Therefore, the Panel recommends regular review of this strategy under an adaptive management model so that the list of monitored taxa remains current in terms of those least resilient to timber harvesting.

The Panel recommends a 12 month trial operation of FORESTCHECK on several sites where both strategies (that proposed by FORESTCHECK and that proposed by the Panel) can be evaluated to compare and contrast the cost-effectiveness of the two techniques. The trial should aim to identify indicator species, to evaluate their usefulness and utility, and to recommend which of the two strategies is most informative, cost-effective and representative. The results of this trial should be reported to the Conservation Commission and to the EPA.” (Burrows *et al* 2001, p23-24)

The Proposed Forest Management Plan contains two Actions (8.1 and 8.2) related to biodiversity surveys.

As indicated in the Burrows Panel Report referred to above, there was considerable discussion during the consultation undertaken by the DCLM to establish an effective and efficient process for monitoring the effects of forest management, including logging. Some advocated a broad approach while others suggested the use of more species targeted surveys.

The EPA supports the recommendation of the Burrows Panel for a trial of both monitoring approaches. There is anecdotal evidence to indicate the surveying of some species of fauna in the forest through trapping may lead to fauna behaviour that could under or over estimate their presence, making estimates about impacts difficult.

Habitat trees

Burrows *et al* (2002) pointed to several fundamental issues that are important to biodiversity in the jarrah forests subject to timber harvesting. One of these is the adequate provision of ‘legacy’ habitat components, such as large hollow-bearing trees, hollow logs and patches of structurally mature forest. These habitat elements are not well provided for by regrowth forest and can take up to 140 years to develop following logging.

The jarrah silvicultural guideline in the current Forest Management Plan 1994-2003 requires the retention of four primary habitat trees per hectare. This was intended to be increased to six retained primary habitat trees in the Draft Forest Management Plan as a result of the findings of the Kingston Project, but has been varied in the Proposed FMP to five primary habitat trees. A further six to eight secondary or potential habitat trees per hectare will be retained, which is an increase the current jarrah guideline.

Some submissions promoted the retention of all mature marri trees for their habitat values. The EPA is aware that marri has a range of values, including to fauna, and that the retention of marri as a major tree species in the forest is important. Appendix 5 in the Proposed FMP outlines the guideline for the treatment of marri in those portions of State forest and timber reserves available for timber harvesting.

The adequacy of retained habitat trees in forest areas subject to harvesting will vary between sites according to the scale and intensity of the treatment being applied and the fauna that would rely on them. Ensuring that there are an adequate number of primary and secondary retained habitat trees will need to be subject to further research. The guideline specification should be read as a minimum prescription. Clearly this is an issue where an adaptive management approach needs to be applied when FORESTCHECK and other more specific research identify significant risk to biodiversity.

Climate change

A further threat is associated with climate change. An increasing body of evidence is showing that the Earth's climate system has changed at a global and regional scale since pre-industrial times. Some of the evidence points to the global warming observed over the past 50 or so years as attributable to human activities. Whilst recognising the difficulties involved in managing an ecological system over long time cycles with limited information, nevertheless the EPAS considers that predicted effects of climate change need to be explicitly incorporated into sustained yield calculations and forest modelling. Furthermore these need regular updating as better information becomes available.

While the precise implications of climate change in the South West will take more time to define, there is general agreement about the direction of the likely change, with increased mean summer and winter temperatures and increased frequency of extreme events.

Long-term changes to climatic conditions will affect the forest areas. These changes are likely to include variation of the productivity of tree and understorey vegetation species arising from changed temperature and rainfall, as well as the spread of forest disease and pests, again affecting productivity and biodiversity.

While long-term climatic variation will not necessarily be dramatic or consistent in direction, forest monitoring and management strategies will need to respond effectively to detected changes.

The EPA sought additional information from the DCLM and Conservation Commission on these aspects.

Based on information provided by DCLM, there appears to be relatively minor account of climate change in the sustained yield model to date. Standing inventory measurements in the jarrah and karri forest areas have been undertaken since 1988, thus allowing some account in the model of the reduction in rainfall in the past twenty five years. While a number of the growth assumptions in the model, including the assumption of no future growth in existing mature jarrah and two-tiered karri forest, mean that the sustained yield calculation will have some conservative components, it is not clear how the model can and should address climate change for this plan. It is possible that climate change may provide some improved growth conditions such as increased summer rain but this may be countered by other factors such as enhanced dieback spread.

A ten-year period of monitoring is likely to allow only limited identification of trends in the impacts resulting from climate change. A longer period of monitoring would improve the ability to detect impacts, provided there is adequate and appropriately targeted monitoring. While there is argument about the extent to which climatic variation over the past thirty years is a reflection of climate change, there have clearly been significant changes in rainfall and, to a lesser extent, temperatures. Each of these will be reflected in growth rates.

The impacts from climate change on biodiversity could be profound. The capacity to modify silvicultural practices and other forest management has been provided for in the Proposed FMP. Monitoring which is sensitive to detecting trends in forest

ecosystems resulting from climatic variation will be important, and periodic revision of the sustained yield is required. Monitoring and analysis that incorporates a combination of sample and survey techniques that include tree plot monitoring, FORESTCHECK, soil moisture, and regeneration should assist in determining trends related to climate change.

Summary

The EPA considers that the Proposed Forest Management Plan has addressed the ESFM precautionary principle. However, the EPA has pointed to the need for forest management and research to place an increased focus on fauna protection, the threat from climate change, and monitoring to detect trends and adverse impacts.

4.4 Intergenerational equity principle

Description

Intergenerational equity refers to the principle “that the present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations”

The non-declining sustained yields for jarrah and karri in the Proposed FMP are presented in Tables 2 and 3 in section 2.

As a result of the implementation of the silvicultural guidelines applying to jarrah and karri operations, additional logs including char logs will also be available. These are indicated in Table 3.

The Proposed FMP indicates in Key Performance Indicator 5 that, while the sustained yield has been determined as an annual average yield, there is the capacity to supply above this average during the first five years of the plan.

Submissions

Submissions of the Draft FMP pointed to the inadequacy of the data and the method used to calculate the sustained yield.

Several submissions criticised the Draft FMP for not calculating a sustained yield for other timber species such as marri, wandoo, blackbutt and minor species such as sheoak.

Many submissions on the Draft FMP objected to the non-commercial felling of marri and other species.

Assessment

A key part of the issue of how much timber can be removed from the forest is how much forest is available for that purpose. Over the past thirty years, the area of forest allocated to conservation reserves and other formally protected areas (such as Forest Conservation Area's) has increased, with a proportionate decline in the area from which timber could be removed. There has also been a related reduction in the

volume of timber removed from State forest. These are illustrated in Figure 2 in section 4.1.

Another example of the significant reduction in wood available from State forest and timber reserves is to compare the sustained yield for jarrah, karri and marri for this plan (Tables 2 and 3) and that outlined in the 1994 Forest Management Plan (Land and Forest Commission 1994), as shown in Table 5. Such a comparison indicates that the available whole bole volume for jarrah has declined by approximately 50 per cent, while there has been a 60 per cent reduction for both karri and marri.

Table 4: Annual sustained yield from jarrah and karri forests in the 1994 Forest Management Plan (1994-2003)

	Gross bole volume (m3/yr)	1st grade sawlog (m3/yr)	1st and 2nd grade sawlogs (m3/yr)	Other logs (m3/yr)	Logs (m3/yr)
Jarrah	1 360 000		459 000	685 000	
Karri	417 000	214 000		203 000	
Marri	559 000				559 000

Sustained yield settings and determination

The basis for determining levels of sustainable timber production from the State forest has been subject to a number of technical reviews during the 1994-2003 Forest Management Plan. This include Turner (1998), Turner, Ferguson and Fitzpatrick (1999), Ferguson, Adams, Brown, Cork, Egloff, and Wilkinson (1997), Ferguson, Adams, Bradshaw, Davey, McCormack and Young (2001a), Ferguson, Adams, Bradshaw, Davey, McCormack and Young (2001b), Ferguson (2003) and Ferguson, Adams, Bradshaw, Davey, McCormack and Young (2003).

These reviews examined and tested the assumptions, data, methods and scope of the information used to determine the sustained yield.

In relation to the information used to calculate sustained yield, Ferguson *et al* (2003) advises that:

- the design of the jarrah inventory system represents Australian best practice,
- the jarrah inventory is nearing its useful life,
- the jarrah inventory contains a significant element of conservatism
- the growth estimates for jarrah are robust and appropriate for the estimation of sustained yield in this plan
- the new karri inventory system uses the same design as that for the jarrah forest and therefore also represents Australian best practice.

At the same time, these reviews have also recommended improvements in the sustained yield model. Many of these improvements have been incorporated into the sustained yield calculated in the Proposed FMP, while some others would be implemented during the period of the plan.

Regeneration success

The DCLM has advised the EPA that area of jarrah forest harvested annually during 2004-2013 is likely to be between 6 900 and 9 400 hectares, significantly below the average 18 000 hectares each year since 1998.

Regeneration of areas subject to timber harvesting was not only a requirement under previous Forest Management Plans but it is also essential under ESFM. The success of regeneration has a direct link to the sustained yield of the forest as well as habitat and other ecological values.

The EPA has previously expressed concern about the increasing application of the shelterwood treatment in the jarrah forest, largely because of the level of uncertainty of regeneration following that treatment (EPA 1997). This was identified as an issue in Burrows *et al* (2001), which stated that:

“It is the Panel’s understanding that all areas cut to shelterwood are surveyed for adequacy of regeneration. The results of these surveys indicate that on lower productivity sites (low rainfall, poorer soils) it is difficult to establish regeneration to the standards and within the time frame specified by Silvicultural Guideline 4/97 (Allan Seymour, pers. comm.). The survey data also suggest that regeneration on these sites is patchy, or clumped, rather than evenly distributed. This is also typical of woodlands in lower rainfall areas.” (Burrows *et al* 2001, p 7)

Burrows *et al* (2002) noted specific concerns about regeneration in the eastern jarrah forest:

“While the draft guideline recognises the past difficulties with establishing regeneration and recommends making maximum use of existing regeneration, further research may be required into understanding the flowering phenology seed production and natural recruitment strategies of jarrah to increase the likelihood of successful seedling establishment. Ongoing work to ensure that post harvest burn prescriptions will give satisfactory results is also required. This issue could escalate given the potential for decreasing rainfall (hence productive capacity) across the south-west region (IOCI 2001).” (Burrows *et al* 2002, p 15)

Ferguson *et al* (2003) examined the implication of regeneration on the sustained yield. While indicating that early data derived from a small number of sites indicates considerable variation in regeneration results following shelterwood treatment, especially in the eastern jarrah forest, the Ferguson Panel did not raise concern with regard to the maintenance of ESFM key values, nor was it expected that there would need to be further change in the jarrah guidelines which would impact on sustained yield in the long-term.

Following a request from the EPA about the area likely to be subject to the main jarrah treatments during 2004-2013, the DCLM has indicated that, while precise predictions are not possible without additional lignotuber and dieback survey, the increased emphasis on coppice for regeneration in the revised silvicultural guideline may result in less area requiring shelterwood treatment. The EPA understands that this guide will place greater emphasis on selection cutting.

The Proposed Forest Management Plan responds to these concerns under Action 15.1 and KPI’s 9 and 10.

Thinning

During the life of the current plan, there has been a growing area of forest that has not been thinned as specified in the silvicultural guidelines.

The DCLM advised the EPA that, in relation to karri regrowth areas, thinning is important to be undertaken in accordance with the karri guideline. The sustained yield calculation assumes approximately 730 hectares per annum of karri regrowth thinning will be undertaken during 2004-2013. This is more than double the area of regrowth that was thinned in 2002 (350 ha) and thinning has not met targets for a number of years. Thinning could increase to 1200 hectares per year without affecting sustained yield. If thinnings do not occur as programmed, future sawlog woodflows would be affected while the sustained yield is unlikely to be affected, largely because of the substantial area of karri regrowth that produces sawlogs after 2020. The EPA notes that the Proposed FMP contains Key Performance Indicator 12, which addresses the requirement to meet thinning targets.

Any delay of thinning in the jarrah or karri forest could also affect the water yield from the forest. Unthinned forests are likely to have higher rainfall interception and evapotranspiration rates, leading to reductions in water flows into forest streams. At a time when declining rainfall is being experienced across much of the plan area, this reduction may be significant.

The EPA considers that the achievement of ESFM requires that thinning be undertaken in accordance with the jarrah and karri silvicultural guidelines.

Summary

The Proposed FMP has addressed the ESFM principle of intergenerational equity, following extensive review of the basis for determining the non-declining sustained yield. Ferguson et al (2003) has advised that there is a level of conservatism in the assumptions used to derive the sustained yield, and is aware that the data and methods underlying the sustained yield will be further improved before the end of the plan period. The ability to incorporate reasonable predictions of impact resulting from a range of threats and uncertainties, including those discussed in this report, and to respond through adaptive management, will be an ongoing challenge.

4.5 Conservation of biodiversity and ecological integrity principle

Description

This ESFM principle states “that the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.”

The approach adopted by the Conservation Commission during the preparation of the FMP has been to:

- provide for a dedicated reserve system to achieve protection of key forest ecosystem and other values;
- ensure that there are appropriate areas such as informal reserves and fauna habitat zones throughout the forest available for timber production which can support and maintain ecological values during periods of disturbance; and

- examine the silvicultural guidelines to ensure that key components of the forest within disturbed areas, such as logging coupes, are retained to assist the return of the disturbed area to supporting its previous range of forest values.

The land categories vested in the Conservation Commission and the purposes for their management are set out in Table 6.

Table 5: Land categories vested in the Conservation Commission

Land category	Management purpose(s) CLM Act 56(1)a e
Nature reserve	Sustain and restore the environment, and to protect, care for and promote the study of, indigenous flora and fauna, and to preserve any feature of archaeological, historic or scientific interest.
National park and conservation park	Fulfil so much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna and the features of archaeological, historic or scientific interest.
Other land referred to in the CLM Act section 5(1)(g) or 5(1)(h)	Achieve the purpose for which the land was vested in the controlling body. (Such a purpose cannot include timber production because the reserves do not fall within the meaning of the term 'departmental land' in the FP Act.)
Indigenous State forest or timber reserves	To achieve the purpose or combination of purposes provided for in the proposed management plan under section 55(1a) (conservation, recreation, timber production on a sustained yield basis, water catchment protection or other purpose prescribed by the regulations).
State forest or timber reserves planted with exotic species	To achieve the optimum yield in production consistent with the satisfaction of long-term social and economic needs.

The Proposed FMP contains many proposals for changes to land categories. These are listed in Appendix 2 and illustrated in Map 5 of the Proposed FMP. There are few changes to those indicated in the Draft FMP.

Following several reviews of forest areas nominated to have high conservation value (HCV) (Ecoscape 2002), the Conservation Commission has proposed that:

- all occurrences of the Darling Scarp ecosystem on multiple-use State forest be protected through informal reserves
- DCLM identify suitable parcels of private land with Darling Scarp ecosystem, with a view to increasing the level of reservation/protection of this ecosystem
- approval of applications to clear Darling Scarp and Jarrah Leeuwin ecosystems on private land should be refused
- Stockyard block be added to the Lane Poole reserve
- consolidated areas of old-growth forest in the western part of Telerah block and southern part of Red Gully block that are adjacent to existing and proposed reserves be added to these reserves
- consolidated areas of old-growth forest in the southern part of Central block that are adjacent to the D'Entrecasteaux National Park be added to this reserve
- consolidated areas of old-growth forest in part of Bidella block that are adjacent to the proposed Hillliger National Park be added to this reserve

- reservation of the whole of Dalgarp block
- reservation of the southern part of Whichcliffe block and
- the Conservation Commission reviews and provides advice on the conservation status of Wandoo ecosystems beyond the area of the Forest Management Plan

Informal reserves and other protected areas

There is currently within the State forest and timber reserves a patchwork and network of areas that are not available for timber harvesting. These informal reserves focus on areas with important ecological values.

Appendix 3 of the FMP lists the informal reserves to be retained in areas subject to logging. Table 7 summarises the type, purpose and criteria for informal reserves.

Table 6: Informal reserves in State forest and timber reserves

Informal reserve type	Purpose	Criteria for inclusion in Department's corporate database
Old-growth forest	Protect areas of old-growth forest outside the formal reserve system.	Areas greater than two hectares of ecologically mature forest, where the overstorey is in a mature to senescent growth stage, and where the effects of disturbance (eg. dieback, timber production, grazing) are either absent or now negligible.
River and stream zones	Provide forest undisturbed by timber harvesting. Protect water quality. Protect aesthetic and social values. Protect productive capacity, soil values and carbon pools.	A 60-metre wide corridor in the area of first, second and third order streams, with all boundaries being at least 20 metres from the bank of the stream. A 150-metre wide corridor in the area of fourth order streams, with all boundaries being at least 50 metres from the bank of the stream. A 400-metre wide corridor in the area of fifth order streams, and streams of any higher category, with all boundaries being at least 100 metres from the bank of the stream.
Travel route zones	Protect aesthetic and social values.	A corridor that extends at least 200 metres from each side of Level 1 travel routes in the Warren region. A corridor that extends at least 100 metres from each side of Level 2 travel routes in the Warren region. A corridor that extends at least 200 metres from each side of the Bibbulmun Track. The Level 1 and Level 2 travel routes referred to are indicated in the table appearing in this Appendix.
Diverse ecotype zones (DEZ)	Protect sensitive ecosystems.	Rock outcrops greater than 0.2 hectares and wetlands, heath, sedge, herb and low-density woodland communities. All zones to incorporate a buffer of undisturbed vegetation around them. Ecological characteristics will be used to determine the boundary of these zones. DEZ are defined in the Department's corporate database by vegetation codes.

Informal reserve type	Purpose	Criteria for inclusion in Department's corporate database
Less well reserved vegetation complexes	Provide additional protection for the less well reserved vegetation complexes that occur on State forest and timber reserves available for timber harvesting.	Vegetation complexes that have either less than five per cent of their pre-European area in existing or proposed formal and informal reserves; or between five and 10 per cent of their pre-European area in existing or proposed formal and informal reserves and less than 15 per cent of their pre-European area remaining. The less well reserved vegetation complexes currently on the Department's corporate database are identified in this Appendix.
Poorly reserved forest ecosystem	Provide additional protection for a poorly reserved forest ecosystem that occurs on State forest and timber reserves available for timber harvesting.	Darling Scarp forest ecosystem that has less than 15 per cent of pre-European area in existing or proposed formal plus CAR informal reserves.
Deferred Forest Assessment accredited linkage zones	Provide low disturbance linkage zones.	The areas identified in the Department's corporate database that provide a link between the proposed Milyeanup National Park and an adjacent stream zone, and a corridor between the Helena and Flynn parts of the proposed Helena Valley National Park.

Detailed Management for State Forest Lands

Management within the State Forest and timber reserves available for timber harvesting also has been designed to protect key ecological values during periods of logging and other disturbance.

Appendix 1 of the Proposed Forest Management Plan lists a number of key subsidiary management guideline documents that are to be developed or reviewed to implement the requirements of the plan.

The following guidelines are new guidelines that will be prepared to address in-forest management issues in the Forest Management Plan.

- Guidelines for the Management of Informal Reserves
- Guidelines for the Selection and Management of Fauna Habitat Zones
- Goals for Understorey Structural Diversity
- Fauna Distribution Information System
- Native Forest Timber Harvest Planning Guidelines
- Soil and Water Conservation Guidelines
- Weeds Manual
- Indigenous Heritage Management Guidelines
- Non-indigenous Heritage Management Guidelines
- Forest Monitoring Guidelines
- Key Performance Indicator Protocols

Submissions

Many submissions on the Draft FMP commented that they considered the HCV study by Ecoscape and the Conservation Commission's response were inadequate because few additional reserves resulted from the study and because the study was based on existing information. Submissions indicated the need to reassess what is HCV forest based on additional surveys.

A number of areas not reserved following the reviews of nominated high conservation value (HCV) forests have subsequently been proposed by community organisations for protection during this Forest Management Plan. These areas are:

- HCV forest omitted from Blackwood National Park, i.e. Helms forest and sections of several other blocks adjacent to the Blackwood River south of Nannup
- HCV forest omitted from the Greater Kingston National Park: Warrup, Corbal, Mersea, Dudijup, and Kingston (as proposed for protection by CALM, April 2001)
- HCV forest omitted from Wellington National Park: Arcadia, Yabberup, Munglinup, and Lowden
- HCV forest omitted from Easter National Park: parts of Easter and Iffley beyond the existing proposed park boundary
- Palmer “petition area” and HCV forest remaining in Roseneath (Collie)
- Small addition to Kerr Conservation Park, Balingup

Submissions on dieback management in the Draft FMP were that management was not precautionary enough. Some suggested that the current policy based on protectable areas should stop while many submissions sought improved monitoring and stricter penalties for non-compliance.

Assessment

The EPA has assessed how the Proposed FMP has addressed the protection of biodiversity in several ways. The first has been to review the formal reserve proposals to ensure that they meet criteria of comprehensiveness, adequacy and representativeness. The second has been through an examination of the informal reserves and other areas defined in the plan with a primary objective of conservation. The third has been an examination of the detailed management to apply to the remainder of the land, where conservation may not be the primary objective.

The National Strategy for the Conservation of Australia’s Biological Diversity (Commonwealth of Australia 1996) outlines a number of principles to be adopted as a basis for the Strategy’s objectives and actions and which should be used to guide implementation. Key relevant principles are:

- Biological diversity is best conserved in-situ;
- It is vital to anticipate, prevent, and attack at the source the causes of significant reduction or loss of biological diversity;
- Processes for decisions about the allocation and use of Australia’s resources should be efficient, equitable and transparent;
- Lack of knowledge should not be an excuse for postponing action to conserve biological diversity
- Central to the conservation of Australia’s biological diversity is the establishment of a comprehensive, representative and adequate system of ecologically viable protected areas integrated with the sympathetic management of all other areas, including agricultural and other resource production systems

In relation to forestry, the National Conservation Strategy objective of the achievement of the conservation of biological diversity through the adoption of ecologically sustainable forestry management practices has the following actions:

- “2.4.1 *Improve the knowledge base underpinning forestry in a coordinated way by:*
- a. *undertaking regional surveys of forests for old-growth values and of forested and other lands for wilderness values;*
 - b. *undertaking assessments of forests to identify their value for the conservation of biological diversity;*
 - c. *developing methods for assessing the positive and negative contributions of silvicultural systems to the maintenance of biological diversity;*
 - d. *ensuring improved analytical techniques and greater accessibility and compatibility between databases and techniques and between local government, regional, State, Territory and Commonwealth agencies;*
 - e. *undertaking research and long-term monitoring of the impacts on biological diversity and ecological processes resulting from the commercial use of native forests and the effectiveness or otherwise of management prescriptions (relating to, for example, habitat trees and streamside reserves) in conserving biological diversity.”* (Commonwealth of Australia 1996, p. 20-21)

The Conservation Commission and the reviews undertaken during the preparation of the Proposed FMP have examined forest reservations and management consistent with these National Conservation Strategy actions.

A specific component of this Forest Management Plan is the implementation of the State Government’s *Protecting our old-growth forests* policy. In summary, this policy states that the Government will

- immediately end logging in nearly 99 per cent of Western Australia’s old-growth forests by placing in reserves approximately 340,500 hectares of the 346,000 hectares of remaining old-growth forests;
- place an immediate moratorium on the remaining one per cent and review CALM’s forward logging plans and timber contracts to determine whether the current contracts can be honoured in line with the sustainable yield set by the Regional Forest Agreement without logging this remaining unreserved area of old-growth forests.
- create 30 new national parks, including the 12 new national parks promised under the RFA, and 2 new conservation parks;
- create approximately 200,000 hectares of new reserves, in addition to the 150,000 protected under the RFA;
- reinstate the 17 proposed reserves (54,000 hectares) revoked by the Government during the RFA;
- reserve “icon” old-growth forests including the Walpole Wilderness Area, Greater Kingston, Greater Beedelup, Jane, Easter, Hilliger and Gardner.

This policy has been incorporated into this plan and has complemented the normal review of the reserve system that would be part of the preparation of the Forest Management Plan.

Comprehensive, Adequate and Representative Reserve System

A key element for biodiversity protection and conservation in forests is the establishment and effective management of conservation reserves and complementary management of adjoining forest areas.

The current conservation reserve system in the three regions covered by the FMP has developed over time through a number of stages. At times, the approach to and basis for the establishment of new reserves has been ad hoc, while there has been a more systematic rationale at other times. However, each of these steps has progressively led to an increased proportion of the forest being protected for conservation purposes by reservation. The most comprehensive 'review' of the forest reserve system was during the Regional Forest Agreement process during the 1990s.

Appendix 6 of the Draft FMP outlines the basis used during the RFA process. The area of reserves has been supplemented by additional areas in accordance with the Government's *Protecting our old-growth forests* policy and some areas with high conservation value forests. As a consequence of these decisions, the FMP indicates that 1 259 900 hectares of land in the FMP area will be or is already protected as conservation reserves.

A number of the reserve proposals were identified in the 1987 and 1994 FMP. The EPA notes that many of these are still to have completed the process and achieved protection by way of formal reservation as national park, nature reserve or conservation park. On the basis of information provided to the EPA by the Department of Conservation and Land Management, approximately 39 per cent of all actions for change of land tenure indicated in the 1994 FMP have been fully implemented.

JANIS Criteria and proposed reserves

The criteria for the establishment of a forest reserve system in Western Australia were developed by the Joint ANZECC/MCFFA National Forest Policy Statement Implementation Sub-committee (JANIS), which prepared the Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative (CAR) Reserve System for Forests in Australia (Commonwealth of Australia 1997).

The objectives for a CAR reserve system are:

- to maintain ecological processes and dynamics of forest ecosystems in their landscape context
- to maintain viable examples of forest ecosystems throughout their natural ranges
- to maintain viable populations of native forest species throughout their natural ranges; and
- to maintain the genetic diversity of native forest species. (Commonwealth of Australia 1997)

The achievement of these objectives would be undertaken within the framework of the Interim Biogeographic Regionalisation of Australia (IBRA) and include not only public land but also private land. Three IBRA regions are relevant to the Proposed Forest Management Plan: Jarrah Forest, Warren and Swan Coastal Plain.

The JANIS biodiversity criteria are:

- (1) As a general criterion, 15% of the pre-1750 distribution of each forest ecosystem should be protected in the CAR reserve system with flexibility considerations applied according to regional circumstances, and recognising that as far as possible and practicable, the proportion of Dedicated Reserves should be maximised.
- (2) Where forest ecosystems are recognised as vulnerable, then at least 60% of their remaining extent should be reserved. A vulnerable forest ecosystem is one which is:
 - i) approaching a reduction in areal extent of 70% within a bioregional context and which remains subject to threatening processes; or
 - ii) not depleted but subject to continuing and significant threatening processes which may reduce its extent.
- (3) All remaining occurrences of rare and endangered forest ecosystems should be reserved or protected by other means as far as is practicable.
- (4) Reserved areas should be replicated across the geographic range of the forest ecosystem to decrease the likelihood that chance events such as wildfire or disease will cause the forest ecosystem to decline.
- (5) The reserve system should seek to maximise the area of high quality habitat for all known elements of biodiversity wherever practicable, but with particular reference to:
 - the special needs of rare, vulnerable or endangered species;
 - special groups of organisms, for example species with complex habitat requirements, or migratory or mobile species;
 - areas of high species diversity, natural refugia for flora and fauna, and centres of endemism; and
 - those species whose distributions and habitat requirements are not well correlated with any particular forest ecosystem.
- (6) Reserves should be large enough to sustain the viability, quality and integrity of populations.
- (7) To ensure representativeness, the reserve system should, as far as possible, sample the full range of biological variation within each forest ecosystem, by sampling the range of environmental variation typical of its geographic range and sampling its range of successional stages.
- (8) In fragmented landscapes, remnants that contribute to sampling the full range of biodiversity are vital parts of a forest reserve system. The areas should be identified and protected as part of the development of integrated regional conservation strategies.

There are also JANIS criteria for the reservation of old-growth forest and also wilderness. The first of these has been more than met by the Government's *Protecting our old-growth forests* policy, which also commits to establish the Walpole Wilderness Area.

The EPA has reviewed the application of the JANIS criteria in the Proposed Forest Management Plan reserve proposals. As pointed out in the Draft FMP, the mapping of all of the plan area has been undertaken using a number of different criteria. The mapping of forest ecosystems for the Regional Forest Agreement process did not extend over the whole of the plan area, and mapping based on vegetation associations was used by the Conservation Commission to address this.

Within the RFA boundary, five forest ecosystems are not represented on public land sufficient to meet the reservation target. Appendix 8 of the Proposed FMP indicates that these are Jarrah Rate's Tingle, Jarrah Red Tingle, Karri Rate's Tingle, Bullich and Yate, and Darling Scarp. Achievement of the JANIS reservation target for each of these forest ecosystems will require their protection on private land. The EPA supports this and recommends to the Government that it establishes mechanisms aimed at protecting sufficient areas of these forest ecosystems on private land to meet the JANIS targets.

The Draft FMP indicates that more than half (42) of the number of vegetation associations mapped by Beard-Hopkins occur predominantly outside of the RFA region. Of these 42 vegetation associations (Appendix 12 in the Proposed FMP), seven are not represented on CLM Act land while ten have virtually no representation in formal reserves and another six are represented at less than 15 per cent of their estimated pre-1750 occurrence.

The JANIS report provides two important comments about the implementation of the criteria. The first is that the criteria should be considered as guidelines rather than mandatory targets. The second is that flexibility is necessary to allow for changes to the CAR reserve system as knowledge improves and other influences affect biota, such as climate change. Where these changes occur, including through amendments to boundaries, the JANIS report emphasises that "the CAR reserve system must be predicated on the principle of security of tenure and management". In addition, the report states that "providing that all criteria are considered when making the final reserve design, biodiversity should take precedence." (Commonwealth of Australia 1997, p 9).

The EPA has provided Other Advice in section 6 of this report suggesting that the existing forest reserve system should be reviewed by the Conservation Commission to ensure that areas of significant forest values are protected.

High Conservation Value Forest Areas

Following an assessment of high conservation values of forest areas by Ecoscape Australia (Ecoscape 2002), the Conservation Commission reviewed the areas to determine whether they should be included in the reserve system. A total of 106 forest blocks and four general areas in the FMP area were assessed by Ecoscape.

The 106 forest blocks were assessed and reviewed against four broad categories of conservation value:

- Old-growth forest;
- Biodiversity;
- Wilderness; and
- Areas with a high level of community attachment.

The Conservation Commission found that areas of old-growth forest should be incorporated into existing and proposed reserves, that some areas of forest ecosystems not adequately represented in reserves should be protected through inclusion in informal reserves or fauna habitat zones, and that the southern part of Whichcliffe block and the whole of Dalgarpur block should be reserved. For other areas the Conservation Commission considers that other mechanisms in the Proposed FMP, including fauna habitat zones, would provide protection for areas with high

conservation values. In addition, the Conservation Commission has recommended that the conservation status of Wandoo ecosystems beyond the FMP area should be reviewed. (Conservation Commission 2002)

Submissions on the Draft FMP and presentations by Round Table members to the EPA pointed to areas within the existing and proposed reserve system that did not contain high forest ecosystem values. Submissions also identified areas outside of the reserve system that contained forest ecosystem values that should be protected through reservation. A common theme was that the forest reserve boundaries needed to be further reviewed.

As noted above, the EPA received direct representations that an additional six areas of community nominated high conservation value forest should be subject to a moratorium on logging and further research into their values.

The EPA has been advised by DCLM that the total forest encompassed within these six areas could total between 40 000 and 53 000 hectares. The implications to harvest levels and operations of a moratorium over these six areas could include creating difficulties in the annual operational mix of areas to log, and it will impact the non-declining sustained yield. The extent of these implications has not been reviewed in detail.

An issue raised in submissions about the review of high conservation values by Ecoscape (Ecoscape 2002) was that the assessment relied primarily on existing DCLM data.

The EPA has referred in this report to previous comments by researchers including Burrows et al 2001 that have highlighted the limited knowledge about fauna in the forest. The EPA has supported more comprehensive monitoring and additional research into identifying forest values in section 4.3 of this report.

Following consideration of the submissions about reserve boundaries, the EPA has suggested in section 6 that the environmental values of existing forest reserves and other areas should be further surveyed and that information from the surveys should then be used to review the existing forest reserve system to ensure that the full range of forest values are protected at levels at least consistent with the JANIS criteria. This review would need to identify forest areas with values not adequately represented within the reserve system and those areas within the forest reserves which make little contribution to protecting forest ecosystem values.

Such a review would need to ensure that any change of reserve boundaries would not lead to:

- a reduction of the total area of forest reserves,
 - a diminution of forest values in reserves, or
 - a change in the non-declining sustained yield,
- and would not include reserve proposals in the Government's *Protecting our old-growth forests* policy.

The EPA considers this review should examine forests in the Greater Kingston area as a priority. These forests were the subject of the Kingston Project, which provided a better understanding on the fauna values present in this portion of the forest. The

Proposed FMP promotes the continuation of the Kingston Study through Action 8.2.1. The EPA acknowledges that a substantial portion of the Greater Kingston area is proposed to be set aside as national park. However, the EPA believes that the remaining portions of Warrup, Corbal, Mersea, Dudijup and Kingston blocks not subject to reservation are likely to possess significant ecological values. These areas should be subject to further research and review by the DCLM and Conservation Commission of their forest ecosystem values.

The EPA has been advised by the DCLM that the sustained yield calculation for jarrah includes timber harvesting of approximately 9 300 hectares in Warrup, Corbal, Mersea, Dudijup, and Kingston blocks. As timber harvesting operations in these blocks would affect forest ecosystem values, the EPA considers that such operations should be avoided within these blocks until the Conservation Commission has completed its review and provided its recommendation. While the implications to forest operations and the sustained yield have not been determined, it is clearly important that the review of this area should be undertaken as soon as possible so that there is no impact on the approved sustained yield. The EPA considers that this review of the Greater Kingston area should be completed within two years.

During this period, areas of existing and proposed reserves, not including areas subject to the Government's *Protecting our old-growth forests* policy, with timber values and low conservation value would also need to be identified to maintain the sustained yield.

Informal reserves

One of the issues that was subject to closer investigation during the preparation of the Proposed FMP was a review undertaken by the Water and Rivers Commission (WRC) on the adequacy of river and stream buffers in protecting waterways from salinity, turbidity and other impacts (Water and Rivers Commission 2001). An outcome of this review was a recommendation that there should be logging trials with reduced buffer widths to better understand the nature and extent of the possible impacts on water quality and aquatic fauna.

While such trials would improve our knowledge, the EPA notes that the review did not consider the full range of values associated with riparian buffers, particularly terrestrial values. In addition, more flexibility of application of reduced buffers in the forest suggested by the WRC brings with it increased obligations to audit compliance. While there may be a need for some flexibility in the location of buffers, the EPA considers that the existing guidelines provide certainty of outcome while retaining some flexibility. The informal reserve system provides important protection for a wide range of significant ecological values.

The other components of the informal reserve system are not being varied.

Management in the forest

Within the area of forest that is available for timber harvesting, the silvicultural guidelines define a number of strategies to ensure that environmental values can be protected. The extensive system of informal reserves along water courses and around diverse ecotype zones focuses on the protection of particularly important habitat areas.

Within areas subject to timber harvesting, portions of forest will be also retained between cutting cycles. These are being achieved through temporary exclusions areas (TEAs) around the harvested coupe. The Kingston Study has demonstrated the importance of TEAs for fauna.

As discussed in section 4.3, the Kingston Study has also resulted in the retention of additional protected areas of forest that will be implemented in the Proposed FMP as fauna habitat zones. Indicative fauna habitat zones have been identified and will be applied to all areas where timber harvesting will be undertaken during the plan period, consistent with the guidelines outlined in Appendix 4 of the Proposed FMP. The Proposed FMP also includes an increase in the number of mature trees retained within the harvesting coupe for habitat purposes.

The maintenance and protection of biodiversity in the forest will continue to require relevant ongoing monitoring and regular review to ensure that forest management is achieving its objectives.

Dieback threat

The spread of dieback caused by *Phytophthora cinnamomi* is having a significant impact on forest ecosystems. The recent work by DCLM to incorporate estimates of the spread of dieback in the sustained yield illustrates some of the predicted consequences of dieback infection on timber yield (Ferguson *et al* 2003). An adjustment to the allowance made for the impact of dieback on sustained yield resulting from the modelled autonomous spread of *Phytophthora* has been made. The adjustment resulted in a reduction in sustained yield. This is a dramatic prediction of great concern to the EPA if it proves to be correct.

A much less obvious effect of this spread is the impact on fauna through loss of habitat, including food sources. The implications of dieback on the full range of ecosystem values are likely to be very significant.

Summary

The EPA has examined in some detail how the Proposed Forest Management Plan has addressed the ESFM principle of biodiversity conservation. With a significant increase in the area of forest in protected reserves, based on important forest values, and additional initiatives to improve protection of ecological values within State forest subject to timber production, the EPA considers that the Conservation Commission has considered issues associated with biodiversity conservation in forest areas well. There remains disagreement about the protection of forest areas that are considered by community members to possess significant values. The EPA has considered the issue of reserves further in section 6 of this report.

4.6 Valuation and pricing principle

Description

This principle states “that improved valuation, pricing and incentive mechanisms should be promoted.”

The Forest Products Act 2000 indicates that the Forest Products Commission is required to set a price for the sale of forest products under a production contract which includes:

- a component for the costs of managing or harvesting the forest products (including costs relating to compliance with obligations related to the construction or maintenance of roads or other infrastructure for the purposes of managing or harvesting; silvicultural operations or other preparations before, and silvicultural operations after, the felling or cutting of forest products; and regeneration of forest products after felling or cutting.
- an amount agreed for payment to DCLM for advice given, work performed or services or facilities supplied by the DCLM
- a component for the full recovery of the costs incurred by DCLM under the CLM Act or the relevant management plan in managing the forest products and protecting CLM Act land
- the FPC's operating costs in relation to the forest products.

Submissions

The low price of native forest logs as commented on in many submissions on the Draft FMP, with submissions promoting a substantial increase to encourage better utilisation of and recovery from logs.

Assessment

The EPA has addressed this principle for completeness as it is one of the principles of ESFM. As the Conservation Commission has pointed out in the Proposed FMP that a management plan under Section 55 of the *Conservation and Land Management Act* does not need to include pricing and valuation.

Following the consultations by the EPA with Round Table members and others, the FPC provided information describing the basis for consideration of pricing of sawlogs and the encouragement for improved log removal and utilisation under contracts that would be issued for the period of the FMP. The FPC has now published this information.

The FPC examined the basis behind this principle and suggested that the fundamental directions coming from recent national and international documents appear to be:

- the inclusion of environmental factors in valuation of assets;
- the bearing of environmental costs by those using the resource;
- the use of equitable, non-discriminatory trade and market mechanisms; and
- development of value-adding opportunities especially in regional areas.

An examination of the pricing and valuation in Western Australia by the FPC indicates that log prices and timber valuations are based on the cost of growing the wood, consistent with the requirements of the *Forest Products Act 2000*. The FPC believes that the application of this model incorporates consideration of the cost of managing environmental risks and values. However, it does not include full consideration of the value of other non-timber assets, including water, minerals, recreation and biodiversity found in the forest areas.

The FPC acknowledges that the cost of growing model as it is currently applied in Western Australia lacks the market transparency, through mechanisms such as

auctions, desired in the national and international sustainability frameworks. However, the FPC believes that environmental management costs are considered while key social and economic policy objectives of the State Government are met.

The EPA fully supports the requirement that all management costs in forest areas available for timber production be covered by FPC pricing in production contracts to ensure that there is adequate resourcing to deliver on the management obligations as set out in the FMP.

Summary

The EPA is satisfied that the principle of valuation and pricing is being addressed concurrently with the FMP. The EPA has noted that there is legislative mechanisms in place to ensure that all costs of forest management in State forest and timber reserves available for timber harvesting, including thinning and maintenance of biodiversity, would be covered through the FPC. At the same time, the cost of management of land reserved for conservation purposes would be funded by the Government.

Management to protect the full range of forest values within State forest and timber reserves needs to be provided to assist the achievement of ESFM.

4.7 Compliance

Description

The *Conservation and Land Management Act* places a specific responsibility on the Conservation Commission to assess and audit the performance of DCLM and FPC in carrying out and complying with the Forest Management Plan. The DCLM and FPC also audit compliance of their forest operations with relevant parts of the FMP. To this end, the Proposed FMP contains a number of actions and key performance indicators (KPIs).

The actions in the Proposed FMP identify obligations agreed to by the Conservation Commission, DCLM and FPC. The KPIs are those aspects of the FMP that the Conservation Commission will specifically use to assess the effectiveness of the FMP in meeting the objectives set out in the plan.

Submissions

Submissions on the Draft FMP, particularly pro-forma submissions, emphasised the importance of the plan and associated documents such as harvesting guidelines to be legally binding and enforceable on government and industry.

Assessment

Actions in the Proposed FMP

The Proposed FMP (Appendix 1) contains a list of actions to be undertaken by the Conservation Commission, DCLM and FPC which form a fundamental part of the FMP. The EPA believes that the Proposed FMP is significantly deficient without timeframes being placed against each action. These are key components of the plan, and not to have timeframes against which to measure compliance is an important omission. There are also key subsidiary management guideline documents nominated

in Appendix 1 of the Proposed FMP that support and provide some of the framework for the plan, including some of the actions. A number of the key subsidiary management guideline documents already exist and will continue to be applied without amendment while some will require revision to meet the requirements set out in the Proposed FMP. Likewise, some of the actions are ongoing activities.

The EPA considers that each of the actions and key subsidiary management guideline documents should have a defined timeline to assist in identifying priorities where necessary and to facilitate compliance auditing by the Conservation Commission.

A number of the key subsidiary documents relate to significant initiatives in the Proposed FMP, while others are essential in defining operational implementation of the Plan. The EPA considers that the following key subsidiary management guideline documents should be completed or updated within one year as a high priority:

- Guidelines for Selection and Management of Fauna Habitat Zones
- Guidelines for the Management of Informal Reserves
- Goals for Understorey Structural Diversity
- Jarrah Silviculture Guidelines
- Karri Silviculture Guidelines
- Wandoo Silviculture Guidelines
- Soil and Water Conservation Guidelines
- *Phytophthora cinnamomi* and Disease Caused by it – Volume 1. Management Guidelines
- Guidelines for the Preparation of Area Management Plans For Conservation Reserves

There are several other documents which are fundamental to the implementation of the plan but which are not listed above. They are the three silvicultural guidelines for jarrah, karri and wandoo. These documents already exist but need to be updated to reflect and be consistent with the Proposed Forest Management Plan. The EPA recommends that the Minister ensure that the Jarrah, Karri and Wandoo Silvicultural Guidelines has been updated to be consistent with the Forest Management Plan prior to the plan's implementation.

Another aspect of some of the actions in the Proposed FMP is the use of the words 'has regard to' or similar. In some instances, these words have been used in a number of actions because the key subsidiary management guideline documents which will contain the detailed prescription has yet to be prepared or revised or the action refers to goals. In others the action relates to plantations.

The EPA understands that the term 'has regard to' means that one should be aware of and even to consider but it does not mean to be consistent with or to comply with. In relation to a number of actions, the EPA does not consider that this is sufficient to ensure that ESFM will be met. Use of the term in Actions 8.2.3, 10.9 and 21.1.1 is considered to be appropriate.

As a consequence, the EPA recommends that the words 'has regard to', 'have regard to' or 'having regard to' be replaced with 'is consistent with' in Action 2.1.1, 3.1, 6.1, 6.2.1, 6.3.1, 7.2, 16.1.3, 17.2, 17.6, 17.6.3, 19.1.1, 19.5.1, 20.1.1, 20.5.1, 24.2 and 24.3.1.

Having examined the issue of compliance in some detail, the EPA is also aware that, although it is the proponent, the Conservation Commission has very limited capacity to deal with breaches or failure to implement the approved plan. While their respective legislation indicates that the DCLM and FPC must operate in accordance with the approved plan and the Conservation Commission will audit compliance with the plan, there is no specific action that the Conservation Commission can take to rectify breach or non-implementation other than through the normal Minister to Minister/ Cabinet process and publication of its audit findings.

The EPA recommends that the Minister for the Environment consider whether the Conservation and Land Management Act and the Forest Products Act should be amended to permit the Conservation Commission to require compliance with the approved plan where there has been a breach of compliance.

Audit role of EPA

One of the questions that has been considered by the EPA is whether it should have an ongoing role with the implementation of the FMP.

Prior to 2000, the DCLM was responsible for the preparation, implementation and compliance with management plans. In 2000, the DCLM's role was substantially changed through the establishment of the Conservation Commission and the FPC under amendments to the CLM Act. During the Forest Management Plan 1994-2003, the EPA had a responsibility to audit compliance with the environmental conditions applying to the plan. It has undertaken this primarily through five-year audit and compliance reviews, with one completed in 1997 and the other (2003) currently before the EPA.

The EPA considers that it should continue its role in reviewing compliance with environmental conditions for the next Forest Management Plan 2004-2013. As these conditions will form an integral part of the FMP, there is potentially some duplication with the role of the Conservation Commission. However, while the Conservation Commission has statutory audit responsibilities, it is also the proponent of the FMP under the *Environmental Protection Act*.

Action 31.3 states as follows:

The Conservation Commission will undertake a comprehensive mid-term audit of the extent to which management of land to which the plan applies is undertaken in accordance with the plan which will include consideration of the extent to which all key performance indicators have been achieved.

This audit and others carried out by the Conservation Commission, DCLM and FPC will be published.

The mid-term audit provides an appropriate timeframe for the EPA to review and provide public advice to the Minister for the Environment on compliance with the environmental conditions.

This action should also have an end-of-term audit by the Conservation Commission, to be completed in the penultimate year of the plan period (expected to be in 2012) to inform the next FMP beyond 2013. The EPA therefore recommends that Action 31.3 be amended to provide for such a review by the Conservation Commission, and that

the EPA also review and provide public advice to the Minister for the Environment on compliance with the environmental conditions at that time.

As the Conservation Commission is the proponent for the Proposed FMP but the DCLM and FPC will primarily undertake the plan's implementation, the application of environmental conditions under the Environmental Protection Act is an issue which is addressed in section 5 of this report.

Summary

The last of the ESFM principles deals with legal frameworks and compliance. The EPA has expressed major concerns about compliance with the Forest Management Plan during the plan period (2004-2013) and has made a number of recommendations to improve this situation. In particular, the EPA has recommended that all actions and the preparation of key subsidiary guideline documents have implementation timeframes.

The EPA has provided additional comment about resourcing of the implementation of the Proposed FMP in section 6 of this report which is relevant to compliance.

5. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

One of the difficulties associated with setting conditions on this proposal is that the Conservation Commission is the proponent but it is not the operational manager of the areas subject to the Forest Management Plan. This resides with the Department of Conservation and Land Management (DCLM) and the Forests Products Commission (FPC) according to their respective legislation.

As a consequence, the EPA advises the Minister that the environmental conditions in any statement of implementation issued under section 45 will need to be incorporated into the Forest Management Plan before it is approved. By doing this, the operational implementation of the FMP by the DCLM and FPC will include compliance with the environmental conditions.

5.1 Proponent's commitments

The actions and key performance indicators in the Proposed Forest Management Plan, as subsequently modified by the Statement issued by the Minister, and as shown in Appendix 2, should be made enforceable.

5.2 Recommended conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by the Conservation Commission of Western Australia for a Forest Management Plan to apply to the Swan, South West and Warren Regions of the Department of Conservation and Land Management during 2004-2013, is approved for implementation. These conditions are presented in Appendix 2. Matters addressed in the conditions include the following:

- (a) that the proponent shall amend the Proposed Forest Management Plan in accordance with the recommended conditions in Appendix X prior to transmittal to the Minister for approval
- (b) that the amendments to the Proposed Forest Management Plan relate to
- forest monitoring incorporating FORESTCHECK and specific species sampling approaches
 - timelines for actions and key subsidiary guideline documents
 - amending actions with the words ‘regard to’ to ‘consistent with’
 - amend the Key Performance Indicator 1 performance target to 70 per cent
 - include in Action 31.3 an end-of-term audit by the Conservation Commission
 - a programme for improved transparency and public information by the Conservation Commission, DCLM and FPC.

It should be noted that other regulatory mechanisms relevant to the proposal include:

Conservation and Land Management Act 1984

Forest Products Act 2000

6. Other Advice

Several matters have arisen during the EPA's assessment of the Proposed Forest Management Plan which are important to the success of this plan and which also relate to improved consultation and management.

The debate which has followed successive forest management plans reflects a lack of confidence within the community about matters which form a fundamental component of the plan. The other matter reflects the increasing management commitment that this plan imposes on forest managers.

Increased transparency

The Assessment of Ecologically Sustainable Forest Management in the SW Forest region of WA (Ferguson *et al* 1997) identified public transparency as one of the six criteria applicable to the assessment of ESFM for the purpose of the RFA process across Australia. Aspects to be considered under this criteria include type and level of scrutiny, consultation, access to information, public involvement and reporting.

The EPA notes that the Ferguson Panel (Ferguson *et al* 2003) commended the considerable effort that has gone into improving the transparency through reporting and auditing. The Panel pointed to the need to ensure effective communication with the community of forestry performance and urged that new resources be found to support public education and dissemination (including peer-reviewed publication programmes).

This theme develops further the EPA's desire to reduce the extent of mystery and distrust about some of the basic information that is an essential foundation to ESFM. A recent example of informing the community about a major issue in forest management was the fire symposium held by DCLM in 2002. This was a significant and successful public forum for the presentation of papers and discussion on a very contentious issue, with peer-reviewed papers being subsequently published. This approach to open and quality information sharing by the Conservation Commission, DCLM and FPC as well as universities, museum and other researchers, should be encouraged and expanded, and should occur on a regular basis. One of the important areas that should be covered through improved transparency is the information and the models used to calculate sustained yield.

The Conservation Commission has advised the EPA that it supports the objective of providing more opportunities to inform the community and discuss research findings. The Commission has suggested that further advice on the most effective way to disseminate information will be sought from its Research Advisory Committee, which is currently being established.

The datasets associated with the sustained yield calculations are very large, with over one million tree records in the jarrah inventory. The DCLM has advised that the provision of summary statistics (including area, inventory and yield) and background information could be made available through the DCLM website and publications. These actions are currently under way.

There remains a considerable need to improve public confidence associated with the sustained yield. The initiatives proposed by the Conservation Commission and DCLM to improve the public understanding and dissemination of information related to matters such as the sustained yield is strongly encouraged by the EPA. However, unless the information provided is adequate and able to be fully scrutinised, lack of public confidence will continue.

Another means of improving public confidence will be through the audits to be undertaken and published under Action 31.

The external and transparent review process used in the development of this Forest Management Plan has made a significant contribution to identifying issues and responses to those issues. This process should continue as the sustained yield model, dataset updates, monitoring and adaptive management progressively improve and preparation of a new forest management plan is commenced before the end of this plan.

Resourcing to achieve management

This Proposed FMP places considerable emphasis on forest ecosystem protection within a production forest. The achievement of ecologically sustainable forest management will require a higher level of management. It is essential that sufficient resources are provided to the appropriate bodies to meet management requirements and obligations of the approved FMP. In a number of cases, these resources will need to be available immediately on approval of the FMP, while others will be ongoing through the period of the plan. The Government should be advised by each of the bodies where new resources may be required. Some of the areas where the EPA would expect that additional resources will be required include:

- preparation of new guidelines and the revision of existing guidelines
- auditing of compliance with the plan by the Conservation Commission, DCLM and FPC
- undertaking of actions by the Conservation Commission, DCLM and FPC

The EPA has already discussed the importance of the forest industry providing funding necessary for the management of the State forests and timber reserves in section 4.6 of this report.

Most of the emphasis on management in the Proposed FMP relates to State forest and timber reserves. As has been pointed out in this report, the plan also proposes an increase in conservation reserves such that more forest is in dedicated protected reserves than in forest potentially available for timber harvesting. This expansion of the forest reserve system will impose additional management requirements which the Government will need to ensure are resourced.

Reserves and their boundaries

Submissions on the Draft FMP and presentations to the EPA by Round Table members included suggestions that there were areas within the and proposed reserve system that held limited forest ecosystem values while there were other parts of the forest not in reserve that held much greater values. The EPA has provided some earlier comment on reserve boundaries and the need for further survey and review of forest ecosystem values in section 4.5 of this report.

The existing and proposed forest reserve systems, including their boundaries, have developed at times on an ad hoc basis and at other times has been based on more systematic reviews. The EPA suggests that the Minister for the Environment request the Conservation Commission to review the forest ecosystem values in existing and proposed reserves not subject to the Government's *Protecting our old-growth forests* policy and areas outside existing and proposed reserves through a public process, with a view to ensuring that areas of significant value are protected. Such a review should be based on improved information following additional surveys. Given the scale of the task to survey and review reserve boundaries, the EPA believes that the Conservation Commission should plan to have completed the review by the end of this plan period.

In suggesting such a review, the EPA believes that any change of reserve boundaries should be subject to several caveats. These are that there be:

- no loss of total area of forest reserves,
 - no diminution of forest values in reserves,
 - no change in the non-declining sustained yield,
- and the review would not include reserve proposals in the Government's *Protecting our old-growth forests* policy.

The achievement of these caveats means that this review would need to identify forest areas with values not adequately represented within the reserve system for addition to the reserve system and those areas within the forest reserves which make little contribution to protecting forest ecosystem values and could therefore be excised and returned to State forest.

The EPA received advice during its consultations that some of the proposed additions to the reserve system could include areas with high mineral and petroleum prospectivity, future water supply sources and basic raw materials. The EPA believes that some of these matters could be addressed through this reserve review process while others could be considered through alternate processes, including environmental assessment.

7. Conclusions

The EPA has considered the Proposed Forest Management Plan (Proposed FMP) prepared by the Conservation Commission, to apply to the Swan, South West and Warren Regions of the Department of Conservation and Land Management during 2004-2013.

The EPA acknowledges that considerable work, including scientific reviews lead by Burrows (Burrows *et al* 2001, 2002) and Ferguson (Ferguson *et al* 2001, Ferguson *et al* 2003, Ferguson 2003), has been carried out since 2000 to establish a sound basis for implementing ESFM in Western Australia. This work has guided the Conservation Commission's preparation and EPA's assessment of the Proposed FMP. Ferguson *et al* (2003) have acknowledged that components of the plan with regard to their application to sustained yield are conservatively based.

The EPA also recognises that the Conservation Commission has made substantial effort to address the issues, advice and recommendations that have followed from that work and other inputs to ensure that the Proposed Forest Management Plan achieves Ecologically Sustainable Forest Management.

When assessing the Proposed FMP, the EPA was aware that the ESFM principles apply at the whole of forest level and to the period of the plan and beyond. How these principles will be met will vary across the forest, depending on current and previous management, especially disturbances such as timber harvesting. It is also relevant that none of the ESFM principles can be met in isolation from the other principles.

There are a number of aspects of the Proposed Forest Management Plan that are of concern to the EPA. Two primary concerns relate to compliance matters. The first is that the actions in the plan do not have any timetable for completion and implementation attached to them. Similarly, the key subsidiary management guidelines that support the implementation of the plan do not have timelines, especially for those guidelines that do not currently exist. The EPA has recommended that actions and key guidelines have timelines assigned to them, with a number of them needing to be prepared as soon as possible.

The second matter relates to ensuring that the Proposed FMP is implemented as approved. At issue is the ability of the proponent, the Conservation Commission, to have any control over how the Department of Conservation and Land Management (DCLM) and the Forest Products Commission (FPC) meet the requirements of the plan during implementation of the plan. While their respective legislation indicates that the DCLM and FPC must operate in accordance with the plan and that the Conservation Commission will audit compliance with the plan, the capacity of the Conservation Commission to deal with breaches or non-implementation is very limited. The EPA has recommended that the Minister for the Environment consider whether the legislation should be amended to improve this situation.

While considerable research has been carried out in the forest areas to map vegetation, considerably less is known about forest fauna. Knowledge about the effects of disturbance in forest ecosystems on vegetation and fauna is being improved. However, there remain significant areas where information is inadequate to predict impacts confidently or even reasonably. The EPA has, for some time, encouraged a very precautionary approach to human-induced disturbances such as timber harvesting operations. This plan promotes precaution and adaptive management to address adverse outcomes. Underlying the plan's ability to deliver on these is a well designed monitoring regime, supported by specific research programmes to continue to build our basic knowledge of forest ecosystems. The EPA emphasises the importance of precaution, adaptive management, and adequate monitoring and research through the life of this plan.

The EPA supports the initiatives in the Proposed Forest Management Plan to provide improved protection of fauna values within State forest and timber reserves. This includes the system of fauna habitat zones distributed through the forest, and the increased retention of habitat trees and other vegetation (such as Balga's and Banksia's) important to fauna. Monitoring of the effectiveness of these initiatives, and modification of practices and guidelines through adaptive management, will be essential to the success of this plan.

A fundamental part of the achievement of ESFM is the establishment of a protected system of forest reserves. There has traditionally been an understandable focus on this aspect of planning in the forests over many years, while the length of time taken for reserves in previous forest management plans to be implemented has caused some frustration. With the implementation of additional reserves in the Government's *Protecting our old-growth forests* policy, the majority of the forest will be protected and managed for conservation purposes. The EPA has recommended that at least seventy percent of the reserve proposals contained in this plan be fully implemented by the end of this plan period, i.e. by 2013.

The EPA supports the expansion of the reserve system as a key part of ecosystem protection. For forest areas outside reserves, there remains the need to ensure that the forest ecosystem values are protected. Informal reserves, fauna habitat zones, retained habitat trees and temporary exclusion areas all contribute to achieving the protection of forest ecosystem values over the timber production cycle.

Notwithstanding the reserve proposals in the plan, there remain forest areas that some in the community believe have values that should be better protected. The existing and proposed forest reserve system, including their boundaries, has generally developed on a fairly ad-hoc basis at times and at other times has been based on more systematic reviews. The EPA has suggested under Other Advice that the Minister for the Environment request the Conservation Commission to review the forest ecosystem values in existing and proposed reserves not subject to the Government's *Protecting our old-growth forests* policy and areas outside of existing and proposed reserves through a public process, with a view to ensuring that areas of significant value, are protected. Such a review would take much of the plan period and should be based on improved information following additional surveys.

In suggesting such a review, the EPA believes that any change of reserve boundaries should be subject to several crucial caveats including that there be no loss of total area of forest reserves, no diminution of forest values in reserves, and no change in the non-declining sustained yield resulting from this review. Given the scale of the task, the EPA believes that this review should be completed by the end of this plan period.

One priority area where the EPA considers this review of forest values should be undertaken is in the Greater Kingston area. The EPA acknowledges that a substantial portion of the Greater Kingston area is proposed to be set aside as national park in the Government's *Protecting our old-growth forests* policy. However, on the basis of the research undertaken through the Kingston Project, the remaining portions of Warrup, Corbal, Mersea, Dudijup and Kingston blocks not subject to reservation are likely to possess significant ecological values. As timber harvesting operations in these blocks would affect forest ecosystem values, the EPA considers that such operations in these blocks should be avoided until the Conservation Commission has completed its review and provided its recommendation, consistent with the caveats mentioned above. The review of this area may require additional surveys but should be undertaken within two years and should meet the caveats identified above.

The EPA has considered a number of threats to forests ecosystem values. The incorporation of an allowance for dieback in the sustained yield calculation has highlighted the implications of the spread of this pathogen. While the predicted

impact on sustained yield has been quantified, the consequences of loss of habitat to fauna remain of considerable concern.

Another threat arises from climate change. The effects of climatic variation and change needs to be incorporated explicitly into forest monitoring. There also needs to be improved and transparent provision of parameters affected by climate change in the sustained yield. The EPA recognises that there are difficulties of measuring the extent of change in the short term but emphasises the importance of detecting and allowing for effects over time.

Logging of the forest, especially with the increasing application of clearfelling, gap and shelterwood treatments, has led to an increasing proportion of the forest comprising young trees. This has implications to the ability of the forest to support the full range of ecosystem values, especially those associated with fauna.

A consistent theme reflected in submissions on the Draft Forest Management Plan and in previous forest reviews by the EPA has been a lack of confidence by key stakeholders in the information used to support forest management plans. This is a critical issue in satisfying the community that ESFM has been met. The EPA has provided comment encouraging improved transparency of processes used to define key aspects of the FMP, including information and methods related to the calculation of sustained yield.

Achievement of ESFM through implementation of the Proposed Forest Management Plan will only occur through adequate resourcing. Unless resourcing is sufficient to meet the commitments and obligations of the approved plan, the plan will not satisfy the ESFM principles. The Government will need to ensure that the pricing of timber products covers the full costs of forest management in State forest and timber reserves while additional funding of the Conservation Commission and the DCLM provides for adequate management of dedicated reserves.

While the Conservation Commission has an important role in auditing implementation of the FMP, the EPA has recommended that the EPA continues to have a role in reviewing the achievement of environmental conditions determined by the Minister for the Environment. However, the EPA's involvement should focus on the mid-term and an additional end-of-term audits undertaken by the Conservation Commission.

The EPA has recommended a number of improvements to the Proposed FMP. These are considered to be refinements to the plan rather than major changes of emphasis to that proposed by the Conservation Commission.

The EPA has concluded that the EPA's objectives can be achieved provided there is satisfactory implementation by the Conservation Commission, DCLM and FPC of the proposal, including commitments and actions, and the recommended conditions set out in Appendix 2 and summarised in Section 5.

8. Recommendations

A summary list of recommendations by the EPA to the Minister for the Environment in this report follows:

- The EPA supports the advice from the Burrows Panel (Burrows *et al* 2001) and recommends a trial of both forest monitoring approaches (i.e. FORESTCHECK and species targeted surveys)
- The EPA considers that thinning is critical and recommends that the timing of thinning be scheduled and completed in accordance with the jarrah and karri silvicultural guidelines. Failure to comply with the guidelines, particularly in the case of jarrah, will result in the sustained yield not being achieved.
- The EPA recommends that the Government establishes mechanisms aimed at protecting sufficient area of forest ecosystems to meet the JANIS criteria, including where these forest ecosystems occur on private land.
- The EPA suggests that the Minister for the Environment request the Conservation Commission to review the forest ecosystem values in existing and proposed reserves not subject to the Government's *Protecting our old-growth forests* policy and areas outside existing and proposed reserves, with a view to ensuring that areas of significant ecological value are optimised and protected. There should be no loss of total area of forest reserves, no diminution of forest ecological values in reserves, and no change in the non-declining sustained yield resulting from this review.
- The EPA recommends that the performance target in Key Performance Indicator 1 be amended to at least seventy percent of the reserve proposals contained in this plan be fully implemented by the end of this plan period, i.e. by 2013.
- The forest monitoring system needs to be designed so that it can provide data on the effects of climatic variation and change. Also, the way in which climatic variation and change is allowed for in the calculation of sustained yield needs to be improved. This process should be transparent to increase public confidence.
- The EPA recommends that all management costs in forest areas available for timber production should be covered by FPC pricing in production contracts to ensure that there is adequate resourcing to deliver on the management obligations as set out in the FMP.
- The EPA recommends that each of the actions and key subsidiary management guidelines should have a defined timeline to assist in identifying priorities where necessary and to facilitate compliance auditing by the Conservation Commission.
- The EPA recommends that the following key subsidiary guideline documents be completed within one year as a high priority:
 - Guidelines for Selection and Management of Fauna Habitat Zones
 - Guidelines for the Management of Informal Reserves
 - Goals for Understorey Structural Diversity
 - Jarrah Silviculture Guidelines
 - Karri Silviculture Guidelines
 - Wandoo Silviculture Guidelines
 - Soil and Water Conservation Guidelines
 - *Phytophthora cinnamomi* and Disease Caused by it – Volume 1. Management Guidelines
 - Guidelines for the Preparation of Area Management Plans For Conservation Reserves

- The EPA recommends that the words ‘has regard to’, ‘have regard to’ or ‘having regard to’ be replaced with ‘is consistent with’ in Action 2.1.1, 3.1, 6.1, 6.2.1, 6.3.1, 7.2, 16.1.3, 17.2, 17.6, 17.6.3, 19.1.1, 19.5.1, 20.1.1, 20.5.1, 24.2 and 24.3.1.
- The EPA recommends that the Minister for the Environment consider whether the Conservation and Land Management Act and the Forest Products Act should be amended to permit the Conservation Commission to require compliance with the approved plan where there has been a breach of compliance.
- The EPA recommends that the Conservation Commission amend Action 31.3 to also provide for a end-of -term review in the penultimate year of the plan.
- The EPA recommends that it review and provide public advice to the Minister for the Environment on compliance with the environmental conditions following the Conservation Commission’s mid-term and end-of-term audits.
- The EPA recommends that a programme of improved information sharing with the public by the Conservation Commission, DCLM and FPC be adopted and expanded.
- The EPA recommends that the Minister ensure that the Jarrah, Karri and Wandoo Silvicultural Guidelines has been updated to be consistent with the Forest Management Plan prior to the plan’s implementation.

The EPA submits the following recommendations in relation to the Proposed Forest Management Plan to apply to the Swan, South West and Warren Regions of the Department of Conservation and Land Management during 2004-2013, to the Minister for the Environment:

1. That the Minister considers the report on the relevant environmental factors as set out in Section 4;
2. That the Minister notes that the EPA has concluded that the EPA’s objectives can be achieved provided there is satisfactory implementation by the Conservation Commission, DCLM and FPC of the proposal, including commitments and actions, and the recommended conditions set out in Appendix 2 and summarised in Section 5.
3. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report and requires that the Proposed Forest Management Plan be amended by the Conservation Commission to incorporate the conditions and procedures in Appendix 2, prior to transmittal to the Minister for approval.
4. That the Minister considers the matters and recommendations provided as Other Advice in section 6 of this report.

Appendix 1

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Water and Rivers Commission (2001). A Review of Stream and River Logging Buffers to ensure their adequacy in protecting our waterways from salinity, degradation and turbidity

Appendix 2

Recommended Environmental Conditions and Proponent's Consolidated Actions and Key Performance Indicators

RECOMMENDED CONDITIONS AND PROCEDURES

**STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
ENVIRONMENTAL PROTECTION ACT 1986)**

FOREST MANAGEMENT PLAN (2004-2013)

Proposal: A Forest Management Plan to apply to the Swan, South West and Warren Regions of the Department of Conservation and Land Management from 2004 to 2013 inclusive.

Proponent: Conservation Commission of Western Australia

Proponent Address: Corner of Hackett Drive and Australia II Drive,
CRAWLEY WA 6008

Assessment Number: 1407

Report of the Environmental Protection Authority: Bulletin 1113

The proposal referred to above may be implemented subject to the following conditions and procedures:

1 Implementation and Changes

1-1 The proponent shall implement the proposal as documented in the *Proposed Forest Management Plan (31 July 2003)* subject to the conditions of this Statement.

1-2 Where the proponent seeks to change any aspect of the proposal as documented in *Proposed Forest Management Plan (31 July 2003)* in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.

- 1-3 Where the proponent seeks to change any aspect of the proposal as documented in *Proposed Forest Management Plan (31 July 2003)* in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is not substantial, the proponent may implement those changes upon receipt of written advice of the Minister.

2 Proponent Commitments

- 2-1 The proponent shall implement the Actions and Key Performance Indicators documented in Schedule 1 of this Statement.
- 2-2 The proponent shall implement any subsequent Actions and Key Performance Indicators which the proponent prepares as part of fulfilment of the conditions in this Statement.

3 Proponent Nomination and Contact Details

- 3-1 The proponent for the time being nominated by the Minister for the Environment under Section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under Section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.
- 3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this Statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this Statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.
- 3-3 The nominated proponent shall notify the Department of Environmental Protection of any change of contact name and address within 60 days of such change.

4 Compliance Audit and Performance Review

- 4-1 The proponent shall prepare an audit program and submit compliance reports to the Department of Environmental Protection which address:
- 1 the status of implementation of the proposal as defined in the document *Proposed Forest Management Plan (31 July 2003)*;
 - 2 evidence of compliance with the conditions and Actions and Key Performance Indicators; and

3 the performance of the environmental management plans and programs.

Note: Under Sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environmental Protection is empowered to audit the compliance of the proponent with the Statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures, Actions and Key Performance Indicators contained in this Statement.

5 Review of Conservation Commission Audits

5-1 The proponent shall submit the mid-term audit of performance report and the end-of-term audit of performance report to the Environmental Protection Authority by 31 December 2008 and 31 December 2012, respectively.

5-2 The Environmental Protection Authority will review the audit of performance reports referred to in 5-1 and provide advice to the Minister for the Environment in a public report on compliance with the conditions in this Statement.

6 Amendments to the Proposed Forest Management Plan

6-1 The proponent shall amend the *Proposed Forest Management Plan (31 July 2003)* in accordance with the following:

- 1 Inclusion within Action 8.2 of forest monitoring which incorporates FORESTCHECK and also specific species sampling approaches, developed following consultation with the scientific community and the Conservation Commission. This will also include a review of the comparative effectiveness of each approach after two years;
- 2 Provision of timelines for the meeting of each action or sub-action listed in the plan;
- 3 Replacement of “50 per cent” with “at least 70 per cent” in key performance indicator 1 performance target;
- 4 Provision of timelines for the preparation or update of all key subsidiary guideline documents, with the timeline for each of the following documents to be one year:
 - a. Guidelines for Selection and Management of Fauna Habitat Zones
 - b. Guidelines for the Management of Informal Reserves
 - c. Goals for Understorey Structural Diversity
 - d. Jarrah Silviculture Guidelines
 - e. Karri Silviculture Guidelines
 - f. Wandoo Silviculture Guidelines
 - g. Soil and Water Conservation Guidelines
 - h. *Phytophthora cinnamomi* and Disease Caused by it – Volume 1.

Management Guidelines

i. Guidelines for the Preparation of Area Management Plans For Conservation Reserves

- 5 Replacement of the words “have regard to” or similar with the words “consistent with” in Actions 2.1.1, 3.1, 6.1, 6.2.1, 6.3.1, 7.2, 16.1.3, 17.2, 17.6, 17.6.3, 19.1.1, 19.5.1, 20.1.1, 20.5.1, 24.2 and 24.3.1
 - 6 Inclusion in Action 31.3 of an end-of-term audit report in the penultimate year (expected to be 2012) of the plan by the Conservation Commission; and
 - 7 Expansion of Action 34.2 to include development and implementation of a programme for the improved public availability of information related to the sustained yield statistics and models, including the provision of summary statistics (including area, inventory and yield) and related background information to the public.
- 5-2 The proponent shall transmit the amended *Proposed Forest Management Plan (2004-2013)* to the Minister for the Environment for approval under sections 60(2) and 61 of the *Conservation and Land Management Act 1984*.

6. Review of Reserves

- 6-1 The proponent shall undertake a review of the forest ecosystem values in existing and proposed reserves, not subject to the Government’s *Protecting our old-growth forests* policy, and areas outside the existing and proposed reserves within the plan area, through a public consultative process, with a view to ensuring that forest areas of significant forest ecosystem value are protected
- 6-2 The proponent shall report to the Minister for the Environment before the end of the plan period on the outcome and recommendations of the review required by 6-1, and may report more frequently.
- 6-3 The proponent shall, within two years, carry out and report to the Minister, a review of forest values in the Greater Kingston Area, comprising Warrup, Corbal, Mersea, Dudijup and Kingston blocks, with a view to ensuring that areas of significant value, are protected.
- 6-4 In undertaking the reviews required by 6-1 and 6-3, the proponent shall be guided by the requirement that there be
 - no loss of total area of forest reserves;
 - no diminution of forest values in reserves; and
 - no change in the non-declining sustained yield.
- 6-5 The proponent shall make publicly available the reports provided in accordance with 6-2 and 6-4 following the submission of the reports to the Minister

Procedures

- 1 The Department of Conservation and Land Management and the Forest Products Commission will undertake management and operations on land subject to the Proposed Forest Management Plan (31 July 2003) in accordance with that plan, the *Conservation and Land Management Act 1984*, and the *Forest Products Act 2000*, as appropriate.

Notes

- 1 The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environmental Protection over the fulfilment of the requirements of this statement and the attached Schedule.

Schedule 1

Actions and Key Performance Indicators

September 2003

Forest Management Plan (2004-2013)
(Assessment No. 1407)

Conservation Commission of Western Australia

Actions and Key Performance Indicators

Forest Management Plan (2004-2013) (Assessment No. 1407)

Actions

Objective	Action
Biological Diversity	
To conserve biodiversity and conserve self-sustaining populations of native species and communities, and at the landscape scale for the purpose of seeking to allow the recovery of biodiversity between one timber rotation and the next:	
To conserve biodiversity and ecological integrity in all native forest ecosystems through the establishment and management of a system of reserves that is comprehensive, adequate and representative:	<p>1.1 The Department will initiate the processes required for the land category changes proposed by the plan by:</p> <p style="margin-left: 20px;">1.1.1 undertaking fine scale reserve design for the parks proposed in the <i>Protecting our old-growth forests</i> policy so as to include within the parks as much of the old-growth forest adjacent to the nominal boundaries as the Department considers reasonable;</p> <p style="margin-left: 20px;">1.1.2 facilitating the Government’s community consultation process on fine-scale reserve design;</p> <p style="margin-left: 20px;">1.1.3 advising the Minister for the Environment on final reserve boundaries; and</p> <p style="margin-left: 20px;">1.1.4 undertaking the consultation required to progress the reclassification of land proposed in Appendix 2.</p> <p>1.2 The Department will manage the areas proposed by Appendix 2 for inclusion in a national park, nature reserve, conservation park or forest conservation area consistently with their proposed land category and purpose and relevant Departmental policies until such time as they are formally created. Timber production in these areas will not be permitted.</p> <p>1.3 The Department will cooperate with the Departments of Environmental Protection and Planning and Infrastructure and other agencies in relation to the establishment of a comprehensive, adequate and representative reserve system outside the RFA area, through Bush Forever or similar programs.</p>

Objective	Action
To conserve biodiversity outside of formal reserves:	<p>2.1 The Department and the Forest Products Commission will conduct their operations within the informal reserves established by Appendix 3:</p> <p>2.1.1 in a manner that has regard to the requirements set out in Appendix 3 where the operation occurs prior to the approval of the guidelines referred to in the following paragraph; and</p> <p>2.1.2 in accordance with the Guidelines for the Management of Informal Reserves which are to:</p> <p style="padding-left: 40px;">be developed by the Department with public consultation;</p> <p style="padding-left: 40px;">provide for the manner in which the requirements of Appendix 3 are to be met; and</p> <p style="padding-left: 40px;">be submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect and supercede Appendix 3.</p> <p>2.2 The Department will maintain a register of land classified as old-growth forest and of additions and deletions from the State forest and timber reserves that are classified as old-growth forest, which will be made available for public inspection.</p>
To conserve biodiversity through a diverse representation and distribution of forest structures and understorey seral stages through time:	<p>3.1 The Department will conduct its operations in a manner that has regard to Goals for Understorey Structural Diversity at the Landscape and Operational Scales which will be:</p> <p>3.1.1 developed by the Department within two years of the approval of the plan;</p> <p>3.1.2 developed with public consultation; and</p> <p>3.1.3 submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect.</p> <p>3.2 The Department will monitor its operations to identify the extent to which the Goals for Understorey Structural Diversity at the Landscape and Operational Scales are being achieved and publish a report of the results of that monitoring every five years after the approval of the plan.</p>
To promote integrated management across all land categories at the whole of forest, landscape and operational scales:	<p>4.1 The Conservation Commission will cooperate with the Department of Industry and Resources and mining and petroleum companies in relation to forest management and encourage them to act in a manner that is consistent with the plan.</p> <p>4.2 The Conservation Commission will prepare, with public consultation, guidelines for the preparation of other management plans in a manner that integrates with existing management plans, including this plan.</p>
To reduce the extent of the threat to the diversity and abundance of flora from silvicultural operations that are designed to reduce competition between understorey and commercial species:	<p>5.1 The Department will take the actions identified in Appendix 13 (which relate to the protection of significant flora values).</p> <p>5.2 The Forest Products Commission and its agents will conduct its silvicultural operations in accordance with the Department's Silviculture Guidelines.</p>

Objective	Action
<p>To prevent any species moving to a higher category of threat or, in particular, declining to irretrievably low levels as a result of management actions:</p>	<p>6.1 As soon as is reasonable and practicable after the approval of the plan the Department will identify and publish a map showing locations of indicative fauna habitat zones which are to be established having regard to the criteria specified in Appendix 4.</p> <p>6.2 The Department may change the locations and areas of indicative fauna habitat zones in a manner that:</p> <p>6.2.1 <u>has regard to</u> the criteria specified in Appendix 4, where the change occurs prior to the approval of the guidelines referred to in the following paragraph; and</p> <p>6.2.2 is in accordance with Guidelines for the Selection and Management of Fauna Habitat Zones which are to be: developed by the Department with public consultation within one year after the approval of the plan; and submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect and supercede Appendix 4.</p> <p>6.3 The Department and Forest Products Commission will conduct their operations in indicative fauna habitat zones, and in fauna habitat zones established under Appendix 4 and the Guidelines for the Selection and Management of Fauna Habitat Zones:</p> <p>6.3.1 in a manner that has regard to the requirements set out in Appendix 4, where the operation occurs prior to the approval of the guidelines; and</p> <p>6.3.2 in accordance with the guidelines after they are approved and supercede Appendix 4.</p>

Objective	Action
To protect, and assist the recovery of, threatened and priority species of flora and fauna and ecological communities:	<p>7.1 The Department will maintain a list identifying threatened and priority species of flora and fauna and threatened ecological communities. (Threatened species and communities are those under risk of extinction. Priority species and communities are those that may be threatened but for which there are insufficient survey data, and those that are rare but not threatened).</p> <p>7.2 The Department and the Forest Products Commission will conduct their operations having regard to the Department's Conservation of Endangered and Specially Protected Fauna in the Wild policy and Conservation of Threatened Flora in the Wild policy.</p> <p>7.3 The Department and Forest Products Commission will revise planning checklists to identify actions to be taken in specified circumstances in which declared rare flora species, threatened ecological communities, and other significant flora identified in Appendix 13 may be disturbed by their operations.</p> <p>7.4 The Forest Products Commission and the Department will undertake operations in accordance with guidelines for operations in the presence of fauna, to be developed as part of the Fauna Distribution Information System, which is to be completed by the Forest Products Commission: 7.4.1 to the satisfaction of the Department; and 7.4.2 in consultation with the Conservation Commission.</p> <p>7.5 (Plantations): The Forest Products Commission will advise the Department of its harvesting and management activities within plantations: 7.5.1 where those activities may impact on threatened species and threatened ecological communities, agreed protection measures will be implemented.</p> <p>7.6 The Department will develop and implement recovery plans for selected threatened species and ecological communities, including: 7.6.1 the Western Shield fox baiting program (which seeks to reduce predation pressure on threatened and priority species of fauna).</p>
To develop an improved understanding of the biodiversity of forest regions and the response of forest ecosystems to natural and human induced disturbance, with a view to improving forest management practices:	<p>8.1 The Department will undertake biological surveys, which will be: 8.1.1 of priority areas determined in consultation with the Conservation Commission; 8.1.2 undertaken progressively through the life of the plan; and 8.1.3 used, where appropriate, to assist in evaluating the extent to which biodiversity is being conserved and the need for any review of the reserve system.</p> <p>8.2 The Department will: 8.2.1 continue to monitor the effect of disturbance from timber harvesting on fauna and flora in the Kingston study area; 8.2.2 implement the species, community and process monitoring program, FORESTCHECK; and 8.2.3 maintain a research program on ecologically sustainable forest management which is prepared in a manner that <u>has regard to</u> advice from the Conservation Commission's Research Advisory Committee.</p>
Productive capacity	

Objective	Action
To sustain, and where applicable, enhance the productive capacity of the forest.	
To maintain the net area of forested land	<p>9.1 The Conservation Commission and the Department will make submissions in relation to development proposals forwarded to them for comment or advice, with a view to:</p> <p>9.1.1 seeking to reduce the permanent loss of forested areas as a result of development;</p> <p>9.1.2 seeking the replacement of forested areas permanently lost to development;</p> <p>9.1.3 promoting the construction of infrastructure such as roads, pipelines and other utilities at common locations, such as infrastructure corridors; and</p> <p>9.1.4 reducing the impact of mining and petroleum operations on forested areas with a high productive capacity for timber production.</p> <p>9.2 The Department will, where reasonable and practicable, construct roads in a manner and at a location that will service multiple needs.</p> <p>9.3 The Department will seek to progressively rehabilitate redundant roads.</p> <p>9.4 (Plantations): The Forest Products Commission will maintain the minimum area of plantation estate required to meet State Agreement Act supply requirements by:</p> <p>9.4.1 replanting pines in all suitable areas of State forest and freehold (fee simple) land held in the name of the Executive Director that have previously been planted with pines and have been clearfelled, except at Gnangara, Peel, Hamel and other areas determined consistently with the agreement ratified under the <i>Wood Processing (Wesfi) Agreement Act 2000</i>; and</p> <p>9.4.2 establish new plantations on appropriate cleared land to replace any plantation areas that are clearfelled but not replanted with plantation species.</p>

Objective	Action
<p>To provide for timber production of jarrah and karri sawlogs on a sustained yield basis and to maintain the quality of the sustained yield calculations for the next plan period:</p>	<p>10.1 The average annual yield of logs, calculated over the 10 year life of the plan, shall not exceed the maximum volumes stipulated in Tables 3 and 4, and given above for wandoo, blackbutt and sheoak.</p> <p>10.2 The Forest Products Commission will prepare annual timber harvesting plans that are to be:</p> <p>10.2.1 developed in consultation with, and to the requirements of, the Department;</p> <p>10.2.2 consistent with the allowable timber yields referred to in paragraph 10.1; and</p> <p>10.2.3 made publicly available.</p> <p>10.3 The Forest Products Commission and the Department will monitor the volume of all timber log categories removed from native forest in each year, separately recording for each of the commercial species the volume of:</p> <p>10.3.1 first and second grade sawlogs;</p> <p>10.3.2 lower grades of sawlogs; and</p> <p>10.3.3 residue logs,</p> <p>and will periodically audit the grading and removal of sawlogs.</p> <p>10.4 By the end of 2005 the Department will develop rolling three-year indicative timber harvesting plans, which:</p> <p>10.4.1 will be developed in liaison with the Forest Products Commission;</p> <p>10.4.2 will be consistent with the allowable timber yields referred to in paragraph 10.1; and</p> <p>10.4.3 will be publicly available.</p> <p>10.5 The Forest Products Commission will conduct silvicultural operations in accordance with the Department's Silviculture Guidelines, which when next reviewed will be by the Department with public consultation, submitted to the Conservation Commission for advice and approved by the Minister for the Environment.</p> <p>10.6 The Department and the Forest Products Commission will monitor and record the areas over which each different silvicultural treatment is achieved in each year.</p> <p>10.7 The Forest Products Commission will, where practicable and economically feasible, enter into contracts that are not confined to the supply of first and second grade sawlogs. For example, the Forest Products Commission may enter into contracts for the sale of bole sawlogs. When the Forest Products Commission enters into such a contract, the Forest Products Commission and the Department will calculate the volume of first and second grade sawlogs which would be derived from the volume of timber taken under the contract.</p> <p>10.8 The Department may use forest produce that becomes available for use from the carrying out of operations to which section 33(1)(cb) of the CLM Act applies for the purposes of making improvements to any land to which the CLM Act applies.</p> <p>10.9 The Department will continue to refine the data and methodology used for the sustained yield calculations by:</p> <p>10.9.1 Maintaining and enhancing the quality and coverage of the data sets, and the methodology, used in sustained yield calculations. In doing this the Department will have regard to the recommendations of the Ferguson Panel's Stage 1 and 3 reports (Ferguson <i>et al.</i> 2001, 2003).</p>

Objective	Action
To achieve the optimum yield in production on State forest and timber reserves planted with exotic species consistent with the satisfaction of long-term social and economic needs:	11.1 (Plantations): The Forest Products Commission will harvest exotic species on State forest and timber reserves to supply up to 1.2 million cubic metres per annum of various log products to industry.
To manage the removal of forest produce, other than sawlogs and residue logs, in a manner that, so far as is practicable and sustainable, satisfies public demand for that produce:	<p>12.1 The Department will:</p> <p>12.1.1 regulate the supply of forest produce, other than sawlogs, residue logs, and craftwood (“other forest produce”) through the administration of licensing legislation;</p> <p>12.1.2 maintain and, where appropriate, develop guidelines for the management of other forest produce, which: will be periodically reviewed, with public consultation, and in the case of new guidelines or revisions to guidelines, will be submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect;</p> <p>12.1.3 where reasonable and practicable, monitor supply patterns for signs of non-sustainability; and</p> <p>12.1.4 facilitate the salvage of forest produce generated by management actions or natural events where salvage activities can contribute to rehabilitation and do not significantly increase the level of disturbance or the risk of environmental impacts to the forest area.</p> <p>12.2 The Department and the Forest Products Commission will work together to review the regulation of access to craftwood, which:</p> <p>12.2.1 if considered reasonable and practicable will be through production contracts issued under the FP Act for: areas of State forest and timber reserves subject to timber harvesting for sawlogs planned according to paragraph 10.2 of the plan, and areas of State forest and timber reserves not on harvesting plans prepared according to paragraph 10.2 of the plan.</p> <p>12.3 The Department will conduct research and undertake public consultation with a view to determining the environmental management requirements for the production of domestic firewood.</p>
To reduce the impact of weeds, pests and diseases on the productive capacity of the forest:	<p>13.1 In addition to the action referred to in paragraph 17.4, the Department will:</p> <p>13.1.1 establish a process for the identification and investigation of weed, pest and disease outbreaks that threaten productivity; and</p> <p>13.1.2 where appropriate, prescribe measures in Silviculture Guidelines to limit the impact of weeds, pests and diseases on productivity.</p> <p>13.2 (Plantations): The Forest Products Commission will:</p> <p>13.2.1 maintain an early warning system for <i>Sirex</i> in pine plantations; and</p> <p>13.2.2 monitor weeds, pests and diseases affecting productivity and, where reasonable and practicable, take measures to control them.</p>

Objective	Action
To regenerate or rehabilitate disturbed forest so as to maintain the productive capacity, flora composition and structural attributes of that forest in the long term:	<p>14.1 The Forest Products Commission will conduct regeneration operations in a manner that:</p> <p>14.1.1 is in accordance with the Department’s Silviculture Guidelines; and</p> <p>14.1.2 where regeneration operations do not result in regeneration to a standard specified in the Silviculture Guidelines, repeat the regeneration operations so far as is necessary in order to achieve that standard.</p> <p>14.2 The Forest Products Commission will pursue additional markets for log categories that have traditionally been under-utilised, particularly lower grade jarrah and karri sawlogs and marri sawlogs.</p> <p>14.3 The Department will cooperate with industry and Government agencies in the rehabilitation of areas subject to mining and petroleum activities, including extraction of gravel and sands, by:</p> <p>14.3.1 recommending, where practicable and economically feasible, the inclusion of a formal requirement for the rehabilitation of areas subject to those activities.</p> <p>14.4 (Plantations): The Forest Products Commission will:</p> <p>14.4.1 regenerate areas of plantation that are clearfelled and are to be replanted with exotic species, in accordance with the Forest Products Commission’s Plantation Management Guidelines;</p> <p>14.4.2 rehabilitate the native vegetation in areas of plantation that are clearfelled and are not to be replanted with exotic species, in accordance with Guidelines for the Rehabilitation of Plantation Areas that are to be: developed by the Department with public consultation; and submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect; and</p> <p>14.4.3 where regeneration or rehabilitation operations do not result in regeneration or rehabilitation to a standard specified in the relevant guidelines, investigate the cause and if necessary, repeat the regeneration or rehabilitation operations in order to achieve that standard.</p>
To realise the productive capacity of the forest:	<p>15.1 The Forest Products Commission and the Department will:</p> <p>15.1.1 maintain records of the history of silvicultural treatments applied to stands of trees;</p> <p>15.1.2 develop schedules of future silvicultural treatments for stands of trees to promote growth of timber that can be used to produce sawlogs;</p> <p>15.1.3 assess stand development when silvicultural treatments are scheduled, with a view to determining whether those treatments are then required;</p> <p>15.1.4 undertake or reschedule those proposed silvicultural treatments, according to the assessment referred to in paragraph 15.1.3; and</p> <p>15.1.5 report to the Conservation Commission every five years after the commencement of the plan on the extent to which these scheduled silvicultural treatments have been undertaken.</p>
Ecosystem health and vitality	
To sustain forest ecosystem health and vitality.	

Objective	Action
<p>To use and respond to fire in a manner that:</p> <ul style="list-style-type: none"> optimises the maintenance of forest ecosystem health and vitality; promotes the conservation of biodiversity; controls adverse impacts of fire on the social, cultural and economic values of land managed by the Department and adjoining land; and minimises the risk of smoke emanating from prescribed burns impacting on population centres and other sensitive areas. 	<p>16.1 The Department will:</p> <ul style="list-style-type: none"> 16.1.1 maintain a competent fire management, suppression and response capability; 16.1.2 prepare and maintain a fire management plan and smoke management guidelines; 16.1.3 undertake an annual prescribed burning program; <ul style="list-style-type: none"> in accordance with the fire management plan; in accordance with the smoke management guidelines; having regard to the Goals for Understorey Structural Diversity at the Landscape and Operational Scales referred to in paragraph 3.1; and that considers any special vulnerability of fauna and flora known to exist in a particular area to burning in that area; and 16.1.4 consult with stakeholders and interested community members in a manner that seeks to develop community understanding of and support for, and enable constructive discussions and deliberations on, the planning and implementation of prescribed burning and other fire management programs. <p>16.2 The Forest Products Commission will:</p> <ul style="list-style-type: none"> 16.2.1 undertake an analysis of the risk from fire to its native timber production resources; and 16.2.2 provide to the Department funding sufficient to enable the Department to control that risk to acceptable levels, so far as is reasonable and practicable. <p>16.3 The Department and the Conservation Commission will:</p> <ul style="list-style-type: none"> 16.3.1 participate in the proposed public review of fire management by the Environmental Protection Authority; and 16.3.2 incorporate the recommendations made in the review that are endorsed by the Minister for the Environment into the Department's fire management policy, plan and fire management guidelines (see 16.1.2). <p>16.4 (Plantations): The Forest Products Commission will:</p> <ul style="list-style-type: none"> 16.4.1 undertake an analysis of the risk from fire to its plantation timber production resources; 16.4.2 undertake an analysis of the risk from fire emanating from its plantations moving into surrounding land; and 16.4.3 cooperate with the Department and other organisations in seeking to control the risks to acceptable levels, so far as is reasonable and practicable.

Objective	Action
<p>To:</p> <p>minimise, as far as is reasonable and practicable, the impact on the health and vitality of forest ecosystems of pathogens and their associated diseases;</p> <p>protect from infestation those areas currently free from <i>P. cinnamomi</i>; and</p> <p>control weeds and pests in forest ecosystems.</p>	<p>17.1 The Conservation Commission will develop a whole of Government policy framework for the management of dieback.</p> <p>17.2 The Department and the Forest Products Commission will conduct their operations having regard to the Management of Phytophthora and Disease Caused By It policy and in accordance with Volume 1 of the Phytophthora cinnamomi and Disease Caused by It Guidelines, which:</p> <p>17.2.1 will be periodically reviewed by the Department with public consultation; and</p> <p>17.2.2 in the case of a new policy or guidelines, or revisions to the policy or guidelines, will be submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect.</p> <p>17.3 The Department will:</p> <p>17.3.1 develop an inventory of sites where the impact of <i>P. cinnamomi</i> on the vegetation is known to have been high, with a view to setting priorities for the regeneration or rehabilitation of those areas; and</p> <p>17.3.2 further develop dieback spread and impact models, including models relating to the effects of new infections.</p> <p>17.4 The Department will:</p> <p>17.4.1 maintain records of weeds, pests and diseases that are known to have a significant impact on the health and vitality of forest ecosystems;</p> <p>17.4.2 develop and implement weed, pest and disease control programs;</p> <p>17.4.3 eradicate, wherever reasonable and practicable, localised infestations of weeds, pests or diseases before they are securely established;</p> <p>17.4.4 encourage the coordinated involvement of industry, the community and other land managers in addressing weeds, pests and diseases; and</p> <p>17.4.5 investigate, and where reasonable and practicable take action to control the identified cause of, any significant decline in the health and vitality of forest ecosystems.</p> <p>17.5 The Forest Products Commission will, so far as is reasonable and practicable, maintain their nurseries free from weeds, pests and pathogens that could be transported into the forest with planting stock.</p> <p>17.6 (Plantations): The Forest Products Commission will:</p> <p>17.6.1 monitor for the presence of significant weeds, pests and diseases in plantations, and where reasonable and practicable undertake control measures;</p> <p>17.6.2 develop and implement weed, pest and disease control programs for identified weeds, pests and diseases;</p> <p>17.6.3 where there is an identified risk that plantation operations may result in transport of <i>Phytophthora cinnamomi</i>, conduct its operations having regard to the policy and in accordance with the guidelines referred to in paragraph 17.2; and</p> <p>17.6.4 take reasonable and practicable measures to control the spread of plantation species into adjacent native vegetation.</p>

Objective	Action
To develop self-sustaining ecosystems of native species from regeneration or rehabilitation operations in native forest:	<p>18.1 The Department and the Forest Products Commission will undertake their regeneration or rehabilitation operations by:</p> <p>18.1.1 using natural regeneration where reasonable and practicable; or</p> <p>18.1.2 where natural regeneration is not reasonable and practicable, using seed collected locally or plants propagated from seed collected locally.</p> <p>18.2 The Department and the Forest Products Commission will report to the Conservation Commission annually as to the circumstances where local seed sources have not been used in their regeneration or rehabilitation operations.</p>
Soil and water	
To protect soil and water resources on land to which the plan applies.	
To reduce soil damage:	<p>19.1 The Forest Products Commission and the Department will conduct their operations involving the use of heavy machinery in a manner that:</p> <p>19.1.1 has regard to the requirements of Appendix 6 where the operation occurs prior to the approval of the guidelines referred to in the following paragraph; and</p> <p>19.1.2 is in accordance with the guidelines for soil management in the Soil and Water Conservation Guidelines which are to: be developed by the Department with public consultation; provide for the manner in which the requirements of Appendix 6 are to be met; and be submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect and supercede Appendix 6.</p> <p>19.2 The Department and the Conservation Commission will review the operation of the implementation of Appendix 6 and any guidelines approved under paragraph 19.1.2, 12 months after the commencement of the plan.</p> <p>19.3 The Department will investigate the development of a soil hazard assessment system to help planning to protect soil from damage.</p> <p>19.4 The Forest Products Commission and the Department will rehabilitate soil damaged in the course of their operations by:</p> <p>19.4.1 identifying and mapping damaged soil; and</p> <p>19.4.2 undertaking rehabilitation work as soon as is reasonable and practicable after the completion of the operation.</p> <p>19.5 (Plantations): The Forest Products Commission will:</p> <p>19.5.1 conduct its plantation operations in a manner that has regard to guidelines for soil protection in the Code of Practice for Timber Plantations and the relevant plantation manual, which will be revised in consultation with the Department within two years of commencement of the plan; and</p> <p>19.5.2 rehabilitate damaged soil resulting from plantations operations to the standards specified in the Code of Practice or Timber Plantations and the relevant plantation manual.</p>

Objective	Action
To protect the ecological integrity and quality of streams, wetlands and their associated vegetation, and increase the flow of water to surface and groundwater reservoirs:	<p>20.1 The Department and the Forest Products Commission will conduct their operations:</p> <p>20.1.1 in a manner that has regard to the provisions for stream zones in Appendix 3 where the operation occurs prior to the approval of the guidelines referred to in the following paragraph; and</p> <p>20.1.2 in accordance with the Guidelines for the Management of Informal Reserves referred to in paragraph 2.1.2.</p> <p>20.2 The Department will review the extent and condition of public access ways leading to public water catchment areas, with a view to considering whether the number of access ways ought to be reduced or their condition improved.</p> <p>20.3 The Department and the Forest Products Commission, in consultation with the Conservation Commission, will evaluate with the Water Corporation and the Water and Rivers Commission any proposal seeking to employ silvicultural treatments to increase the flow of water to surface and ground water reservoirs.</p> <p>20.4 The Department:</p> <p>20.4.1 will provide advice and assistance to bodies proposing or assessing new reservoirs located on land to which the plan applies;</p> <p>20.4.2 will take and use water sustainably from land to which the plan applies;</p> <p>20.4.3 may issue permits, after consultation with the Conservation Commission, for the taking of water from land to which the plan applies; and</p> <p>20.4.4 will assist the Conservation Commission to develop a policy to provide guidance when proposals to take water from land to which the plan applies are considered.</p> <p>20.5 (Plantations): The Forest Products Commission will:</p> <p>20.5.1 conduct its plantation operations in a manner that has regard to guidelines for water protection in the Code of Practice for Timber Plantations and the relevant plantation manual, which will be revised in consultation with the Department, within two years of commencement of the plan;</p> <p>20.5.2 consult with the Water and Rivers Commission prior to undertaking plantation operations in a public water catchment area; and</p> <p>20.5.3 evaluate with the Department, the Water Corporation and the Water and Rivers Commission any proposal seeking to employ silvicultural treatment to increase the flow of water to surface and ground water reservoirs.</p>
Global carbon cycles	
To sustain the contribution of the forest to global carbon cycles.	
To sustain or increase the net quantity of carbon stored in the forest ecosystem:	<p>21.1 In addition to the actions proposed in previous chapters, which will assist in maintaining net carbon storage, the Department will incorporate carbon management considerations into management planning and guidelines by:</p> <p>21.1.1 having regard to the function of the forest as a carbon sink in the ongoing development of its greenhouse gas position and policy on emissions, sequestration, and bioenergy.</p>

Objective	Action
To incorporate the best available predictions of likely future climate change into management planning:	22.1 The Department will: 22.1.1 investigate the likely impacts of climate change on the forest, including the role of forest ecosystems in the carbon cycle; 22.1.2 maintain contact and, where appropriate, collaborate with external groups undertaking research and modelling relating to climate change; and 22.1.3 incorporate climate change prediction into future planning for the management of land to which the plan applies, where reasonable and practicable.
Natural and cultural heritage	
To maintain natural and cultural heritage.	
To work with Aboriginal people to identify, interpret, protect, and manage significant cultural heritage sites:	23.1 The Department will: 23.1.1 seek to establish a formal Nyoongar consultative working group to advise on issues relating to Aboriginal cultural heritage in the plan area; 23.1.2 identify Nyoongar women and men with authority and knowledge relating to Aboriginal cultural heritage in the plan area, and provide for their involvement in the management of the forest; and 23.1.3 facilitate cross-cultural awareness and interpretive activities to inform and educate the wider community regarding Aboriginal culture.
To identify, record, assess and manage places of natural and cultural heritage significance on land to which the plan applies:	24.1 The Department will: 24.1.1 maintain and, where reasonable and practicable, enhance databases of cultural heritage places and values; and 24.1.2 cooperate with Commonwealth and State agencies, local government authorities and non-statutory organisations in relation to cultural heritage identification and conservation. 24.2 The Department and the Forest Products Commission will conduct their operations in a manner that has regard to areas identified on databases of cultural heritage places and values. 24.3 (Plantations): The Forest Products Commission will: 24.3.1 undertake its operations in a manner that has regard to guidelines in the Code of Practice for Timber Plantations and the relevant plantation manual for the identification of significant heritage sites, which are to be revised in consultation with the Department, within two years of commencement of the plan; and 24.3.2 share information relating to identified heritage sites with the Department.
Socio-economic benefits	
To sustain and enhance socio-economic benefits obtained from the forest to meet community needs.	

Objective	Action
To provide opportunities for active and passive recreation and tourism that will meet public demand, so far as is practicable and sustainable, and provide regional economic benefits:	<p>25.1 The Department will:</p> <p>25.1.1 develop, in consultation with the Conservation Commission, and progressively implement a strategic framework plan for recreation and tourism on land to which the plan applies;</p> <p>25.1.2 issue and administer licences, leases and permits for commercial tourism uses in accordance with the provisions of the CLM Act;</p> <p>25.1.3 issue permits and take other action to enable organised non-commercial recreation and educational groups to undertake appropriate activities;</p> <p>25.1.4 undertake research in relation to the knowledge, attitudes, skills and activities of visitors to land to which the plan applies; and</p> <p>25.1.5 where appropriate, provide designated areas where camping may take place or where dogs and horses may be taken.</p>
To protect visual landscapes:	<p>26.1 The Department and the Forest Products Commission will:</p> <p>26.1.1 maintain a visual landscape classification and management system;</p> <p>26.1.2 review guidelines for the application of visual landscape management principles in land-use planning, codes of practice, operational guidelines and other relevant manuals; and</p> <p>26.1.3 make submissions in relation to development proposals that may impact on visual landscapes that are forwarded to them for comment or advice, with a view to seeking to reduce the effect of any proposed development on the visual quality of the landscape.</p> <p>26.2 (Plantations): The Forest Products Commission will consider the impact of plantation operations on the visual quality of the landscape and where reasonable and practicable, will conduct those operations in a manner that seeks to reduce their impact on the visual quality of the landscape.</p>
To reduce the impact of mineral and petroleum operations on land to which the plan applies:	<p>27.1 The Department and the Conservation Commission will:</p> <p>27.1.1 make submissions in relation to mining and petroleum proposals on land to which the plan applies that are forwarded to them for comment or advice, with a view to seeking to reduce the effect of mining and petroleum operations on that land;</p> <p>27.1.2 provide advice and, where appropriate, assistance to industry and Government agencies in relation to the effect of mining and petroleum operations on the forest, the means by which those effects may be reduced and the rehabilitation of the forest after those operations are complete; and</p> <p>27.1.3 seek to recover the cost of providing that advice and assistance.</p>

Objective	Action
To manage basic raw materials (BRM) and promote the rehabilitation of areas to which the plan applies where BRM have been extracted:	28.1 The Department will extract and use gravel and other BRM required for the management of land to which the plan applies. 28.2 The Conservation Commission will review its policy on BRM extraction as a matter of priority. 28.3 The Department will make submissions in relation to proposals to extract basic raw materials on land to which the plan applies that are forwarded to it for comment or advice, with a view to seeking: 28.3.1 to have the cost of rehabilitation of areas from which basic raw materials are extracted borne by the organisation responsible for the extraction of those materials; and 28.3.2 the lodgement of a rehabilitation performance bond. 28.4 The Department and the Forest Products Commission will maintain a database of areas from which basic raw materials have been extracted and will progressively develop plans and works programs for the rehabilitation of these areas.
To promote, encourage and facilitate the controlled exploration of native flora for scientific, therapeutic and horticultural purposes:	29.1 The Department will issue and administer leases for facilities and uses in accordance with the provisions of the CLM Act. 30.1 The Department will implement the current contract.
Plan implementation	
To ensure that forest management is undertaken in accordance with the plan and is continually improved so as to achieve best practice.	

Objective	Action
<p>To monitor and audit the extent to which management of land to which the plan applies is undertaken in accordance with the plan:</p>	<p>31.1 The Department and the Forest Products Commission, in consultation with the Conservation Commission, will:</p> <p>31.1.1 cooperate in the development of an annual audit program to monitor the extent to which management of land to which the plan applies is undertaken in accordance with the plan; and</p> <p>31.1.2 conduct audits in accordance with the annual audit program, and report the results to the Conservation Commission.</p> <p>31.2 The Conservation Commission will undertake independent audits to assist it in assessing the extent to which management of land to which the plan applies is undertaken in accordance with the plan, and will give priority to auditing:</p> <p>31.2.1 the management of old-growth forest in informal reserves;</p> <p>31.2.2 the protection of stream zones and less well reserved vegetation complexes;</p> <p>31.2.3 the selection and management of fauna habitat zones;</p> <p>31.2.4 marri retention;</p> <p>31.2.5 dieback hygiene;</p> <p>31.2.6 protection of significant flora and understorey species; and</p> <p>31.2.7 soil management.</p> <p>31.3 The Conservation Commission will undertake a comprehensive mid-term audit of the extent to which management of land to which the plan applies is undertaken in accordance with the plan which will include consideration of the extent to which all key performance indicators have been achieved.</p> <p>31.4 The Conservation Commission and the Department will publish the results of the audits referred to in paragraphs 31.1, 31.2 and 31.3.</p> <p>31.5 The Department, in consultation with the Conservation Commission, will develop a protocol for each key performance indicator in the plan, which will:</p> <p>31.5.1 identify the data to be collected and analysed in assessing the extent to which the key performance indicator has been achieved; and</p> <p>31.5.2 specify the persons who are responsible for the collection and analysis of that data.</p> <p>31.6 The Department and the Forest Products Commission will cooperate with the Commonwealth in the implementation of the Montreal Indicator program.</p> <p>31.7 (Plantations): The Forest Products Commission will, through the Plantation Environmental Management System, audit the extent to which plantation operations are undertaken in accordance with the plan. Audits will be planned with and reported to the Department and the Conservation Commission.</p>

Objective	Action
To provide for adaptive management to improve forest management:	<p>32.1 The Department and the Forest Products Commission will, in cooperation with the Water and Rivers Commission and the Water Corporation, and in consultation with the Conservation Commission, conduct research in relation to the extent to which stream zones in informal reserves adequately protect biodiversity, water quality and water quantity in areas subject to timber harvesting.</p> <p>32.2 The Department will, in consultation with the Conservation Commission, conduct trials, where reasonable and practicable, of improvements to silviculture and fire management practices.</p> <p>32.3 The Forest Products Commission will test methods to increase the utilisation of sawlogs below first and second grade standards.</p>
To ensure that the plan actions, policies and guidelines maintain their currency:	<p>33.1 The Department and the Conservation Commission will:</p> <p>33.1.1 develop or maintain a comprehensive suite of operational guidance documents (see Appendix 1);</p> <p>33.1.2 evaluate the results from research, monitoring, audits and trialing of adaptive management practices to determine whether the plan, or guidelines and policies referred to in the plan, should be amended;</p> <p>33.1.3 amend the plan if required according to the CLM Act;</p> <p>33.1.4 adopt the same processes for consultation, advice and approval for amending policies and guidelines as described earlier in the plan to develop or review them; and</p> <p>33.1.5 take action that is reasonable and practicable to address problems identified in management systems.</p>
To provide opportunities for Government agencies, non-government organisations and the community to participate in plan implementation:	<p>34.1 The Department and the Forest Products Commission will, when required by the provisions of the plan, undertake public consultation in relation to the development and review of management policies and guidelines.</p> <p>34.2 The Department will:</p> <p>34.2.1 develop and implement programs that seek to provide the community with educational opportunities and information on ecologically sustainable forest management;</p> <p>34.2.2 establish public consultation processes;</p> <p>34.2.3 provide opportunities for community participation in voluntary activities and educational and social development programs relating to ecologically sustainable forest management; and</p> <p>34.2.4 provide a range of opportunities for volunteers to be involved in forest management activities.</p>
	<p>35.1 The Department will develop and maintain an environmental management system for forest management which is to be independently accredited as conforming to AS/NZS ISO 14001.</p> <p>35.2 (Plantations): The Forest Products Commission will maintain an environmental management system independently accredited as conforming to AS/NZS ISO 14001.</p>
To facilitate effective management of forests:	<p>36.1 The Department and the Forest Products Commission will:</p> <p>36.1.1 identify key roles and responsibilities in forest operations and specify the persons who are responsible for fulfilling those roles and responsibilities; and</p> <p>36.1.2 identify key tasks associated with implementation of the plan and specify the persons who are responsible for undertaking those tasks.</p>

Objective	Action
To generate and transfer knowledge and develop the necessary skills and competencies in staff of the Department and staff and contractors of the Forest Products Commission, with a view to leading to improvements in forest management:	37.1 The Department will develop and implement research programs, in cooperation with the Conservation Commission, including the research referred to in paragraphs 8.1 and 8.2.
	37.2 The Department and the Forest Products Commission will take reasonable and practicable steps to:
	37.2.1 identify the skills required to competently undertake the key tasks referred to in paragraph 36.1.2;
	37.2.2 review the skills and competency levels of persons responsible for undertaking those tasks; and 37.2.3 initiate training and other programs to increase skill and competency levels where they are deficient.

Key Performance Indicators

Key Performance Indicator	Description
Key performance indicator 1	The representation of forest ecosystems in formal reserves.
Performance measure	Area of each forest ecosystem by land category (existing and proposed separately).
Performance target(s)	50 per cent of the individual areas proposed for the reserve system to have their land category formally changed within 10 years after the approval of the plan. Substantial progress to have been made in formally changing the land category of all remaining areas.
Reporting	Biennially on progress.
Response to progress shortfall	The Department to investigate lack of progress and report to the Conservation Commission and to the Minister for the Environment. The Department to address those impediments within its control and the Department and the Conservation Commission to advise the Minister for the Environment on measures to address other impediments.
Key performance indicator 2	The status of (critically endangered, endangered, vulnerable, conservation dependent) forest-dwelling species and ecological communities as determined by listing.
Performance measure	List of species and ecological communities and their status that tracks movements of species between protection categories.
Performance target(s)	No species or ecological community will move to a higher category of threat as a result of management activities.
Reporting	Annually with the review of the lists.
Response to target shortfall	The Department to investigate the cause of a change to a more threatened category and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices, in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 3	The status of selected threatened or conservation dependent species that are the subject of management actions to protect them.

Key Performance Indicator	Description
Performance measure	The trap success for animals at selected monitoring sites.
Performance target(s)	As per recovery plans.
Reporting	Annually.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 4	The area of native forest and plantations.
Performance measure	Change in: <ul style="list-style-type: none"> • the area of native forest and plantations; • area of forest by land category; • area of forest cleared; and • area of forest rehabilitated.
Performance target(s)	No permanent loss of net area of forested land.
Reporting	After each five years.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment.
Key performance indicator 5	Annual removal of wood products compared to the sustainable yield determined by the plan.
Performance measure	<ul style="list-style-type: none"> • Cumulative removals for jarrah and karri first and second grade sawlogs compared to the average annual sustainable yield. • Annual removal of jarrah and karri sawlogs below first and second grade. • Annual removal of all logs.
Performance target(s)	No more than 720,500 cubic metres of first and second grade jarrah sawlogs and 297,000 cubic metres of first and second grade karri sawlogs to be removed in the first five years of the plan. No more than 1,310,000 cubic metres of first and second grade jarrah sawlogs and 540,000 cubic metres of first and second grade karri sawlogs to be removed over the 10 year life of the plan. Annual volume of jarrah and karri sawlogs other than first and second grade sold for value added products to show a positive trend. No more than 13,000 cubic metres of wandoo, 16,000 cubic metres of blackbutt and 19,000 cubic metres of sheoak sawlogs to be removed over the 10 year life of the plan.
Reporting	Annually.
Response to target shortfall	The Forest Products Commission to advise the Conservation Commission how it will manage removals to be under the end of plan target. The Conservation Commission to evaluate the need for a revision of harvesting levels in the context of its assessment and auditing functions, in consultation with the Department.
Key performance indicator 6	Area of forest cut over annually.
Performance measure	Annual area of each forest type harvested according to each silvicultural objective.
Performance target(s)	Not possible to set a realistic target for area cut over.
Reporting	Annual publication of areas cut over.

Key Performance Indicator	Description
Response to reporting	The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Forest Products Commission and the Department.
Key performance indicator 7	The removal of non-sawlog timber.
Performance measure	Total removals of firewood compared to the authorised removal through contract and licence.
Performance target(s)	Authorised removals more than 70 per cent of estimated total removals based on survey information.
Reporting	After five years.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 8	The presence of <i>Sirex</i> in softwood plantations.
Performance measure	Evidence of <i>Sirex</i> in trap trees.
Performance target(s)	No evidence of <i>Sirex</i> in trap trees.
Reporting	Annually.
Response to target shortfall	The Forest Products Commission to initiate a control program.
Key performance indicator 9	Time to regenerate harvested areas.
Performance measure	The time between completion of native forest harvesting of a coupe for regeneration and the completion of post-harvest regeneration treatment.
Performance target(s)	For karri and planted jarrah: <ul style="list-style-type: none"> • achieve more than 75 per cent of areas treated to be completed within 18 months; and • achieve 100 per cent of areas treated to be completed within 30 months. For other jarrah: <ul style="list-style-type: none"> • achieve 100 per cent of areas treated to be completed within 18 months.
Reporting	Annually.
Response to target shortfall	The Forest Products Commission to advise the Department how it will rectify the shortfall. The Department to determine the need for a revision of management practices, in consultation with the Conservation Commission.
Key performance indicator 10	Effectiveness of regeneration of native forest and plantation.
Performance measure	The proportion of the sampled annual regeneration program that does not meet the standard set out in the Silviculture Guidelines.
Performance target(s)	No more than five per cent of the area regenerated requiring remedial action.
Reporting	Annually.
Response to target shortfall	The Forest Products Commission to advise the Department how it will rectify the shortfall. The Department to determine the need for a revision of management practices, in consultation with the Conservation Commission.
Key performance indicator 11	Forecast strategic timber yield versus actual timber yield.
Performance measure	The volume of timber removed in harvesting from monitoring plots against the volume predicted to be removed by the sustained yield calculation.
Performance target(s)	No target.
Reporting	At the mid-term (five years) review of the plan to allow for a reasonable number of plots to be measured in a range of strata to each silvicultural objective. The report to identify the size of the variation and the reasons for the variations.

Key Performance Indicator	Description
Response to target shortfall	The Conservation Commission to evaluate the need for revision of yield forecasting in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 12	The achievement of early thinning schedules that underpin future yield.
Performance measure	Achieved thinning versus that prescribed in silviculture schedules.
Performance target(s)	All stands thinned at the prescribed stand development stage.
Reporting	Two years after commencement of the plan and each two years thereafter.
Response to target shortfall	The Forest Products Commission and the Department to investigate the cause and report to the Conservation Commission. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function in consultation with the Department.
Key performance indicator 13	Direct and indirect employment in the timber industries.
Performance measure	The numbers employed in native timber harvesting, processing and downstream manufacture.
Performance target(s)	No target, trends to be reported.
Reporting	Forest Products Commission to report biennially.
Response to target shortfall	The Department to investigate the cause and report to Conservation Commission and to the Minister for the Environment.
Key performance indicator 14	Access for apiculture.
Performance measure	The number of registered sites by land category.
Performance target(s)	No target, trends to be reported.
Reporting	Biennially.
Response to target shortfall	The Department to investigate the cause and report to Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 15	Wildflowers and seed picking.
Performance measure	The level of activity measured by picking endorsements and returns.
Performance target(s)	No target, trends to be reported.
Reporting	Annually.
Response to target shortfall	The Department to investigate the cause and report to Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 16	The risk to conservation, life, property and other forest values posed by wildfire.
Performance measure	The area of forest by fuel age classification.
Performance target(s)	Target to be determined following the Environmental Protection Authority review of fire management.
Reporting	Annually.
Response to reporting	The Department to evaluate high-risk areas and incorporate into fuel reduction planning for subsequent years.
Key performance indicator 17	The severity status of weeds and pests as determined by subjective survey.
Performance measure	List of important weeds and pests and their severity status that tracks movements of species between severity categories.
Performance target(s)	No weed or pest to increase in severity status.

Key Performance Indicator	Description
Reporting	Every five years.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 18	The effectiveness of dieback hygiene.
Performance measure	The number of sampled areas uninfested with <i>Phytophthora cinnamomi</i> that remain uninfested following an operation with an approved hygiene management plan.
Performance target(s)	No uninfested protectable area to become infested as a result of management actions.
Reporting	After five years. Results for State forest and timber reserves, and conservation reserves to be reported separately.
Response to target shortfall	The Department to investigate and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 19	The annual flow weighted mean salinity and the trend for streams in fully forested catchments.
Performance measure	The annual flow weighted mean salinity and the trends for gauging stations on the following rivers: Mitchell River (603005) Weld River (606002), (606195) Carey Brook (608002) Barlee Brook (608151) Harvey River (613002) Tallanalla Creek (613005) Falls Brook (613008) South Dandalup (614007) Little Dandalup (614017) Wilson Brook (614021)
Performance target	Salinity trends to be neutral.
Reporting	Every five years.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 20	Percentage of water bodies (e.g. stream kilometres, lake hectares) with significant variance of biodiversity from the historic range of variability.
Performance measure	The diversity of aquatic macro-invertebrate fauna at a selected number of monitoring sites.
Performance target(s)	No sites with fauna significantly different from the reference condition.
Reporting	Every five years.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.

Key Performance Indicator	Description
Key performance indicator 21	The level of soil damage resulting from timber harvesting.
Performance measure	Soil damage by risk category as measured by survey.
Performance target(s)	Soil damage not to exceed prescribed maximum levels (see Appendix 6).
Reporting	Annually.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 22	Water production.
Performance measure	Stream flow of selected forest streams.
Performance target(s)	Streamflow to be maintained.
Reporting	The Water Corporation and the Water and Rivers Commission to report every five years (linked to KPI 19).
Response to target shortfall	The Department and the water authorities to identify the reasons for the trend and the Department to report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 23	The identification and protection of cultural heritage.
Performance measure	The number of existing and new heritage sites identified in management planning and the number protected.
Performance target(s)	No disturbance of a registered place without formal approval.
Reporting	Annually.
Response to target shortfall	The Department or the Forest Products Commission to investigate the cause and report to the Conservation Commission and in the case of the Department, to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 24	Consultation and involvement of Aboriginal people in forest management.
Performance measure	Establishment of the Nyoongar working group. Issues addressed by the Nyoongar working group. Statutory referrals required under native title legislation.
Performance target(s)	Nyoongar working group to be established within one year of plan approval. All statutory referrals made.
Reporting	Annually.
Response to target shortfall	The Department or the Forest Products Commission to investigate the cause and report to the Conservation Commission and in the case of the Department, to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 25	The protection of heritage places through representation in reserves.
Performance measure	Representation of heritage values in the existing and proposed formal and informal reserve system.
Performance target(s)	50 per cent of the individual areas proposed for the reserve system to have their land category formally changed within 10 years after the approval of the plan. Substantial progress to have been made in formally changing the land category of all remaining areas.
Reporting	Biennially on progress.

Key Performance Indicator	Description
Response to target shortfall	The Department to investigate the lack of progress and report to the Conservation Commission and to the Minister for the Environment. The Department to address those impediments within its control and the Department and the Conservation Commission to advise the Minister for the Environment on measures to address other impediments.
Key performance indicator 26	Number, range and use of recreation/tourism activities available by proposed land category in the plan area.
Performance measure	Type and number of recreation and tourism facilities available in the plan area (e.g. picnic sites, campsites, toilets, visitor centres, walking trails, or major tourism developments). The number of visits to selected recreation areas. The satisfaction visitors express with their experience.
Performance target(s)	Visitor satisfaction maintained at high levels.
Reporting	Annually.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 27	Basic raw material supply.
Performance measure	The number of notices of entry served to the Department under the Local Government Act.
Performance target(s)	No target, trends to be reported.
Reporting	Annually.
Response to target shortfall	The Department to investigate the cause and report to Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.
Key performance indicator 28	Adaptive management.
Performance measure	The number and topic of formal adaptive management trials.
Performance target(s)	Within five years, trials will be held into at least two separate issues detailed in the plan's action statements.
Reporting	Five years.
Response to target shortfall	Department to report to the Conservation Commission and to the Minister for the Environment on measures required to address achievement.
Key performance indicator 29	Provide for public involvement activities and public education, awareness and extension programs and make available forest- related information.
Performance measure	Compilation of programs for public involvement, education, awareness and extension programs.
Performance target(s)	Available programs and numbers of the community exposed to programs increases over time.
Reporting	Annually.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment.
Key performance indicator 30	Develop and maintain human resource skills across relevant disciplines.
Performance measure	The extent to which the Department demonstrates the capacity and commitment to develop and maintain the essential skills of staff.
Performance target(s)	Persons responsible for undertaking key tasks on average meet 80 per cent of the competency requirements for key tasks indicated in the environmental management system.

Key Performance Indicator	Description
Reporting	Annually.
Response to target shortfall	The Department and the Forest Products Commission to investigate the cause and report to the Conservation Commission and in the case of the Department, to the Minister for the Environment.
Key performance indicator 31	Development of scientific understanding of ecosystem characteristics and functions.
Performance measure	Expenditures on research and development related to ecologically sustainable forest management; Person years of scientific research, by ecosystem or disciplinary area of study, in the field of ecologically sustainable forest management; and/or Number of peer-reviewed articles published annually on ecologically sustainable forest management.
Performance target(s)	No target.
Reporting	Annually.
Response to report	The Conservation Commission to review the scientific effort in forests in relation to the total Departmental effort and discuss priorities with the Department.
Key performance indicator 32	Environmental management system.
Performance measure	Development of a Departmental environmental management system to a standard suitable for accreditation.
Performance target(s)	December 2005.
Reporting	December 2005.
Response to target shortfall	The Department to report to the Conservation Commission and to the Minister for the Environment on measures it proposes to complete the task and the completion date.
Key performance indicator 33	Operational control.
Performance measure	The extent to which guidance documents have been prepared/reviewed and management modified to improve ecologically sustainable forest management.
Performance target(s)	All guidance documents referred to in the actions proposed by the plan to be prepared/reviewed by mid-term.
Reporting	Annually.
Response to target shortfall	The Department to investigate the cause and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.