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Introduction to the plan

The following Foreword, Executive summary and Background discussion of the principles of ecologically sustainable forest management are provided by way of summary only, and do not constitute a formal part of the Forest Management Plan 2004-2013. The text of the plan, which has been approved by the Minister for the Environment under section 60 of the Conservation and Land Management Act 1984, begins on page 18.

Foreword

This is the first forest management plan since amendments to the *Conservation and Land Management Act 1984* (CALM Act) separated the management of forests from commercial timber operations. The amendments passed in November 2000 also described the principles of ecologically sustainable forest management and made it a function of the new Conservation Commission of Western Australia (the Conservation Commission) to advise the Minister for the Environment on the application of these principles. The plan constitutes a component of that function.

The plan has been prepared in accordance with the CALM Act for land vested in the Conservation Commission within the Swan, South West and Warren regions of the Department of Conservation and Land Management (the Department). It is a function of the Conservation Commission to prepare proposed management plans for land vested in it, and this process is prescribed in Part V of the CALM Act. The plan gives effect to the Government's *Protecting our old-growth forests* policy and takes into account the principles of ecologically sustainable forest management described in section 19(2) of the CLM Act.

The Conservation Commission is the proponent for the purpose of the assessment of the plan undertaken by the Environmental Protection Authority (EPA) under the *Environmental Protection Act 1986* (EP Act).

The Conservation Commission, the Department and the Forest Products Commission will seek to achieve the plan's objectives by undertaking the Actions specified. The Conservation Commission is responsible for giving effect to the conditions imposed on the plan by the Minister under the EP Act.

The plan has adopted the, slightly modified, Montreal Criteria[1] of sustainability as the framework within which to identify management actions in line with the principles of ecologically sustainable forest management. The criteria are: the conservation of biodiversity, the maintenance of productive capacity, the maintenance of ecosystem health and vitality, the conservation and maintenance of soil and water, the maintenance of forests contribution to the global carbon cycle, the maintenance of heritage, and the maintenance of socio-economic values.

The plan has adopted three scales of management: whole of forest, landscape and operational, to accommodate better planning for the maintenance of biodiversity. Actions are set for each of the criteria for sustainability, where appropriate at each of the scales of management.

The plan is a more concise document without the background information in the Draft Forest Management Plan (Conservation Commission 2002a). While not forming part of the plan itself, the Background chapter discussing the principles of ecologically sustainable forest management outlines some of the matters considered by the Conservation Commission in formulating the plan. The paper, Implementing Ecologically Sustainable Forest Management – An Explanatory Paper by the Conservation Commission of Western Australia to accompany the proposed Forest Management Plan 2004-2013 (Conservation Commission 2003a) summarises the principal changes from the draft plan and provides further detail on the

[1] Australia and 12 other countries participating in the Montreal Process agreed in 1995 that the criteria and indicators they had developed provided a common understanding of sustainable forest management at a whole of forest scale.

Conservation Commission's rationale for the management proposals in the plan, and its position on matters related to the plan.

Actions relating to the area of State forest and timber reserves planted with exotic species have been expanded to address a broader range of issues facing their management. Key performance indicators are proposed at the conclusion of each of the chapters based on the Montreal Criteria.

Actions for a plan that covers an extensive area for a 10-year term need to be set at a strategic level, with operational details that are likely to change over that period as a result of continual improvement and adaptive management set out in a series of subsidiary management guidelines (Appendix 1). To ensure clarity in this process:

- key management requirements are stipulated in appendices in the plan as the minimum that will be included in the relevant guidelines – these requirements will be given effect to through amendments to existing, and proposed guidelines, and used as operational practice until the completion of the new guidelines;
- the plan requires the development and review of the relevant guidelines to be undertaken within specified timelines, with public consultation, then submitted to the Conservation Commission for advice and approved by the Minister for the Environment; and
- auditing of adherence to the relevant guidelines will be undertaken and published.

The proposals in the plan have been developed taking into consideration the comments received in the 5,600 submissions on the Draft Forest Management Plan (Conservation Commission 2002a). The Conservation Commission's response has been published in Analysis of Public Submissions on the Draft Forest Management Plan (Conservation Commission 2003b).

The Conservation Commission has found the need to balance biodiversity conservation and the provision of ecological goods and services to be a particular challenge. The Conservation Commission believes that it has prepared a management plan that will leave a lighter footprint on the forests and thereby also a secure future for all forest users. Improvements in the plan's current biodiversity and socio-economic outcomes are planned through adaptive management and an increase in the utilisation of sawlogs below first and second grade standard.

The majority of the management proposals in the plan will be implemented in part by the Department, and in part by the Forest Products Commission. The CALM Act and the *Forest Products Act 2000* (FP Act) require the Department and the Forest Products Commission respectively to operate in accordance with an approved forest management plan. The Department and the Forest Products Commission are committed to the implementation of the plan, however, implementation of all the Actions will depend to some extent on the provision of necessary funds, which is subject to budgetary and other constraints, as well as for the Department to address other priorities throughout the State. Reports on the implementation of the plan will make clear which Actions are not being progressed due to resource constraints.

From the commencement date of this plan it has replaced the Forest Management Plan 1994-2003 and those parts of the 1987 Northern Forest, Central Forest and Southern Forest Regional Management Plans that were not replaced by the 1994 plan.

Executive summary

The plan covers all land categories vested in the Conservation Commission, and freehold land that contains native vegetation held in the name of the Executive Director of the Department of Conservation and Land Management, within the Department's Swan, South West and Warren Regions. However, there is a focus on the management of State forest and timber reserves because it is primarily on these land categories that disturbance activities are permitted.

The Conservation Commission's overall objective in formulating the plan is for biodiversity to be conserved, the health, vitality and productive capacity of ecosystems to be sustained, and the social, cultural and economic benefits valued by the community to be produced in a manner taking account of the principles of ecologically sustainable forest management.

Biodiversity

The plan implements the Government's commitments in the *Protecting our old-growth forests* policy for 30 new national parks, and includes the new areas identified through the high conservation value study (see Biological diversity chapter and Appendix 2). The proposed area of formal reserves and forest conservation areas is now 1,264,100 hectares and the area of State forest and timber reserves 1,209,600 hectares. Reservation targets for forest ecosystems are generally achieved and in a lot of cases well exceeded except for the ecosystems; Jarrah Rates tingle, Jarrah Red tingle, Karri Rates tingle, Bullich and Yate and Darling Scarp. Protection of these ecosystems on private land is required to meet the targets.

The informal reserve system is expanded to include patches of old-growth forest that were too fragmented to be included in the formal reserve system. This will implement the Government's commitment in the *Protecting our old-growth forests* policy to end timber harvesting in old-growth forest. Consideration will be given to increasing the security of classification of these patches by classifying them as forest conservation areas under the CALM Act. The informal reserve system is also expanded to increase the protection of less well reserved vegetation complexes and the forest ecosystem, Darling Scarp, that did not meet its comprehensive, adequate and representative (CAR) target (see Biological diversity chapter and Appendix 3).

The measures designed to provide for the maintenance of fauna populations in areas subject to timber harvesting and to facilitate the recolonisation of regenerated areas have been expanded and integrated. Fauna habitat zones have been introduced (see Action 7 and Appendix 4) and the Silviculture Guidelines amended to provide for the retention of additional habitat elements and an increased number of habitat trees (Appendix 5).

The Silviculture Guidelines have also been amended to provide increased protection for understorey species during logging, more surety of regeneration in eastern jarrah forest, and rules that seek a balance between the culling of marri that could not be removed commercially, to ensure adequate regeneration, and biodiversity value of retaining the marri.

Management for the maintenance of biodiversity will be given an added level of sophistication with the proposal to develop goals at the landscape scale for diversity in understorey vegetation. Prescribed fire will be used to achieve and maintain the diversity goals.

Measures to protect and recover threatened species and threatened ecological communities are retained.

Productive capacity

A significant decrease in the sustained yield of jarrah and karri sawlogs from the Forest Management Plan 1994-2003 and that proposed in the Regional Forest Agreement (RFA) is introduced. This is due to the reduced area available for timber harvesting as a result of the expansion of the formal and informal reserve systems, the creation of fauna habitat zones, the changes to silviculture and provision for risk factors including the forecast impact of dieback on timber yield resulting from the ongoing autonomous spread of *Phytophthora cinnamomi*. The sustained yield of jarrah first and second grade sawlogs is 131,000 cubic metres per annum and for karri first and second grade sawlogs it is 54,000 cubic metres per annum. There will also be 534,000 cubic metres per annum of other bole jarrah logs, 117,000 cubic metres per annum of other bole karri logs. Some of the submissions on the draft plan requested an annual supply of between 140,000 to 180,000 cubic metres of first and second grade jarrah sawlogs. This is higher than the sustained yield in the plan, however, the preceding figures for other bole logs indicate that there is a significant volume of additional wood available that industry has used very little of in the past. The opportunity for the furniture industry to increase production is now dependent on the ability of industry to utilise these smaller, shorter and lower quality logs. The plan commits the Forest Products Commission to continue exploring ways to facilitate the utilisation of these logs and the introduction of bole sawlogs is one means proposed. As a consequence of harvesting the jarrah and karri sawlogs, quantities of marri (196,000 cubic metres per annum), wandoo (1,300 cubic metres per annum) and other species will be made available. Removal of timber from the forest will be tracked and reported on against the sustained yield on an annual basis.

The removal of other forest produce will be managed and regulated by licence. Management of the removal of domestic firewood is identified as a priority area for improvement and is consequently a key performance indicator.

Standards for the timing and stocking to be achieved in regeneration operations following logging are set out. New standards for the regeneration of jarrah and the monitoring of regenerated areas are introduced (Appendix 5) to address concerns on regeneration timing and effectiveness, particularly in eastern jarrah forest.

The future productivity of regrowth forests has increased in importance for the yield of sawlogs since timber harvesting in old-growth forest was ended. The plan recognises the significance of conducting early and mid-term thinning schedules to ensure growth is maximised onto utilisable product and includes a number of Actions to monitor that it is occurring.

Forest areas utilised by extractive industries are to be rehabilitated.

Ecosystem health and vitality

The plan recognises the proposed review of fire by the Environmental Protection Authority and the fact that policy may change as a result of it. However, the broad thrust of the recommendations from the Departmental review of fire management in the south-west forests are adopted, particularly that burn planning be based on diversity/structural models of vegetation units so as to promote the maintenance of biological diversity. This ties in with the proposal in the biodiversity section to set goals for understorey vegetation diversity. The commitment to maintaining an adequate level of protection for south-west communities remains.

Management of the threat to ecosystem health from the plant pathogen *Phytophthora cinnamomi* maintains focus on identifying protectable areas and instituting measures to minimise the risk of infesting them when operations are planned. A greater emphasis on monitoring implementation of the policy and reviewing its adequacy is included as a result of the Environmental Protection Authority's assessment of the protocol for the identification and prioritisation for management of protectable areas. The use of phosphite to protect threatened plants from the pathogen is maintained.

The monitoring of weeds posing a significant threat to ecosystem health will be undertaken and reported on through a key performance indicator.

Soil and water

The likelihood of damage to soils from the use of heavy machinery in wet soil conditions is reduced by the introduction of controls on operating times and methods based largely on indirect measures of soil moisture content (see Soil and Water chapter and Appendix 6). Other operational measures to limit soil damage from erosion are maintained.

Maintaining the quantity and quality of water run-off to dams has increased in significance as the drying trend of the past 30 years continues. Water quality maintenance measures through the buffering of all streams, and basal area controls for salinity, are maintained. However, a trial to evaluate an improved configuration of stream buffers proposed by the Water and Rivers Commission is foreshadowed. The plan commits to working with the Water Corporation and the Water and Rivers Commission on proposals they have to access land in the plan area to assess and utilise surface and subsurface water for public water supply and to use targeted timber harvesting to enhance water run-off.

Carbon cycles

The intent of the plan is to maintain the forest's contribution to the global carbon cycles and in particular not to diminish the size of the carbon pool of the forest. Timber harvesting and other forest management activities are considered an acceptable land-use with respect to maintaining the carbon pool, provided the measures prescribed in the various sections of the plan are undertaken.

The possibility of future climate change has been incorporated into sustained yield calculations for timber, but it is not considered to necessitate changes in management in the 10-year term of the plan. The Department will monitor climate modelling research, assist where possible and incorporate forecasts into planning as necessary.

Heritage

Emphasis is given to addressing Aboriginal heritage requirements through the management of registered sites and the facilitation of native title processes, but more importantly through consultation and working with Aboriginal people to enable them to practice their culture on lands subject to the plan.

The management of non-Aboriginal heritage is to be enhanced through the life of the plan by improvements to databases and the processes used to identify and protect sites of significance.

Socio-economic

The plan provides for recreation and tourism, timber harvesting, which is covered in the Productive Capacity chapter, water extraction, which is covered in the Soil and Water chapter, visual landscape management, basic raw materials extraction, leases and bioprospecting. The management system is designed to sustain biodiversity, productive capacity, ecosystem health and vitality, soil and water, the role of the forests in the global carbon cycle, and cultural and natural heritage.

Mineral and petroleum operations on land to which the plan applies provide significant economic and social benefits to the State, but are approved and conducted through Government processes outside the control of the plan.

Implementation

Considerable emphasis is put on mechanisms for checking implementation and improving performance. Systematic and informal monitoring are expanded, key performance indicators for assessing the plan's implementation are introduced, formal adaptive management through trials is prescribed and compliance auditing with public reporting is expanded (see Plan Implementation chapter).

The development and certification of an environmental management system (EMS) to the International Standards Organisation 14000 series standard is incorporated to provide for more effective delivery of on-ground actions. The development of the EMS will also encompass the Actions in the plan for better definition of the roles and responsibilities and competencies and training for staff in delivering ecologically sustainable forest management.

Consultation with the public, industry and other government agencies on implementation of aspects of the plan, particularly the development of guidance documents, is given greater emphasis than in the previous forest management plan.

The effective implementation of management in the field will depend to a large extent on the guidance provided to staff. The plan puts considerable emphasis on the review and development of a suite of guidance documents and provides, in appendices of the plan, requirements that need to be incorporated in the appropriate guidelines.

Background

Principles of ecologically sustainable forest management

The Conservation Commission's overall objective in formulating the plan is for biodiversity to be conserved, the health, vitality and productive capacity of ecosystems to be sustained, and the social, cultural and economic benefits valued by the community to be produced in a manner taking account of the principles of ecologically sustainable forest management.

Conservation of biodiversity is one of the purposes for which State forest and timber reserves are managed, and a fundamental consideration in ecologically sustainable forest management. The existing and proposed conservation reserves will be managed in an integrated way with State forest and timber reserves, to achieve biodiversity objectives that are consistent with the National Strategy for the Conservation of Australia's Biological Diversity (Commonwealth of Australia 1996).

The principles from the National Strategy for the Conservation of Australia's Biological Diversity to which Western Australia is a signatory, recognise that:

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 forest areas, the concept of maintaining sympathetic (or complementary) management across production land-uses was recognised in the RFA in the following statement:

The strategy for conserving biodiversity relies not just on a CAR reserve system, but also on the application of ecologically sustainable forest management across all land categories.

As a result the plan does not propose significant additional areas of conservation reserve beyond those proposals in the Government's old-growth forests policy, rather it emphasises the requirements for ecologically sustainable forest management across production land uses as part of a commitment to seek to ensure that biodiversity is effectively conserved at the whole of forest level and across the region. This results in a plan that will lead to a less intensive use of forest resources, especially timber, than in the past.

Ecologically sustainable forest management is defined in various ways. In broad terms ecologically sustainable forest management may be considered to be a management system that seeks to sustain ecosystem integrity, while continuing to provide ongoing social and economic benefits to the community through the sustainable access to wood and non-wood forest resources and enjoyment of other forest values.

The Actions proposed in the plan are guided by the principles of ecologically sustainable forest management described in section 19(2) of the CLM Act, which are highlighted here in boxes.

That the decision-making process should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations. (Sustainability)

Decision-making that integrates both long-term and short-term economic, environmental, social and equitable considerations is commonly recognised as sustainable development, or as complying with principles of sustainability. This has been done for development 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.

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. (Precautionary Principle)

The precautionary principle is concerned with decision-making under uncertainty. The precautionary principle recognises that sometimes action should be taken to prevent damage even where there is no absolute certainty that damage will occur. The extent of caution built into management prescription is a matter of judgement and will depend on the level of risk, that is the likelihood and consequences of environmental harm occurring in the absence of the prescription or as a result of a less restrictive prescription.

That the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. (Intergenerational Equity)

This is commonly known as the principle of intergenerational equity. It means that decisions taken today should ensure that at least an equal set of opportunities is available to succeeding generations. Along with the rights to use the resources available, it imposes certain obligations to care for ecosystems so that they retain their health and productive capacity. Again this is a fundamental component of sustainable use and, in relation to the timber industry, specifically the concept of sustained yield. However, it is acknowledged that some uses such as mining are non-renewable.

That the consideration of biological diversity and ecological integrity should be a fundamental consideration in decision-making. (Conservation of Biodiversity and Ecological Integrity)

The National Strategy for the Conservation of Australia's Biological Diversity (Commonwealth of Australia 1996) contains nine principles, the following of which are relevant to the application of the above principle in the plan:

- biological diversity is best conserved *in situ*; and
- central to the conservation of Australia's biological diversity is the establishment of a CAR system of ecologically viable protected areas integrated with the sympathetic management of all other areas, including agricultural and other resource production systems.

This principle is also inherent in the creation and management of national parks for the conservation of the natural landscape and ecological systems and for compatible recreation and appreciation in perpetuity. It is imperative in this regard that these core reserves are also managed in such a way as to retain their values over the very long term.

That improved valuation, pricing and incentive mechanisms should be promoted.

Actions under this principle do not fit within the statutory planning and management responsibility of the Conservation Commission or the Department. However, the Conservation Commission has a statutory role to provide advice on the above principle to the Minister for the Environment.

Scales of management

Ferguson *et al.* (2001) identified a need for explicit setting of whole of forest goals as an integral part of the forest management plan development process. This report also saw a major shortcoming in the lack of specific non-timber objectives at the landscape or catchment scale. The plan has sought to address this issue, proposing three scales of management, which are defined as follows:

Whole of forest: All land categories that are subject to the plan (see Table 1).

Landscape: A mosaic where the mix of local ecosystems and landforms is repeated in a similar form over a kilometres-wide area. Several attributes including geology, soil types, vegetation types, local flora and fauna, climate and natural disturbance regimes tend to be similar and repeated across the whole area. It could be a (sub) catchment or, for convenience, an administrative management unit such as a forest block or an aggregation of blocks. Landscape scale is usually tens of thousands to a few thousand hectares.

Operational: A discrete area of forest to which one or more operations have been or are planned to be applied.

Plantation has also been defined as: State forest and timber reserves planted with exotic species.

Legislative framework

The Conservation Commission is a controlling body established under the CLM Act. Among the functions of the Conservation Commission are: to have State forest, timber reserves and conservation reserves vested in it; and to prepare management plans for those lands as prescribed in Part V of the CLM Act. The Conservation Commission has developed the plan through the agency of the Department in consultation with the Forest Products Commission in respect of State forest and timber reserves, and the Water and Rivers Commission and the Water Corporation in respect of public water catchment areas.

Other relevant legislation

The *Wildlife Conservation Act 1950* (WC Act), administered by the Department, provides for the conservation of flora and fauna throughout the State. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* also contains provisions relating to the protection of nationally-listed threatened species and ecological communities. In that part of the plan area covered by the RFA, the Commonwealth and State Governments have agreed that the CAR reserve system, and the forest management system, meet the requirements of that Act for the protection of threatened flora and fauna and ecological communities (RFA clause 56). Therefore, the provisions of that Act for environmental assessment are not triggered for forestry operations. The Commonwealth has also confirmed that its obligations under the *Australian Heritage Commission Act 1975* for the protection of listed and interim listed national estate places have similarly been met (RFA clause 20).

The plan has been assessed under Part IV of the EP Act, and forms the proposal that was assessed under that Act. Additionally, development proposals within the plan area that are not contained in the plan itself, such as for many mining proposals, infrastructure or tourism developments, may also be assessed by the Environmental Protection Authority.

The *Bush Fires Act 1954* provides some regulation of the control of wildfire and the use of prescribed fire, however, it is not aimed at biodiversity conservation.

The *Soil and Land Conservation Act 1945* provides mechanisms for the conservation of soil and land resources principally through mitigation of the effects of erosion, salinity and flooding.

Water allocation plans prepared by the Water and Rivers Commission, and source protection plans prepared by the Water and Rivers Commission and the Water Corporation, include objectives and policies that the Department takes into account when planning at strategic and operational levels. The protection of water resources in the plan area is covered under the *Country Areas Water Supply Act 1947* and the *Metropolitan Water Supply Sewerage and Drainage Act 1909.*

State Agreement Acts are in force for the major mining projects operating on land that is the subject of the plan, the most significant being for bauxite mining. The CLM Act does not generally preclude land vested in the Conservation Commission from mining or development projects. Section 4(1) of the CLM Act provides that, with some exceptions, nothing in the Act will derogate from the operation of any Act relating to minerals or petroleum or any Agreement Act for a development project. However, all mining and industrial development projects are required to undergo environmental, heritage and native title assessments and address State initiatives such as a forest management plan. State Agreement Act project companies are required to provide written reports annually and triennially on their environmental management programs which are provided to relevant Government agencies for review and comment. Government agencies provide advice to the companies on issues that may arise. Mining activities within the Alcoa and Worsley mining leases are continually monitored through respective liaison groups (e.g. Mining Management Program Liaison Group).

The *Mining Act 1978* controls other mineral resource extraction activities, and mineral exploration. Petroleum exploration and production is authorised under the *Petroleum Act 1967*. Exploration activities regulated under both these Acts are subject to stringent conditions intended to protect the environment through specific approvals developed by the Department of Industry and Resources in consultation with the Conservation Commission and the Department. Mineral and petroleum extraction activities are allowed only after approval is given for each specific project proposal submitted to the Department of Industry and Resources following consultation with the Conservation Commission and the Department. In addition, all significant proposals are referred to the Environmental Protection Authority for assessment.

The State supplies pine log timber under other State Agreement Acts. These will largely determine the level of production from pine plantations during the life of the forest management plan.

The *Aboriginal Heritage Act 1972* and the *Heritage of Western Australia Act 1990* provide for the protection and management of human cultural heritage that may be affected by resource extraction.

CONSERVATION AND LAND MANAGEMENT ACT 1984

FOREST MANAGEMENT PLAN 2004-2013

Pursuant to sections 60(2) and 61 of the *Conservation and Land Management Act 1984*, I:

(a) approve the following Forest Management Plan 2004-2013; and

(b) revoke, from 1 January 2004, the Forest Management Plan 1994-2003 and those parts of the 1987-1997 Regional Management Plans for the Southern Forest, Central Forest and Northern Forest Regions that have not previously expired or been revoked.

The Forest Management Plan 2004-2013 comes into operation on 1 January 2004, as specified in the plan.

Judy Edwards

Minister for the Environment

Date: 10 . 12 . 03

Forest Management Plan 2004-2013

Application of the plan

Structure

The Actions proposed in the plan are set out under the seven criteria for sustainability developed in the Montreal Process. Australia and 12 other countries participating in the Montreal Process agreed in 1995 that the criteria and indicators they had developed provided a common understanding of sustainable forest management at a whole of forest scale. Further background can be found in the July 2002 Draft Forest Management Plan (Conservation Commission 2002a).

Some issues, such as fire management, are relevant to a number of the Montreal Criteria, which serve as the framework of the plan. Generally, each issue is addressed under the criterion most relevant to that issue, although it has been necessary to address some issues under a number of criteria.

By way of preamble to the Actions proposed by the plan, the plan identifies the objectives which reflect the Conservation Commission's purpose in proposing the Actions. These statements of objective are not intended to impose any legal obligation on, or prescribe any action to be taken by, either the Department or the Forest Products Commission. The Department and the Forest Products Commission will act in accordance with the plan by undertaking the Actions proposed.

Scope

The plan applies within the geographic area of the Swan, South West and Warren Regions (Map 1) of the Department, other than marine waters.

The plan covers the management of the following land categories:

- Indigenous State forest and timber reserves (Map 2 existing, Map 3 proposed by the plan), including State forest to be classified as a forest conservation area through section 62(1) of the CLM Act.
- 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 (Map 2 existing, Map 3 proposed by the plan). However, more detailed management actions on these land categories may flow from:
    - the requirements of the CLM Act, the WC Act, 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 (Appendix 7).

Insert Map 1

- State forest and timber reserves planted with exotic species (Map 4 shows the major areas). The application of the plan to these areas is limited to specific Actions labelled for plantations.

The plan has no relevance for CLM Act marine conservation reserves within the defined geographic area, as these are not vested in the Conservation Commission. Table 1 shows the land categories and areas to which the plan applies.

The plan does not address the pricing and allocation of harvested timber.

Table 1: Area of land categories covered by the plan (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)
1,114,900	44,400	6,800	50,300	1,264,100
1,216,400				1,264,100

Purposes for reservation of indigenous State forest and timber reserves

Section 55(1a) of the CLM Act requires the plan to specify the purpose, or combination of purposes, for which an indigenous State forest or timber reserve is reserved, being one or more of the purposes identified in that subsection.

All areas of indigenous State forest and timber reserves within the Swan, South West and Warren Regions, other than those identified in Appendix 2, are reserved for the purposes of conservation, recreation, timber production on a sustained yield basis, water catchment protection and other purposes being a purpose prescribed by the regulations. To date no additional purposes for State forest and timber reserves have been prescribed in regulations. These areas of State forest and timber reserves are shown on Map 3.

The plan proposes that some State forest and timber reserves be reclassified as a national park, conservation park, nature reserve or forest conservation area. These areas are identified in Map 5 and Appendix 2. The purposes for reservation of these areas of State forest and timber reserves are conservation, water catchment protection and, in the case of proposed national parks and conservation parks, recreation. This statement of the purpose of reservation of those areas of State forest and timber reserves has effect until they have been formally reclassified in the manner proposed by the plan.

Insert Map 4

Operation of the plan

The plan comes into operation on 1 January 2004 and continues to operate until 31 December 2013. The plan revokes the Forest Management Plan 1994-2003 and those parts of the three 1987 Regional (Southern Forest, Central Forest and Northern Forest) Management Plans that were current during the life of the Forest Management Plan 1994-2003.

The Forest Management Plan 1994-2003 had 18 Ministerial conditions and 18 commitments attached to its implementation pursuant to the EP Act. The 1994 plan has been revoked, so that the Ministerial Conditions and commitments attached to its implementation are no longer in force. However, where issues to which those Ministerial Conditions relate have ongoing relevance to forest management they have been addressed in this plan. This plan is a separate proposal which has been assessed by the Environmental Protection Authority under the EP Act and as a consequence has a set of Ministerial Conditions attached to its implementation.

During the period of the plan new information from monitoring, auditing and adaptive management and other sources will result in progressive refinement of the proposed Actions. This refinement process will involve public consultation (see Plan Implementation chapter). As many of the requirements of the plan are complex, the various parts of the overall plan will be implemented progressively according to available resources. Improved utilisation of sawlogs below first and second grade will also provide opportunities for more efficient management that will flow through to improved outcomes.

Some of the Actions proposed by this plan are to be completed by a date specified in the Action. However, a failure to complete an Action by the specified date does not prevent the Action from being undertaken in accordance with this plan after that date. The Department's and Conservation Commission's capacity to complete Actions by these dates will be dependent on obtaining an appropriate level of funding. The dates may need to be extended if what is required to complete the documents varies markedly from the Department's and Conservation Commission's current assessment.

A more general indicative timeframe for the implementation of the remaining Actions proposed in this plan for which an indicative timeframe can be provided is contained in Appendix 14.

The following parts of the plan refer to various existing or proposed policies and guidelines of the Department and Forest Products Commission. The references to those policies and guidelines in the plan are references to those policies and guidelines as they may exist from time to time. Those policies and guidelines may be amended during the life of the plan. Those that have particular application to forest management are to be developed, or reviewed and possibly subject to further amendment from time to time in the manner described in the following chapters.

Biological diversity

Biological diversity (biodiversity) refers to the variability among living organisms and the ecosystems of which they are a part. It is measured or observed at three different levels: ecosystems, species and genes. Conserving biodiversity ensures that ecosystems remain productive and resilient to disturbance. The conservation of biodiversity is a driving factor in shaping the proposals in the plan. To conserve biodiversity requires maintenance of a diversity of habitats and ecological processes at various spatial scales from entire forested landscapes to specific localised habitats. It also includes sustaining populations and maintaining their genetic diversity.

Biodiversity and biodiversity components are defined in section 3 of the CLM Act as follows:

'Biodiversity' means the variability among living biological entities and the ecosystems and ecological complexes of which those entities are a part and includes -

(a) diversity within native species and between native species;

(b) diversity of ecosystems; and

(c) diversity of other biodiversity components.

'Biodiversity components' includes habitats, ecological communities, genes and ecological processes.

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to conserve biodiversity and seeking to conserve self-sustaining populations of native species and communities, and at the landscape scale for the purpose of seeking to allow for the recovery of biodiversity between one timber rotation and the next:

1. Formal reserves

The establishment of a CAR reserve system is fundamental to the conservation of biodiversity in the forest. The plan gives effect to the commitments to new reserves set out in the Government's *Protecting our old-growth forests* policy, further additions proposed following an assessment of high conservation value forests (Conservation Commission 2002b) and carries forward proposals from the RFA and the Forest Management Plan 1994-2003. These proposals are listed in Appendix 2, and include some reserves currently not vested in the Conservation Commission. In addition, Appendix 8 and 9 provide the area and percentage reservation levels respectively for forest ecosystems within the RFA area[2] and Appendix 10 provides similar statistics for the reservation level of old-growth forest. Since the scope of the plan extends beyond the RFA area, Appendix 11 and 12 provide data for Beard-Hopkins vegetation associations (Hopkins *et al*. 1996) within and outside the RFA area.

[2] The design of the reserve system has been addressed in two separate parts because of the different level of vegetation mapping available. Map 1 shows the RFA area.

Table 2: Reservation levels of forest ecosystem categories (within the RFA area)

Forest ecosystem category	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (ha)	Formal conservation reserves (ha)			
			Existing reserves (Additions proposed)			
			National park	Nature reserve	Conservation park	5(1)(g) and (h)
Jarrah dominant	2,783,950	1,806,650	137,120 (363,390)	13,790 (9,710)	12,660 (59,790)	12,700 (240)
Karri dominant	231,600	190,160	48,910 (41,080)	250 (120)	10 (400)	0 (0)
Wandoo dominant	526,200	218,680	26,650 (31,760)	5,300 (910)	8,430 (25,260)	0 (0)
Other	594,600	408,570	162,810 (126,370)	7,530 (1,540)	250 (1,560)	520 (20)
TOTAL	**4,136,350**	**2,624,060**	**938,090**	**39,150**	**108,360**	**13,480**

Objective

The plan proposes the following actions at the whole of forest scale for the purpose of seeking 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:

Actions proposed

1.1 The Department will initiate the processes required for the land category changes proposed by the plan by:

1.1.1 undertaking fine scale reserve design for the parks proposed in the *Protecting our old-growth forests* policy so as to include within the parks old-growth forest adjacent to the nominal boundaries;

1.1.2 facilitating the Government's community consultation process on fine-scale reserve design; and

1.1.3 consulting with the Conservation Commission and then advising the Minister for the Environment on final reserve boundaries.

Consultation with the community and affected government and local government authorities as contemplated by Action 1.1.2 may result in minor amendments to the boundaries of reserves shown on Map 3 and Map 5.

1.2 The Department will manage the areas proposed by Appendix 2 for inclusion in a national park, nature reserve or conservation park 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.

1.3 The Department will cooperate with the Departments of Environment 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.

2. Forest conservation areas

The plan identifies some areas of forest that are proposed for classification as forest conservation areas under section 62(1) of the CALM Act. The priority for the management of these areas is the maintenance of biodiversity and they will not be available for timber production, but may be available for other uses such as wildflower picking, apiculture or craftwood. Forest conservation areas are proposed to provide a higher level of security of classification than informal reserves for areas that are too small, or have some other impediment, to be considered for a formal reserve category.

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to complement the function of the formal reserve system in the conservation of biodiversity:

Actions proposed

2.1 The Department will initiate the processes required for the land classification changes proposed by the plan.

2.2 The Department will manage the areas proposed by Appendix 2 to be classified as forest conservation areas consistently with their proposed classification and purpose and relevant Departmental policies until such time as they are formally classified. Timber production in these areas will not be permitted, but other productive activities not involving harvesting of sawlogs or other residue logs may be allowed.

2.3 The Department in consultation with the Conservation Commission will consider classifying all areas of old-growth forest outside the formal reserve system as forest conservation areas to improve their long-term security of classification.

3. Informal reserves

To achieve the overall objectives for the maintenance of biodiversity it is important that forest outside the formal reserve system that will be used to provide resources, particularly timber, is managed to control the adverse effects of disturbance on biodiversity.

Objective

The plan establishes informal reserves described in Appendix 3 and proposes the following Actions at the operational scale for the purpose of seeking to conserve biodiversity outside of formal reserves and forest conservation areas:

Actions proposed

3.1 The Department and the Forest Products Commission will conduct their operations within the informal reserves established by Appendix 3:

3.1.1 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

3.1.2 in accordance with the Guidelines for the Management of Informal Reserves which are to:

- be prepared by the Department with public consultation;
- provide for the manner in which the requirements of Appendix 3 are to be met; and
- be submitted to the Conservation Commission for advice and approved by the Minister for the Environment by 31 December 2004, when they will take effect and supercede Appendix 3.

3.2 The Conservation Commission will:

3.2.1 assess whether any areas available for timber harvesting which were classified as old-growth forest in the Department's corporate database in 1997, but which are not classified as old-growth forest on the date of the commencement of this plan, should be reclassified as old-growth forest;

3.2.2 prepare with public consultation an assessment process and field assessment criteria, which will:

- be based on the Department's current approach to the application of the criteria for classification of land as old-growth forest in the Department's corporate database;
- include a process for persons to request the Conservation Commission to assess whether areas on an indicative timber harvest plan referred to in Action 11.5 should be classified as old-growth forest in the Department's corporate database, and for the Conservation Commission to determine whether such an assessment is warranted; and
- be made publicly available; and

3.2.3 publish the reasons for altering or confirming an area's classification in the Department's corporate database after it has been assessed by the Conservation Commission.

3.3 Where the Conservation Commission advises the Department that it has assessed that land not currently classified as old-growth forest should be reclassified as old-growth forest, the Department will amend the Department's corporate database in accordance with the Conservation Commission's assessment.

3.4 The Forest Products Commission will not undertake any timber production in any area:

3.4.1 referred to in Action 3.2.1; or

3.4.2 for which the Conservation Commission has determined an assessment of whether the area should be classified as old-growth forest on the Department's corporate database to be warranted;

until the Conservation Commission has assessed the area and confirmed the classification of that area in the Department's corporate database as other than old-growth forest.

4. Diversity in vegetation structure

While disturbance can be deleterious to conserving biodiversity, natural and some human induced disturbance can provide opportunities to conserve biodiversity by creating diversity in habitat and food sources. Therefore developing and sustaining diversity in vegetation structure is a means to provide for biodiversity.

In addition to the following proposed Actions, the plan seeks to achieve overstorey structural diversity at the operational and landscape scales through the establishment of formal reserves, informal reserves, fauna habitat zones and temporary exclusion areas proposed elsewhere in the plan.

Objective

The plan proposes the following Actions at the landscape scale for the purpose of seeking to conserve biodiversity through a diverse representation and distribution of forest structures and understorey seral stages through time:

Actions proposed

4.1 The Department will conduct its operations in a manner that has regard to Goals for Understorey Structural Diversity, which are to be:
- 4.1.1 prepared by the Department with public consultation; and
- 4.1.2 submitted to the Conservation Commission for advice and approved by the Minister for the Environment by 31 December 2005, when they will take effect.

4.2 The Department will monitor its operations to identify the extent to which the Goals for Understorey Structural Diversity are being achieved and publish a report of the results of that monitoring.

5. Integrating forest management

Objective

The plan proposes the following Actions for the purpose of seeking to promote integrated management across all land categories at the whole of forest, landscape and operational scales:

Actions proposed

5.1 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.

5.2 The Conservation Commission will prepare by 31 December 2004, guidelines for the preparation of other management plans in a manner that integrates with existing management plans, including this plan.

6. Operations and the conservation of flora

The plan identifies vegetation complexes and other significant flora that are less well protected in formal and informal conservation reserves.

Objective

The plan proposes the following Actions at the operational scale for the purpose of seeking 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:

Actions proposed

6.1 The Department will undertake the measures identified in Appendix 13 (which relate to the protection of significant flora values).

6.2 The Forest Products Commission and its agents will conduct its silvicultural operations:
- 6.2.1 in accordance with the Department's Silviculture Guidelines; and
- 6.2.2 prior to the formal incorporation of the amendments identified in Appendix 5 into those Guidelines, in a manner that is consistent with those amendments.

7. Retention of habitat elements in harvesting operations

Indirect measures to conserve biodiversity, such as informal reserves, are inadequate for some species that need direct management to provide for their ongoing presence in the forest and associated ecosystems.

Objective

The plan proposes the following Actions at the landscape scale for the purpose of seeking 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:

Actions proposed

7.1 The Department will publish a map by 1 January 2004 showing locations of indicative fauna habitat zones.

7.2 The Department may change the locations and areas of indicative fauna habitat zones in a manner that:
- 7.2.1 has regard to the criteria specified in Appendix 4, where the change occurs prior to the approval of the Guidelines referred to in the following paragraph; and
- 7.2.2 is in accordance with Guidelines for the Selection and Management of Fauna Habitat Zones, which are to be:
  - prepared by the Department with public consultation; and
  - submitted to the Conservation Commission for advice and approved by the Minister for the Environment by 31 December 2004, when they will take effect and supercede Appendix 4.

7.3 By 30 June 2004 the Department, in consultation with the Conservation Commission, will complete a review of the location of indicative fauna habitat zones having regard to the criteria specified in Appendix 4, with a view to making appropriate changes to those locations under Action 7.2.1.

7.4 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:
- 7.4.1 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
- 7.4.2 in accordance with the Guidelines after they are approved and supercede Appendix 4.

8. Threatened and priority species and ecological communities

Objective

The plan proposes the following Actions at the landscape scale for the purpose of seeking to protect, and assist the recovery of, threatened and priority species of flora and fauna and ecological communities:

Actions proposed

8.1 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).

8.2 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.

8.3 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.

8.4 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:
- 8.4.1 to the satisfaction of the Department; and
- 8.4.2 in consultation with the Conservation Commission.

8.5 **(Plantations):** The Forest Products Commission will advise the Department of its harvesting and management activities within plantations:
- 8.5.1 where those activities may impact on threatened species and threatened ecological communities, agreed protection measures will be implemented.

8.6 The Department will develop and implement recovery plans for selected threatened species and ecological communities, including:
- 8.6.1 the Western Shield fox baiting program (which seeks to reduce predation pressure on threatened and priority species of fauna).

9. Increasing knowledge

Strategies for the maintenance of biodiversity continue to evolve as knowledge increases. The continuation of research and other processes to increase the knowledge base is an essential part of management.

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking 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:

Actions proposed

9.1 The Department will undertake biological surveys, which will be:
- 9.1.1 of priority areas determined in consultation with the Conservation Commission; and
- 9.1.2 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.

9.2 The Department will:

9.2.1 continue to monitor the effect of disturbance from timber harvesting on fauna and flora in the Kingston study[3] area;

9.2.2 implement the species, community and process monitoring program, FORESTCHECK;

9.2.3 conduct a monitoring trial using a specific species sampling approach and review the comparative effectiveness of this and the monitoring protocol adopted for FORESTCHECK since its inception in 2001; and

9.2.4 maintain a research program on ecologically sustainable forest management which is prepared in a manner that has regard to advice from the Conservation Commission's Research Advisory Committee.

Key performance indicators

Key performance indicators are being used to track the plan's implementation. Three indicators have been selected to provide a broad cross-section of achievement of the Actions related to conserving biodiversity.

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)	The Department and the Conservation Commission to complete all actions for which they are responsible in order to formally change the land category of areas proposed for the reserve system within 10 years after the commencement of the plan.
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.

[3] A major interdisciplinary research study by the Department located in jarrah forest in Kingston and surrounding forest blocks north-east of Manjimup, to examine the impact of native forest silvicultural practices on flora and fauna.

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.
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.

Productive capacity

Productive capacity is one way to measure the sustainability of the flow of benefits from the forests to society. It is a measure that can be applied to both timber and non-timber resources and is a key factor in assessing the sustainability of management. Maintaining the productive capacity of the forest involves maintaining the area of forested land and providing for harvesting rates for timber and non-timber products that do not exceed sustainable yields.

Objective

An overall aim of the plan is to seek to sustain and, where applicable, enhance the productive capacity of the forest.

10. Maintaining forest area

Objective

The plan proposes the following Actions for the purpose of seeking to maintain the net area of forested land:

Actions proposed

10.1 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:

- 10.1.1 seeking to reduce the permanent loss of forested areas as a result of development;
- 10.1.2 seeking the replacement of forested areas permanently lost to development;
- 10.1.3 promoting the construction of infrastructure such as roads, pipelines and other utilities at common locations, such as infrastructure corridors; and
- 10.1.4 reducing the impact of mining and petroleum operations on forested areas with a high productive capacity for timber production.

10.2 The Department will, where reasonable and practicable, construct roads in a manner and at a location that will service multiple needs.

10.3 The Department will seek to progressively rehabilitate redundant roads.

10.4 **(Plantations):** The Forest Products Commission will maintain the minimum area of plantation estate required to meet State Agreement Act supply requirements by:

- 10.4.1 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 *Wood Processing (Wesfi) Agreement Act 2000*; and
- 10.4.2 establish new plantations on appropriate cleared land to replace any plantation areas that are clearfelled but not replanted with plantation species.

11. Sustained yield

The CALM Act requires that timber production in native forests be conducted on a sustained yield basis. The methodology and data used in the sustained yield calculations for the plan have been independently reviewed (Ferguson *et al.* 2003).

Plantations on State forest and timber reserves, and the supply of timber from them, are managed to achieve the optimum yield consistent with long-term social and economic needs.

The proposed average annual sustained yields of jarrah and karri first and second grade sawlogs are indicated in Table 3.

Table 3: Sustained yield (cubic metres) of first and second grade sawlogs for principal timber species

Species	Log grade	Average annual yield for 10 years (m^3)	Approximate level of average annual 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

The woodflow from each forest region may vary between years depending on the mix of forest made available in annual harvest plans.

In the course of harvesting jarrah and karri sawlogs, lower grade logs are obtained from the boles of trees felled to obtain the first and second grade jarrah and karri sawlogs. Lower grade logs are also obtained from trees, including marri, that are removed in order to facilitate regeneration, or growth of retained crop trees.

The plan seeks to improve the utilisation of these logs, which traditionally have been removed to varying levels. This will increase the socio-economic benefits obtained from, and decrease residue produced by, timber harvesting.

Lower grade logs are also available from some thinnings that do not produce sawlogs. Expanded programs of first thinning in regrowth karri and jarrah forest could be undertaken that would not affect the sustained sawlog yields but would make available additional bole volume. Such expanded activities would promote future sawlog growth and stand management, and may occur during the life of the plan in mining rehabilitation, water catchment areas, or young regrowth karri forest.

Partial retention of mature marri (additional to habitat requirements) occurs in some forest types. This has largely arisen as a consequence of market conditions. While larger marri will generally be preferred for retention, variations to the retention of marri could occur within the Silviculture Guidelines without affecting silvicultural outcomes. This would make available some additional bole volume from integrated harvest operations.

The volumes of other bole logs in Table 4 provide for the volume made available in the course of harvesting for sawlogs and first thinnings within the Silviculture Guidelines. The provision of volumes of other bole volume beyond the upper limits in Table 4 would necessitate a review of the plan.

Table 4: Availability of other bole volume (cubic metres)

Species	Log grade	Average annual availability for 10 years (m^3)
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

The bole is that part of the tree from the stump to the crown break and is the part of the tree measured in inventories and used to determine the sustainable yield of sawlogs. The crown of the tree may also contain utilisable wood, which is mainly residue, which can be used in some circumstances. This wood is referred to as 'non-bole' logs and there is no inventory of it as they do not form part of the sustained yield calculations. However, sampling has shown that non-bole logs can add an additional 10 per cent to the gross bole volume of individual trees.

Small volumes of wandoo, blackbutt and sheoak sawlogs are also expected to become available as a consequence of jarrah and karri sawlog harvesting. The dispersed distribution and fine-scale mix of these species with the jarrah and karri may give rise to some fluctuations in availability between years. However, the quantities harvested will not exceed an annual average volume of 1,300 cubic metres of wandoo, 1,600 cubic metres of blackbutt, and 1,900 cubic metres of sheoak, representing less than 0.5 per cent of the standing volume for each of these species. Other bole volume of these species will also be made available in quantities that will vary depending on the structure and mix of forest accessed during the plan.

Objective

The plan proposes the following Actions for the purpose of seeking 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:

Actions proposed

11.1 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.

11.2 In addition to the yield referred to in 11.1, the Forest Products Commission may contract for the removal and sale of forest products of species other than jarrah, karri, marri, blackbutt, wandoo and sheoak that become available in small quantities from operations designed to produce the yield referred to in 11.1 or as a result of other operations such as mining.

11.3 The Forest Products Commission will prepare annual timber harvesting plans that are to be:

11.3.1 developed in consultation with, and to the requirements of, the Department;

11.3.2 consistent with the allowable timber yields referred to in Action 11.1; and

11.3.3 made publicly available.

11.4 The Forest Products Commission and the Department will:

11.4.1 monitor the volume of all timber log categories removed from native forest in each year, separately recording for each of the commercial species the equivalent volume of:

- first and second grade sawlogs;
- lower grades of sawlogs; and
- residue logs; and

11.4.2 periodically audit the grading and removal of sawlogs.

11.5 The Department will prepare rolling three-year indicative timber harvesting plans that are to be:

11.5.1 developed in consultation with the Forest Products Commission;

11.5.2 consistent with the allowable timber yields referred to in Action 11.1; and

11.5.3 made publicly available.

11.6 The Forest Products Commission will conduct its silvicultural operations:

11.6.1 in accordance with the Department's Silviculture Guidelines; and

11.6.2 prior to the formal incorporation of the amendments identified in Appendix 5 into those Guidelines, in a manner that is consistent with those amendments.

11.7 Any amendment to the Silviculture Guidelines following the incorporation of the amendments identified in Appendix 5 into those Guidelines will be prepared by the Department with public consultation, submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect.

11.8 The Department and the Forest Products Commission will monitor and record the areas over which each different silvicultural treatment is achieved in each year.

11.9 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 equivalent volume of first and second grade sawlogs which would be derived from the volume of timber taken under the contract.

11.10 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 CALM Act applies for the purposes of making improvements to any land to which the CALM Act applies.

11.11 The Department will continue to refine the data and methodology used for the sustained yield calculations by:

11.11.1 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 *et al.* 2001, 2003).

12. Exotic species on State forest and timber reserves

Objective

The plan proposes the following Action for the purpose of seeking 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:

Action proposed

12.1 **(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.

13. Other forest produce

State forest and timber reserves also supply other forest produce such as firewood, burls, craftwood, wildflowers and seeds and honey. Knowledge of supply and demand for this produce is not as well understood as that for sawlogs.

Objective

The plan proposes the following Actions for the purpose of seeking 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:

Actions proposed

13.1 The Department will:

13.1.1 regulate the supply of forest produce, other than sawlogs, residue logs, and craftwood ('other forest produce') through the administration of licensing legislation;

13.1.2 maintain and, where appropriate, prepare guidelines for the management of other forest produce that:

- are to be periodically reviewed, with public consultation, and
- in the case of new guidelines or revisions to guidelines, are to be submitted to the Conservation Commission for advice and approved by the Minister for the Environment before they take effect;

13.1.3 where reasonable and practicable, monitor supply patterns for signs of non-sustainability; and

13.1.4 facilitate the salvage of forest produce generated by management actions the primary purpose of which is not timber production, 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.

13.2 The Department and the Forest Products Commission will work together to review the regulation of access to craftwood, which:

13.2.1 if considered reasonable and practicable will be through production contracts issued under the FP Act for areas of State forest and timber reserves (whether or not those areas are identified in timber harvesting plans proposed by Action 11.3).

13.3 The Department will conduct research and undertake public consultation with a view to determining the environmental management requirements for the production of domestic firewood.

14. Weeds, pests and diseases

Weeds, pests and diseases can impact on the productivity of the forest and need to be monitored. Armillaria and borers are threats to karri regrowth that are being addressed. The most serious disease in the forest areas is dieback resulting from the pathogen *Phytophthora*

cinnamomi. As this disease constitutes a significant threat to ecosystem health and vitality, the proposed response to it is addressed in the following chapter.

Objective

The plan proposes the following Actions at the operational scale for the purpose of seeking to reduce the impact of weeds, pests and diseases on the productive capacity of the forest:

Actions proposed

14.1 In addition to the measures referred to in Action 18.4, the Department will:
- 14.1.1 establish a process for the identification and investigation of weed, pest and disease outbreaks that threaten productivity; and
- 14.1.2 where appropriate, prescribe measures in Silviculture Guidelines to limit the impact of weeds, pests and diseases on productivity.

14.2 **(Plantations):** The Forest Products Commission will:
- 14.2.1 maintain an early warning system for *Sirex* in pine plantations; and
- 14.2.2 monitor weeds, pests and diseases affecting productivity and, where reasonable and practicable, take measures to control them.

15. Regeneration and rehabilitation of disturbed forest

To maintain the productivity of the forest, disturbed areas must be regenerated and, where necessary, subject to ongoing management to maintain their productive capacity.

Objective

The plan proposes the following Actions for the purpose of seeking 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:

Actions proposed

15.1 The Forest Products Commission will conduct regeneration operations in a manner that:
- 15.1.1 is in accordance with the Department's Silviculture Guidelines; and
- 15.1.2 prior to the formal incorporation of the amendments identified in Appendix 5 into those Guidelines, is consistent with those amendments.

15.2 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.

15.3 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:
- 15.3.1 recommending, where practicable and economically feasible, the inclusion of a formal requirement for the rehabilitation of areas subject to those activities.

15.4 **(Plantations):** The Forest Products Commission will:
- 15.4.1 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;

15.4.2 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

15.4.3 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.

16. Management of regrowth stands

Objective

The plan proposes the following Actions for the purpose of seeking to realise the productive capacity of the forest:

Actions proposed

16.1 The Forest Products Commission and the Department will:

16.1.1 maintain records of the history of silvicultural treatments applied to stands of trees;

16.1.2 develop schedules of future silvicultural treatments for stands of trees to promote growth of timber that can be used to produce sawlogs;

16.1.3 assess stand development when silvicultural treatments are scheduled, with a view to determining whether those treatments are then required;

16.1.4 undertake or reschedule those proposed silvicultural treatments, according to the assessment referred to in Action 16.1.3; and

16.1.5 report to the Conservation Commission every two years after the commencement of the plan on the extent to which these scheduled silvicultural treatments have been undertaken.

Key performance indicators

Key performance indicators are being used to track the plan's implementation. Twelve indicators have been selected to provide a broad cross-section of achievement of the Actions related to the maintenance of productive capacity.

Key performance indicator 4	The area of native forest and plantations.
Performance measure	Change in: • 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 sustained yield determined by the plan.
Performance measure	• 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 10 per cent more than the average annual yield of first and second grade sawlogs of each species to be removed in any one year. • No more than 412,650 cubic metres of first and second grade jarrah sawlogs and 170,100 cubic metres of first and second grade karri sawlogs to be removed in any three consecutive years. • 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 exceeding target	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.
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 *Sirex* in softwood plantations.
Performance measure	Evidence of Sirex in trap trees.
Performance target(s)	No evidence of *Sirex* in trap trees.
Reporting	Annually by Forest Products Commission.
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: • 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: • 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 release program that does not meet the stocking 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.
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.

Ecosystem health and vitality

Disturbance of forest ecosystems ranges from small random periodic events (e.g. tree fall) to larger events that may have long-term impacts (e.g. insect infestations or a high intensity bushfire). Many of these events can assist the recovery and maintenance of ecosystems, while others, such as weeds, pests and diseases, may impede the recovery, and impact on the health and vitality of ecosystems.

Objective

An overall aim of the plan is to seek to sustain forest ecosystem health and vitality.

17. Fire

Fire has an impact on forest ecosystems. For example, fire can assist in the regeneration of vegetation. Fire can release nutrients required for plant growth, which might otherwise be locked up within litter and other dead plant materials. However, the excessive use of fire can be detrimental.

Attempts to suppress fire over large areas can result in the gradual build-up of fuel on the forest floor. This will increase the probability of large and intense fires, which are more costly to suppress and result in a greater loss of economic and biological assets. In most vegetated ecosystems, it is difficult to prevent fire for long periods over large areas. To attempt to do so may be detrimental to biodiversity conservation and the protection of the community.

There are strongly held views in the community that more prescribed burning is required to reduce the risk of wildfire and conversely, that less and a different type of burning is required to protect biodiversity. A review of fire management to be undertaken by the Environmental Protection Authority is proposed to address the use of planned fire for biodiversity management while allowing for protection of human life, property and other values.

Objective

The plan proposes the following Actions at the whole of forest and landscape scale for the purpose of seeking to use and respond to fire in a manner that:

- 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.

Actions proposed

17.1 The Department will:

17.1.1 maintain a competent fire management, suppression and response capability;

17.1.2 prepare and maintain a fire management plan and smoke management guidelines;

17.1.3 undertake an annual prescribed burning program in a manner that:

- is in accordance with the fire management plan;

- is in accordance with the smoke management guidelines;
- has regard to the Goals for Understorey Structural Diversity referred to in Action 4.1; and
- considers any special vulnerability of fauna and flora known to exist in a particular area to burning in that area; and

17.1.4 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.

17.2 The Forest Products Commission will:

17.2.1 undertake an analysis of the risk from fire to its native timber production resources; and

17.2.2 provide to the Department funding sufficient to enable the Department to control the risk to acceptable levels, so far as is reasonable and practicable.

17.3 The Department and the Conservation Commission will:

17.3.1 participate in the proposed public review of fire management by the Environmental Protection Authority; and

17.3.2 incorporate the recommendations made in the review that are endorsed by the Minister for the Environment into the Department's fire management policy, plan (see Action 17.1.2) and fire management guidelines.

17.4 **(Plantations):** The Forest Products Commission will:

17.4.1 undertake an analysis of the risk from fire to its plantation timber production resources;

17.4.2 undertake an analysis of the risk from fire emanating from its plantations moving into surrounding land; and

17.4.3 cooperate with the Department and other organisations in seeking to control the risks to acceptable levels, so far as is reasonable and practicable.

18. Weeds, pests and diseases

Weeds, pests and diseases present major threats to the health and vitality of forest ecosystems.

In particular, dieback caused by *Phytophthora cinnamomi* continues to spread and reduce the distribution and abundance of many plant species and their dependent fauna. It is the most significant threat to the health and vitality of many ecosystems in the plan area. It remains a high priority for the plan to minimise the risk of new infestations in areas that are uninfested.

Objective

The plan proposes the following Actions at the operational scale for the purpose of seeking to:

- minimise, as far as is reasonable and practicable, the impact on the health and vitality of forest ecosystems of pathogens and their associated diseases;
- protect from infestation those areas currently free from *P. cinnamomi*; and
- control weeds and pests in forest ecosystems.

Actions proposed

18.1 The Conservation Commission will develop a whole of Government policy framework for the management of dieback.

18.2 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:

18.2.1 will be reviewed by the Department with public consultation by 31 December 2008; and

18.2.2 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.

18.3 The Department will:

18.3.1 prepare an inventory of sites where the impact of *P. cinnamomi* on the vegetation is known to have been high, with a view to setting priorities for the regeneration or rehabilitation of those areas; and

18.3.2 further develop dieback spread and impact models, including models relating to the effects of new infections.

18.4 The Department will:

18.4.1 maintain records of weeds, pests and diseases that are known to have a significant impact on the health and vitality of forest ecosystems;

18.4.2 develop and implement weed, pest and disease control programs;

18.4.3 eradicate, wherever reasonable and practicable, localised infestations of weeds, pests or diseases before they are securely established;

18.4.4 encourage the coordinated involvement of industry, the community and other land managers in addressing weeds, pests and diseases; and

18.4.5 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.

18.5 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.

18.6 **(Plantations):** The Forest Products Commission will:

18.6.1 monitor for the presence of significant weeds, pests and diseases in plantations, and where reasonable and practicable undertake control measures;

18.6.2 develop and implement weed, pest and disease control programs for identified weeds, pests and diseases;

18.6.3 where there is an identified risk that plantation operations may result in transport of *Phytophthora cinnamomi*, conduct its operations having regard to the policy and in accordance with the Guidelines referred to in Action 18.2; and

18.6.4 take reasonable and practicable measures to control the spread of plantation species into adjacent native vegetation.

19. Developing self-sustaining ecosystems

Objective

The plan proposes the following Actions at the operational scale for the purpose of seeking to develop self-sustaining ecosystems of native species from regeneration or rehabilitation operations in native forest:

Actions proposed

19.1 The Department and the Forest Products Commission will undertake their regeneration or rehabilitation operations by:
- 19.1.1 using natural regeneration where reasonable and practicable; or
- 19.1.2 where natural regeneration is not reasonable and practicable, using seed collected locally or plants propagated from seed collected locally.

19.2 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.

Key performance indicators

Key performance indicators are being used to track the plan's implementation. Three key performance indicators have been selected to provide a broad cross-section of achievement of the Actions related to the maintenance of ecosystem health and vitality.

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's 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 as a result of management actions.
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 *Phytophthora cinnamomi* 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.

Soil and water

Forest productivity is heavily influenced by soil and water quality. Forest soils play an important role in regulating surface and groundwater flow. The interaction of soil and water also plays an important role in the health of the streams and rivers. Clean water is critical to the community's quality of life. The conservation of soil and water is an important part of the conservation of biodiversity and sustaining the productive capacity and health and vitality of forest ecosystems.

Objective

An overall aim of the plan is to seek to protect soil and water resources on land to which the plan applies.

20. Soil

Past soil management strategies have been reactive to soil damage as a result of compaction, puddling and mixing. The plan seeks to adopt a more proactive approach to reduce the occurrence of soil damage.

Objective

The plan proposes the following Actions at the operational scale for the purpose of seeking to reduce soil damage:

Actions proposed

20.1 The Forest Products Commission and the Department will conduct their operations involving the use of heavy machinery in a manner that:

20.1.1 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

20.1.2 is in accordance with the Soil and Water Conservation Guidelines which are to:

- be prepared 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 by 31 December 2005, when they will take effect and supercede Appendix 6.

20.2 The Department and the Conservation Commission will review the operation of the implementation of Appendix 6 and any Guidelines approved under Action 20.1.2, 12 months after the commencement of the plan.

20.3 The Department will investigate the development of a soil hazard assessment system to help planning to protect soil from damage.

20.4 The Forest Products Commission and the Department will rehabilitate soil damaged in the course of their operations by:

20.4.1 identifying and mapping damaged soil; and

20.4.2 undertaking rehabilitation work as soon as is reasonable and practicable after the completion of the operation.

20.5 **(Plantations):** The Forest Products Commission will:

20.5.1 conduct its plantation operations in a manner that is in accordance with 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 by 31 December 2005; and

20.5.2 rehabilitate damaged soil resulting from plantations operations to the standards specified in the Code of Practice for Timber Plantations and the relevant plantation manual.

21. Water

Water is one of the most widely used products that come from forests. The quantity and quality of water used for environmental and consumption purposes should be protected and, where necessary and practicable, enhanced.

Objective

The plan proposes the following Actions at the operational scale for the purpose of seeking 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:

Actions proposed

21.1 The Department and the Forest Products Commission will conduct their operations:

21.1.1 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

21.1.2 in accordance with the Guidelines for the Management of Informal Reserves referred to in Action 3.1.2 and the Soil and Water Conservation Guidelines referred to in Action 20.1.2.

21.2 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.

21.3 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.

21.4 The Department:

21.4.1 will provide advice and assistance to bodies seeking access to the potential sub-surface aquifers and surface reservoirs located on land to which the plan applies;

21.4.2 will facilitate access to land to which the plan applies for the purposes of water extraction and the development of associated infrastructure for public water supply purposes where this is consistent with the CALM Act;

21.4.3 will take and use water sustainably from land to which the plan applies;

21.4.4 may issue permits, after consultation with the Conservation Commission, for the sustainable taking of water from land to which the plan applies; and

21.4.5 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.

21.5 **(Plantations):** The Forest Products Commission will:

21.5.1 conduct its plantation operations in a manner that is in accordance with 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 by 31 December 2005;

21.5.2 consult with the Water and Rivers Commission prior to undertaking plantation operations in a public water catchment area; and

21.5.3 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.

Key performance indicators

Key performance indicators are being used to track the plan's implementation. Four key indicators have been selected to provide a broad cross-section of achievement of the Actions related to the maintenance of soil and water.

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 subject to information being provided by the Water and Rivers Commission.
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 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	Every five years subject to information being provided by the Water Corporation and the Water and Rivers Commission (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.

Global carbon cycles

Carbon dioxide is one of the gases naturally found in the earth's atmosphere. It is widely accepted and well documented that atmospheric levels of carbon dioxide have increased dramatically over the past 100 years. Many scientists believe the greenhouse effect from increased levels of atmospheric carbon dioxide and other greenhouse gases is increasing the earth's temperatures to the point of undesirably changing the earth's climate - a phenomenon referred to as global warming and climate change. Forests play a major role in the functioning of the earth's biosphere and contribute to and regulate the global carbon cycles.

Objective

An overall aim of the plan is to seek to sustain the contribution of the forest to global carbon cycles.

22. Forests as a carbon sink

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to sustain or increase the net quantity of carbon stored in the forest ecosystem:

Actions proposed

22.1 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:

22.1.1 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.

23. Enhanced greenhouse effect

Increasing concentrations of greenhouse gases in the atmosphere appear to have played a part in the warming and drying trend experienced over the past 30 years. This trend is predicted to continue although its effect may not be great over the 10 years of the plan. However, consideration should be given during the life of the plan to the manner in which the impact of this drying trend on the forest might be addressed further.

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to incorporate the best available predictions of likely future climate change into management planning:

Actions proposed

23.1 The Department will:

23.1.1 investigate the likely impacts of climate change on the forest, including the role of forest ecosystems in the carbon cycle;

23.1.2 maintain contact and, where appropriate, collaborate with external groups undertaking research and modeling relating to climate change; and

23.1.3 incorporate climate change prediction into future planning for the management of land to which the plan applies, where reasonable and practicable.

Key performance indicators

No key performance indicators have been selected for this criterion.

Natural and cultural heritage

Heritage comprises the things we value and want to keep as a community and as a culture. This concept can be applied to natural and cultural environments. Therefore heritage in forests includes both cultural, i.e. those aspects associated with human association with the forest, and natural values related to the biophysical expression of forests.

Heritage in forests includes Aboriginal and non-Aboriginal cultural values and natural values. The plan provides for the management of the range of heritage values. Management and interpretation of Aboriginal cultural heritage will be carried out jointly with Aboriginal people.

Objective

An overall aim of the plan is to seek to maintain natural and cultural heritage.

24. Aboriginal heritage

Objective

The plan proposes the following Actions at the operational scale for the purpose of seeking to work with Aboriginal people to identify, interpret, protect, and manage significant cultural heritage sites:

Actions proposed

24.1 The Department will:

- 24.1.1 seek to establish a formal Nyoongar consultative working group to advise on issues relating to Aboriginal cultural heritage in the plan area;
- 24.1.2 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
- 24.1.3 facilitate cross-cultural awareness and interpretive activities to inform and educate the wider community regarding Aboriginal culture.

25. Natural and other cultural heritage

Objective

The plan proposes the following Actions at the operational scale for the purpose of seeking to identify, record, assess and manage places of natural and cultural heritage significance on land to which the plan applies:

Actions proposed

25.1 The Department will:

- 25.1.1 maintain and, where reasonable and practicable, enhance databases of cultural heritage places and values; and
- 25.1.2 cooperate with Commonwealth and State agencies, local government authorities and non-statutory organisations in relation to cultural heritage identification and conservation.

25.2 The Department and the Forest Products Commission will conduct their operations in a manner that has regard to the Indigenous Heritage Management Guidelines and Non-Indigenous Heritage Management Guidelines after those Guidelines have been prepared.

25.3 **(Plantations):** The Forest Products Commission will:

25.3.1 undertake its operations in a manner that is in accordance with 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; and

25.3.2 share information relating to identified heritage sites with the Department.

Key performance indicators

Key performance indicators are being used to track the plan's implementation. Three key indicators have been selected to provide a broad cross-section of achievement of the Actions related to the maintenance of cultural and natural heritage.

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 by 31 December 2004. 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)	The Department and the Conservation Commission to complete all actions for which they are responsible in order to formally change the land category of areas proposed for the reserve system within 10 years after the commencement of the plan.
Reporting	Biennially on progress.
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.

Socio-economic benefits

Natural ecosystems provide a diverse mix of socio-economic benefits. These include jobs, wages, profits and tax revenues from producing and consuming forest-related goods and services; user benefits associated with the opportunity to participate in outdoor recreation and tourism; environmental benefits such as clean air and water; and benefits that satisfy the social and spiritual needs of society.

The ability to deliver multiple social and economic goods and services over the long term depends on the maintenance of the net area of forested land and of forest ecosystems. The plan provides management actions for the provision of a range of goods and services from the forest areas: water; minerals and petroleum; recreation; timber and non-log timber products; basic raw materials; visual amenity; forest leases; and genetic resources for the development of medicines. Provisions of the plan relating to water are contained in the Soil and Water chapter of the plan. Provisions relating to production of timber and other forest produce, such as bee-keeping, wildflowers and seeds, are contained in the Productive Capacity chapter.

Objective

An overall aim of the plan is to seek to sustain and enhance socio-economic benefits obtained from the forest to meet community needs.

26. Recreation and tourism

There is an increasing demand for the use of forested areas for recreation and tourism, which tends to be concentrated in national parks and State forest but is undertaken on most land categories.

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking 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:

Actions proposed

26.1 The Department will:

- 26.1.1 prepare, in consultation with the Conservation Commission, and progressively implement a strategic framework plan for recreation and tourism on land to which the plan applies;
- 26.1.2 issue and administer licences, leases and permits for commercial tourism uses in accordance with the provisions of the CALM Act;
- 26.1.3 issue permits and take other action to enable organised non-commercial recreation and educational groups to undertake appropriate activities;
- 26.1.4 undertake research in relation to the knowledge, attitudes, skills and activities of visitors to land to which the plan applies; and
- 26.1.5 where appropriate, provide designated areas where camping may take place or where dogs and horses may be taken.

27. Visual landscape

Visual landscape management supports nature-based tourism and maintains an aesthetically pleasing environment for local communities.

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to protect visual landscapes:

Actions proposed

27.1 The Department and the Forest Products Commission will:

- 27.1.1 maintain a visual landscape classification and management system;
- 27.1.2 review guidelines for the application of visual landscape management principles in land-use planning, codes of practice, operational guidelines and other relevant manuals; and
- 27.1.3 make submissions in relation to development proposals that may impact on visual landscapes 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 any proposed development on the visual quality of the landscape.

27.2 **(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.

28. Minerals and petroleum

Mineral and petroleum operations in the forest areas provide significant economic and social benefits to the State. Approval for use of forests for these purposes is undertaken through Government processes outside the control of the plan.

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to reduce the impact of mineral and petroleum operations on land to which the plan applies:

Actions proposed

28.1 The Department and the Conservation Commission will:

- 28.1.1 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;
- 28.1.2 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
- 28.1.3 seek to recover the cost of providing that advice and assistance.

29. Basic raw materials

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to manage basic raw materials (BRM) and promote the rehabilitation of areas to which the plan applies where BRM have been extracted:

Actions proposed

29.1 The Department will extract and use gravel and other BRM required for the management of land to which the plan applies.

29.2 The Conservation Commission will review its policy on BRM extraction as a matter of priority.

29.3 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:

29.3.1 to have the cost of rehabilitation of areas from which BRM are extracted borne by the organisation responsible for the extraction of those materials; and

29.3.2 the lodgment of a rehabilitation performance bond.

29.4 The Department and the Forest Products Commission will maintain a database of areas from which BRM have been extracted and will progressively develop plans and works programs for the rehabilitation of these areas.

30. Leases

Leases of land to which the plan applies have previously been granted for uses such as communication towers, utilities, grazing, water storage, industrial facilities, rubbish sites, house sites, recreation facilities and BRM extraction.

Objective

The plan proposes the following Action at the whole of forest scale for the purpose of seeking to manage leases:

Action proposed

30.1 The Department will issue and administer leases for facilities and uses in accordance with the provisions of the CALM Act.

31. Bioprospecting

Bioprospecting is a small but potentially valuable industry looking for pharmaceutical, industrial and agricultural chemicals in native flora. The Department has a contract with a bioprospecting company to assess the potential of specific flora.

Objective

The plan proposes the following Action at the whole of forest scale for the purpose of seeking to promote, encourage and facilitate the controlled exploration of native flora for scientific, therapeutic and horticultural purposes:

Action proposed

31.1 The Department will implement the current contract.

Key performance indicators

Key performance indicators are being used to track the plan's implementation. Two key performance indicators that relate to the role of the plan in facilitating socio-economic benefits from the key economic uses of the land have been selected. Minerals and petroleum, although the largest generators of economic activity from land subject to the plan, are not included because the plan does not materially influence their extraction.

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.

Plan implementation

Objective

The plan proposes the following Actions for the purpose of seeking to ensure that forest management is undertaken in accordance with the plan and is continually improved so as to achieve best practice:

32. Monitoring and audit

Objective

The plan proposes the following Actions for the purpose of seeking to monitor and audit the extent to which management of land to which the plan applies is undertaken in accordance with the plan:

Actions proposed

32.1 The Department and the Forest Products Commission, in consultation with the Conservation Commission, will:
- 32.1.1 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
- 32.1.2 conduct audits in accordance with the annual audit program, and report the results to the Conservation Commission.

32.2 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:
- 32.2.1 the management of old-growth forest in informal reserves;
- 32.2.2 the protection of stream zones and less well reserved vegetation complexes;
- 32.2.3 the selection and management of fauna habitat zones;
- 32.2.4 marri retention;
- 32.2.5 dieback hygiene;
- 32.2.6 protection of significant flora and understorey species; and
- 32.2.7 soil management.

32.3 The Conservation Commission will undertake comprehensive mid-term and end-of-term audits of the extent to which management of land to which the plan applies has been undertaken in accordance with the plan, which will include consideration of the extent to which all key performance indicator targets have been achieved. These audits will be provided to the Environmental Protection Authority for review by 31 December 2008 and 31 December 2012 respectively.

32.4 The Conservation Commission, the Department and the Forest Products Commission will publish the results of the audits referred to in Actions 32.1, 32.2 and 32.3.

32.5 The Forest Products Commission will publish annual reports on the compliance of its staff and contractors with the provisions of the plan and subsidiary management guideline documents.

32.6 The Department, in consultation with the Conservation Commission, will develop a protocol for each key performance indicator in the plan, which will:

32.6.1 identify the data to be collected and analysed in assessing the extent to which the key performance indicator has been achieved; and

32.6.2 specify the persons who are responsible for the collection and analysis of that data.

32.7 The Department and the Forest Products Commission will cooperate with the Commonwealth in the implementation of the Montreal Indicator program.

32.8 **(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.

33. Adaptive management

Objective

The plan proposes the following Actions for the purpose of seeking to provide for adaptive management to improve forest management:

Actions proposed

33.1 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.

33.2 The Department will, in consultation with the Conservation Commission, conduct trials, where reasonable and practicable, of improvements to silviculture and fire management practices.

33.3 The Forest Products Commission will test methods to increase the utilisation of sawlogs below first and second grade standards.

34. Review

Objective

The plan proposes the following Actions for the purpose of seeking to ensure that the plan Actions, policies and guidelines maintain their currency:

Actions proposed

34.1 The Department and the Conservation Commission will:

34.1.1 develop or maintain a comprehensive suite of operational guidance documents (see Appendix 1);

34.1.2 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;

34.1.3 amend the plan if required according to the CALM and EP Acts;

34.1.4 initiate an independent expert review of silvicultural practices and their impacts on biodiversity during the second half of the life of the plan. The

review will have regard to the results from FORESTCHECK and other research monitoring, audits, and adaptive management trials of these practices;

34.1.5 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

34.1.6 take action that is reasonable and practicable to address problems identified in management systems.

35. Community involvement

Objective

The plan proposes the following Actions for the purpose of seeking to provide opportunities for Government agencies, non-government organisations and the community to participate in plan implementation:

Actions proposed

35.1 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.

35.2 The Department will:

35.2.1 develop and implement programs that seek to provide the community with educational opportunities and information on ecologically sustainable forest management, in particular information relating to the sustained yield statistics and models;

35.2.2 establish public consultation processes;

35.2.3 provide opportunities for community participation in voluntary activities and educational and social development programs relating to ecologically sustainable forest management; and

35.2.4 provide a range of opportunities for volunteers to be involved in forest management activities.

36. Management and performance standards

Objective

The plan proposes the following Actions for the purpose of seeking to provide for continuous improvement in management and performance standards:

Actions proposed

36.1 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.

36.2 **(Plantations):** The Forest Products Commission will maintain an environmental management system independently accredited as conforming to AS/NZS ISO 14001.

37. Roles and responsibilities in management

Objective

The plan proposes the following Actions for the purpose of seeking to facilitate effective management of forests:

Actions proposed

37.1 The Department and the Forest Products Commission will:

37.1.1 identify key roles and responsibilities in forest operations and specify the persons who are responsible for fulfilling those roles and responsibilities; and

37.1.2 identify key tasks associated with implementation of the plan and specify the persons who are responsible for undertaking those tasks.

38. Knowledge

Objective

The plan proposes the following Actions for the purpose of seeking 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:

Actions proposed

38.1 The Department will develop and implement research programs, in cooperation with the Conservation Commission, including the research referred to in Actions 9.1 and 9.2.

38.2 The Department and the Forest Products Commission will take reasonable and practicable steps to:

38.2.1 identify the skills required to competently undertake the key tasks referred to in Action 37.1.2;

38.2.2 review the skills and competency levels of persons responsible for undertaking those tasks; and

38.2.3 initiate training and other programs to increase skill and competency levels where they are deficient.

Key performance indicators

Key performance indicators are being used to track the plan's implementation. Six key performance indicators have been selected to provide a broad cross-section of achievement of the Actions related to implementing the plan.

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.
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 (EMS) to a standard suitable for accreditation.
Performance target(s)	EMS developed by 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.

Appendices

APPENDIX 1

Key subsidiary management guideline documents to the plan

The purpose of this appendix is to foreshadow the key subsidiary documents that are to be prepared or reviewed to implement the requirements of the plan.

Guidelines for the Management of Informal Reserves
Proposed document
Status: To be prepared by the Department in accordance with Action 3.1.2.

Guidelines for Selection and Management of Fauna Habitat Zones
Proposed document
Status: To be prepared by the Department in accordance with Action 7.2.2.

Goals for Understorey Structural Diversity
Proposed document
Status: To be prepared by the Department in accordance with Action 4.1.

Fauna Distribution Information System
Proposed document
Status: To be prepared by the Forest Products Commission in accordance with Action 8.4.

Native Forest Timber Harvest Planning Guidelines
Proposed document
Status: To be prepared by the Department by 31 December 2008 in accordance with Action 34.1.1

Jarrah Silviculture Guidelines
Existing document
Status: To be updated by the Department in consultation with the Conservation Commission in accordance with Appendix 5.

Karri Silviculture Guidelines
Existing document
Status: To be updated by the Department in consultation with the Conservation Commission in accordance with Appendix 5.

Wandoo Silviculture Guidelines
Existing document
Status: To be updated by the Department in consultation with the Conservation Commission in accordance with Appendix 5.

Soil and Water Conservation Guidelines
Proposed document
Status: To be prepared by the Department in accordance with Action 20.1.2.

***Phytophthora cinnamomi* and Disease Caused by it – Volume 1. Management Guidelines**
Existing document
Status: To be reviewed by the Department in accordance with Action 18.2.1.

Fire Operations Manual
Existing document
Status: Broader application than in forest areas.

Feral Animal Control Manual
Existing document
Status: Broader application than in forest areas.

Weeds Manual
Proposed document
Status: Broader application than in forest areas.

Indigenous Heritage Management Guidelines
Proposed document
Status: Broader application than in forest areas.

Non-indigenous Heritage Management Guidelines
Proposed document
Status: Broader application than in forest areas.

Visual Landscape Management Guidelines
Existing document
Status: Broader application than in forest areas.

Mining on CALM Lands Guidelines
Existing document
Status: Broader application than in forest areas.

Guidelines for the rehabilitation of plantation areas to be returned to native vegetation
Proposed document
Status: To be prepared in accordance with Action 15.4.2.

Operations manual for management of the flora industry
Existing document
Status: Broader application than in forest areas.

Apiary Site Management Guidelines
Existing document
Status: Broader application than in forest areas.

Guidelines for the Management and Rehabilitation of Gravel Pits
Existing document
Status: Broader application than in forest areas.

Forest Monitoring Guidelines
Proposed document
Status: To be prepared by the Department by 31 December 2005 in accordance with Action 34.1.1.

Key Performance Indicator Protocols
Proposed document
Status: To be prepared by the Department in accordance with Action 32.6.

Public Participation Manual
Existing document
Status: Broader application than in forest areas.

Guidelines for the preparation of area management plans for conservation reserves
Proposed document
Status: To be prepared by the Conservation Commission in accordance with Action 5.2.

Other guidelines will be prepared as is considered necessary by the Department
Status: To be prepared by the Department with public consultation for the approval of the Minister for the Environment in consultation with the Conservation Commission.

APPENDIX 2

Reserve proposals

(see page 85 for explanatory notes)

ID	Locality name	Area (ha)	Management plan ID 1987	Management plan ID 1994	RFA ID	*Protecting our old-growth forests* policy: Rein-stated	*Protecting our old-growth forests* policy: New	*Protecting our old-growth forests* policy: New class'n	Proposal type
1	Moore River	22,130	114-118						NR, other, NP to NR
2	Mogumber	130	130,131						Ex Dir freehold to NR
3	Boonanarring	890	99-101						Other to NR
4	Caraban	2,200	108-109	8(a)					SF to s5(1)(h)
5	Caraban	3,330	110, 111	8(b)					SF to CP
6	Yanchep	110	126						SF to NR
7	Wabling	2,170	123-125						SF to NR
8	Lake Muckenburra	70	112						Other to NR
9	Julimar	28,630	75-80, 129		1				SF to CP; Interim FCA
10	Julimar	30	73, 74						S5(1)(g), other to CP
11	Ridges	2,420	121, 122						SF to NP
12	Pinjar	700							SF to NR
13	Pinjar	5,020							SF to s5(1)(h)
14	Neerabup	1,240	119						NP*
15	Yongka (Melaleuca Park)	3,200	113						SF to NR
16	Moondyne	5,170	84, 127						NR, other to NP
17	Avon Valley (Toodyay)	3,580	pt 97						Misc res to NP
18	Avon Valley (Toodyay)	1,710	pt 97		2				Misc res to NP; Interim FCA
19	Morangup	930	128						NR to NP
20	Greenmount	60	71						NP*
21	Gooseberry Hill	30	70						NP*
22	Kalamunda	400	81						NP*
23	Mundaring (Mundaring)	2,240			4				SF to NP
23A	Mundaring (Mundaring)	110					yes		SF, Ex Dir freehold, UCL, other to NP

* Previous proposals to change the category of these areas from national park will not proceed.

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
24	Mundaring (Mundaring)	740	85-93, 134		5				SF, other to NP
24A	Mundaring (Mundaring)	980					yes		WAPC freehold to NP
25	Mundaring (Mundaring)	600					yes		SF to NP
26	Lesmurdie Falls	60	52, 53, 83						NP*
27	Helena (Helena Valley)	5,070			8				SF to NP
28	Flynn (Helena Valley)	3,950			11				WRC freehold to NP
29	Wandoo (Wandoo)	2,240					yes		SF to NP
30	Wandoo (Wandoo)	13,760			12				SF, other to NP
31	Wandoo (Wandoo)	29,400	57, 58, 59, pt 94, 67-69, 72, 96		13				CP to NP
32	Russell (Wandoo)	450	pt 94		14				SF to NP
33	Russell	3,360	pt 94, pt 95						SF to CP
34	Russell (Wandoo)	340	pt 94		pt 15	yes (pt)		yes	SF, UCL to NP
35	Talbot	60			16, 17				Other to NR
36	Victoria (Pickering Brook)	5,850			6				SF, UCL to NP
36A	Victoria (Pickering Brook)	550					yes		WAPC freehold to NP
37	Illawarra (Canning)	2,520			7				SF, other to NP
37A	Illawarra (Canning)	420					yes		WAPC freehold to NP
38	Dale (Helena Valley)	1,330	66		10				Ex Dir freehold to NP
39	Dale (Helena Valley)	5,770	65		9				CP to NP
39A	Dale (Helena Valley)	160					yes		SF to NP
40	Monadnocks	300		6	18				s5(1)(g) to s5(1)(h)
41	Monadnocks	15,200	39	5					s5(1)(g) to NP
42	Monadnocks	30		7					s5(1)(g) to s5(1)(h)
43	Monadnocks	7,480			20-23				SF, WRC freehold to NP
44	Monadnocks	1,520					yes		SF to NP
45	Flint	1,980					yes		SF, TR to CP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
46	Gibbs	2,280		pt 9	pt 19	yes (pt)			SF to CP
47	Wearne	1,530					yes		TR to CP
48	Bannister	1,150					yes		SF to CP
49	Gyngoorda	1,350	pt 16		pt 26	yes (pt)			SF to CP
50	Monadnocks	4,990	pt 14, 15		24				SF, UCL to NP
51	Monadnocks	690	pt 14		pt 25	yes (pt)		yes	SF to NP
52	Wandering	4,360	27-31						Other, TR to CP
53	Serpentine	40	41						Other to NP
53A	Serpentine	30	36						CP to NP
54	Serpentine	120			27				Other to NP
54A	Serpentine	280	33						NR to NP
55	Darling Scarp	410			28-32				SF to NR
56	North Dandalup	60	13						Other to NR
57	Clifton north	120	pt 32						UCL to NP
58	Clifton south	520	52						SF to NP
59	McLarty	690	61						SF to NP
60	Marrarup	30			33				UCL to NR
61	Lane Poole	230	24						Misc res to s5(1)(h)
62	Lane Poole (Icy Creek)	180	22	12					Ex Dir freehold to s5(1)(h)
63	George	1,180		pt 13	pt 34	yes (pt)			SF to CP
64	George	140					yes		SF to CP
65	George	540		pt 13					SF to CP
66	Myalup	690	60						SF to NP
67	Myalup	220	59						SF to NP
68	Wagerup (Yarloop)	10	64	15					Other to NR
69	Clarke (Falls Brook)	400		pt 22	pt 36				SF to NR; Interim FCA

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
70	Clarke (Falls Brook)	200		pt 22					SF to NR
71	Clarke	290		pt 22	37	yes			SF to NR
72	Harvey	100			35				UCL to CP
73	Lane Poole**	4,300			38-40				SF, UCL to CP
74	Lane Poole	40					yes		SF to NP
75	Lane Poole	1,490			41, 42				SF to NP
76	Lane Poole	1,120					yes		SF to NP
77	Lane Poole	38,090	36-39, 40, 57, 63	23-25					SF, s5(1)(g),TR, WRC freehold, other to NP
78	Lane Poole	2,440					yes		SF to NP
79	Lane Poole	3,810					yes		SF, TR to NP
80	Kemerton	550		17					Ex Dir freehold to s5(1)(h)
81	Kemerton	1,860	55, 56	18, 19					Ex Dir freehold to s5(1)(h)
82	Kemerton	90		20					Ex Dir freehold to s5(1)(h)
83	Leschenault Peninsula	490		pt 21					Freehold to CP
84	Gervasse/Lennard/Davis/ Lowden (Wellington)	8,080					yes		SF to NP
85	Gervasse/Lennard/Davis (Wellington)	5,040	21, 22, 23	pt 26, 27	pt 49			yes	SF to NP
86	Gervasse/Lennard/Davis (Wellington)	760			pt 49			yes	SF to NP
87	Wellington	650			48				SF to NP
88	Westralia (Wellington)	1,130	pt 48		pt 46				SF to CP; Interim FCA
89	Westralia (Wellington)	860	pt 48, 49		pt 46				SF to CP
90	Westralia (Wellington)	310					yes		SF to FCA

** The *Protecting our old-growth forests* policy states the Government will 'investigate upgrading Lane Poole Reserve to a national park'.

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
91	Batalling	400			43				SF to NR
92	The Angle	920			44				TR to NR
93	Cordering	1,110			45				TR to NR
94	Bennelaking	5,630	26-30						SF, UCL, other to CP
95	Muja	6,370	41-47						UCL, TR to CP
96	Camballan	1,520	75, pt 76, pt 79	pt 36, 38					UCL, other, leasehold to CP
97	Camballan	6,680	pt 76, pt 79	pt 36, 37	56	yes			UCL, other, leasehold to CP
98	Camballan	430	77, 78	pt 36					Leasehold to CP
99	Goonac (Greater Preston)	360	32, 35, 80	30				yes	UCL, leasehold to NP
99A	Goonac (Greater Preston)	1,300		pt 29, 30				yes	SF, other to NP – pending expiry/surrender of grazing rights
100	Goonac (Greater Preston)	3,640	pt 33	pt 29	55			yes	SF to NP
101	Roseneath (Greater Preston)	1,330		28				yes	SF to NP
102	Noggerup south (Greater Preston)	800			54			yes	SF, UCL to NP
103	Noggerup (Greater Preston)	3,310	67	31				yes	SF to NP
104	Hovea (Greater Preston)	1,100		34			yes		SF to NP
105	Preston (Greater Preston)	880	68	32	53			yes	SF to NP
106	Boyanup	30			52				SF to NR
107	Dardanup	120			51				SF to NR
108	Dardanup	570	pt 31						SF to CP
109	Dardanup	70	pt 31		50	yes			SF to CP
110	Nth Boyanup Rd	4	24						Other to NR
111	Tuart Forest	50	11						SF, other to NP
112	Tuart Forest	60	10						SF to NP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
113	Leeuwin-Naturaliste	230	No	previous	ID				Ex Dir freehold to NP
114	Leeuwin-Naturaliste	10	6						UCL to NP
115	Leeuwin-Naturaliste	20			85				Other to NP
116	Yelverton (Yelverton)	790			86				TR, other to NP
117	Yelverton	420			87				TR, other to FCA
118	Whicher	290			83				SF to FCA
119	Whicher (Whicher)	30	pt 16		84			yes	SF to NP
120	Whicher (Whicher)	3,220	pt 16					yes	SF to NP
121	Whicher (Whicher)	3,220	pt 16		pt 82	yes		yes	SF to NP
122	Ryall	900			75-79				SF, TR, UCL to FCA
123	Ryall	280		33	74				SF to CP; Interim FCA
124	Mullalyup	540			73				SF, UCL to FCA
125	Mullalyup	910	85		72				SF to CP; Interim FCA
126	Harrington	690			71				SF to FCA
127	Mullalyup	1,250	86, 87		70				SF, Ex Dir freehold to CP; Interim FCA
128	Greenbushes	430	82						SF, Ex Dir freehold to NR
129	Greenbushes	330			68				SF to FCA
130	Golden Valley	60	66		69				Ex Dir freehold to FCA. To be reviewed to provide appropriate protection for the values, uses and long-term future of the area.
131	Kerr	130					yes		SF to CP
132	Kulikup	140			57				Other to NR
133	Hester east	780		40					TR to CP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
134	Nollajup	670	88						SF to NR
135	Hester south	1,440			59				SF, other to FCA
136	Hester central	1,490					yes		SF to CP
137	Hester west	1,030		42	60				SF, TR to CP; Interim FCA
138	Greenbushes	530	83		61				SF to NR; Interim FCA
139	Nelson	620			62-64				SF to FCA
140	Dalgarup	950	99		65				SF to NR; Interim FCA
140A	Dalgarup	2,560					yes		SF to NP
141	Ellis Creek	140	89		67				SF to CP; Interim FCA
142	Jarrahwood	160			80				Other to CP
143	St John Brook	3,440	101, 102		81	yes			SF to CP
144	Rapids	1,270	pt 14						SF to CP
145	Rapids	1,110	pt 14		92	yes			SF to CP
146	Mowen	840	12		93	yes			SF to NR
147	Bramley (Bramley)	4,010			89				SF, TR, other, UCL to NP
148	Bramley	250			90				TR to FCA
149	Leeuwin-Naturaliste	70			88				Other to NP
150	Witchcliffe	1,060	17, 18						UCL to SF
150A	Witchcliffe	490					yes		UCL to NP
151	Leeuwin-Naturaliste	310		43					Other to NP
152	Leeuwin-Naturaliste	10	1						NR to NP
153	Forest Grove (Forest Grove)	1,390			91				TR, other to NP
154	Blackwood River (Blackwood River)	2,490	2, 91, 92		97				SF to NP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management Plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
155	Blackwood River (Blackwood River)	14,120			94-96, 98				SF, TR, other to NP
156	Butler (Butler)	12,580					yes		SF to NP
156A	Blackwood River (Blackwood River)	2,000					yes		SF to NP
157	Blackwood River (Blackwood River)	1,000	90, 93-98						SF to NP
158	Blackwood River (Blackwood River)	760					yes		SF to NP
159	Chester	370	5						SF to NR
160	Paget	1,400	13						SF to NR
161	Hilliger	9,080			99				SF, UCL, other to FCA
162	Hilliger (Hilliger)	13,440					yes		SF to NP
162A	Hilliger (Hilliger)	3,390					yes		SF to NP
163	Milyeannup (Milyeannup)	8,800			102				SF to NP
163A	Milyeannup (Milyeannup)	3,100					yes		SF to NP
164	Milyeannup (Milyeannup)	420			100				SF to NP
165	Milyeannup (Milyeannup)	5,680	100		101				SF to NP
166	Beaton	440		44	66				TR to CP; Interim FCA
167	Glenlynn	1,400			106, 107				SF, TR, other to FCA
168	Wournbelup/Chowerup	2,160	70-72		58				UCL, other to NR
169	Wournbelup	660	69						UCL to SF
170	Chowerup	700	103, 104						UCL, other to SF
171	Blackbutt	40	1	45					SF to CP
172	Easter (Easter)	920			103			yes	SF to NP
173	Easter (Easter)	60					yes		SF to NP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
174	Easter (Easter)	590	5, 13		104			yes	SF to NP
175	Iffley (Easter)	1,280					yes		SF to NP
176	One Tree Bridge	660	15, 16		105				SF, s5(1)(g), Ex Dir freehold to CP; Interim FCA
177	Lewin	40	7						UCL to SF
178	Solai	20	23						Other to SF
179	King Jarrah	190		49					Misc res to SF
180	Dingup	230		48	113				SF to CP; Interim FCA
181	Strickland (Greater Beedelup)	1,670	24		114			yes	SF to NP
182	Beavis (Greater Beedelup)	15,550					yes		SF, Ex Dir freehold to NP
183	Giblett (Greater Beedelup)	440			115				SF to NP
184	Sir James Mitchell NP	160	21, 22, 111						NP to SF
185	Dordagup (Greater Dordagup)	6,600					yes		SF to NP
186	Nairn	60	86						UCL to SF
187	Mickalarup Swamp (Tone-Perup)	80		47					Other to NP
188	Walcott (Greater Kingston)	40					yes		TR to NP
189	Warrup (Greater Kingston)	760			112			yes	SF to NP
190	Kingston (Greater Kingston)	20,310					yes		SF, TR, UCL, other to NP
191	Ballajup Rocks (Greater Kingston)	130					yes		Other to NP
192	Keninup (Tone-Perup)	5,770		pt 46	108			yes	SF, TR to NP
193	Keninup (Tone-Perup)	1,080		pt 46				yes	TR to NP
194	Weinup	80			111				Other to NR

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
195	Yackelup (Tone-Perup)	40,230	17, 18					yes	SF, TR, NR, UCL to NP
196	Talling (Tone-Perup)	4		52				yes	Other to NP
197	Talling (Tone-Perup)	5,500		pt 53	110	yes		yes	SF to NP
198	Talling (Tone-Perup)	830		pt 53				yes	SF to NP
199	Stoate (Tone-Perup)	840					yes		SF to NP
200	Bolbelup	1,500			109				TR, UCL to FCA
201	Bolbelup	40	11	54					Other to SF (to be reviewed)
202	Bokarup	480	2, 3, 10						Other, UCL to NR
203	Quannup (D'Entrecasteaux)	4,480	46						Leasehold, UCL to NP
203A	Central (D'Entrecasteaux)	600					yes		SF to NP
204	Fly Brook (Greater Hawke)	1,430					yes		SF to NP
205	Charley (Greater Hawke)	2,340	pt 27	pt 56	116	yes			SF to NP
206	Charley (Greater Hawke)	2,020	pt 27	pt 56					SF to NP
207	Hawke	2,880	pt 27		117				SF to NP
208	Hawke (Greater Hawke)	210	pt 27	57					SF to NP
209	Dombakup (Greater Hawke)	100	80					yes	SF to NP
210	Crowea (Greater Hawke)	3,460					yes		SF to NP
211	Dombakup (Greater Hawke)	470			118				SF to NP
212	Jane (Jane)	130	83				yes		UCL to NP
213	Jane (Jane)	6,220					yes		SF, Ex Dir freehold to NP
214	Jane (Jane)	520					yes		SF, UCL, Ex Dir freehold to NP
215	Northcliffe (Boorara-Gardner)	1,070	87-90		119,120				UCL, other to NP
216	Northcliffe (Boorara-Gardner)	1,520					yes		TR, UCL to NP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
217	Northcliffe (Boorara-Gardner)	270					yes		SF to NP
218	Northcliffe (Boorara-Gardner)	700					yes		UCL to NP
219	Muirillup (Boorara-Gardner)	170	85					yes	SF to NP
219A	Muirillup (Boorara-Gardner)	60					yes		SF to NP
220	Boorara (Boorara-Gardner)	660	31					yes	SF to NP
221	Boorara (Boorara-Gardner)	260					yes		SF to NP
222	Babbington (Boorara-Gardner)	270					yes		SF, UCL to NP
223	Gardner (Boorara-Gardner)	6,060	pt 81				yes		SF, UCL to NP
224	Gardner	530	pt 81						UCL to SF
225	D'Entrecasteaux	1,000	103						SF to NP
226	Northcliffe	20	91						UCL to SF
227	D'Entrecasteaux	30	62	58					UCL to SF
228	Northcliffe	60	92						UCL to SF
229	Boyndaminup (Boyndaminup)	4,420					yes		SF to NP
230	Boyndaminup (Boyndaminup)	400					yes		SF to NP
231	Mattaband	260		59					SF to NP
232	Wattle east	200					yes		SF to NP
233	Wattle west	510					yes		SF to NP
234	Poorginup (Lake Muir)	9,460					yes		SF to NP
235	Chitelup (Lake Muir)	310					yes		SF to NP
236	Lake Muir NR (Lake Muir)	11,390						yes	NR to NP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
237	Weld-Mossop	5,780					yes		SF to NP
238	Long-Rocky (Mt Frankland north)	21,950					yes		SF to NP
239	Deep-Ordnance (Mt Frankland south)	29,250					yes		SF, other to NP
239A	Wye-Deep	3,040						yes	SF, other to FCA
239B	Dawson	410						yes	SF to FCA
239C	Dawson	70						yes	SF, other to FCA
239D	Dawson	530						yes	SF to FCA
239E	Keystone-Swarbrick	950						yes	SF, other to FCA
240	Sharpe (Mt Frankland south)	3,430			121				SF to NP
241	Collis (Mt Frankland south)	5,440			122, 126				SF, UCL, other, s5(1)(g) to NP
241A	Colliss	320			122, 126			yes	SF, s5(1)(g), UCL to FCA
241B	Colliss	170			122			yes	SF to FCA
242	Trent (Mt Frankland south)	2,410					yes		SF, s5(1)(g) to NP
242A	Colliss	1,110						yes	SF, s5(1)(g) to FCA
243	Trent (Mt Frankland south)	1,830		pt 66	127, pts 128, 129				SF, TR to NP
243A	Trent	100			127			yes	TR to FCA
244	Bow River (Mt Frankland south)	270		pt 66	pt 128		yes		SF to NP
245	Crown res 14325 (Walpole-Nornalup)	80					yes		Other to NP
246	Walpole Townsite (Walpole-Nornalup)	60					yes		UCL to NP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
247	Swarbrick (Walpole-Nornalup)	200			125				SF to NP
247A	Swarbrick	260			123, 124			yes	SF to FCA
248	Crown res 13045 (Walpole-Nornalup)	430	155						Other to NP
249	Hiker (Mt Roe)	8,620	pt 183	pts 60, 61 & 55	135				SF, UCL to NP
250	Gully (Mt Roe)	5,060	pts 183,128 & 142	pt 61	136				SF, UCL, other to NP
251	Kent River (Mt Roe)	36,910	pts 183 & 142	pts 61 & 67	137				SF, UCL, other to NP
252	Roe-London (Mt Roe)	11,400	pt 142, 143, pts 159 & 183	pts 60, 61, 62	130				SF, UCL to NP
253	Thames-Romance (Mt Roe)	16,720	pts 142, 144, 145	pt 62, 70	pts 130 & 131				SF, UCL, other to NP
254	Thames-Romance (Mt Roe)	1,130	129, 130, 153					yes	NR to NP
255	Trent (Mt Roe)	1,030		pt 66	pt 129				SF to NP
256	Bow River (Mt Roe)	350		pt 66	pt 128		yes		SF to NP
257	Styx (Mt Roe)	2,140		pt 66	134			yes	UCL, other to NP
258	Rate (Mt Roe)	490		pt 66	133		yes		Other to NP
259	Thames (Mt Roe)	250	154	pt 66	132			yes	Other to NP
260	Thames	320						yes	TR to FCA
261	Styx	4,410	pt 142					yes	SF, other to FCA
262	Styx	20	150						Other to SF
263	Thames	60	149					yes	Other to FCA
264	Kordabup	300	131-136						TR, UCL to NR
265	Camballup (Mt Roe)	7,710	pts 142, 148		138			yes	SF, UCL, other to NP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
265A	Perillup	130			138			yes	NR to FCA
266	Perillup (Mt Roe)	3,520	pts 142, 146, 147	pt 61	139			yes	SF, other to NP
267	Perillup (Mt Roe)	790			140			yes	SF to NP
268	Clear Hills (Mt Roe)	15,820		pt 61	pt 130				SF, other to NP
269	Amarillup (Mt Roe)	290			142				SF, other to NP
270	Pardelup	3,670			141				SF, TR, other to FCA
271	Kwornicup Lake	10	184						Other to NR
272	Denbarker	250			150, 152				Other, leasehold (Aboriginal) to FCA
273	Mt Barker	60			pt 153				UCL, other to FCA
274	Denbarker (Mt Lindesay)	26,920	pts 144, 203, 175-179, 124-126, 127	67	pt 131			yes	SF, UCL, other to NP
274A	Denbarker	240	127		pt 131			yes	UCL, other to FCA
275	Harewood (Mt Lindesay)	2,450		pt 66	143			yes	SF, TR, other to NP
275A	Harewood	3,180		pt 66	143			yes	SF, TR, other to FCA
276	Denmark River (Mt Lindesay)	250		pt 66	144		yes		SF, other to NP
276A	Denmark River	50		pt 66	pt 144			yes	SF to FCA
277	Harewood	100		pt 66	pt 144			yes	SF to FCA
278	Crown res 15623 (Mt Lindesay)	60						yes	s5(1)(g) to FCA
279	Harewood south east (Mt Lindesay)	110						yes	SF to FCA
280	Crown res 19242 (Mt Lindesay)	50	137						NR to NP

APPENDIX 2 (cont.)

Reserve proposals

ID	Locality name	Area (ha)	Management plan ID		RFA ID	*Protecting our old-growth forests* policy			Proposal type
			1987	1994		Rein-stated	New	New class'n	
281	Crown res 35168 (Mt Lindesay)	1,170	221						NR to NP
282	Sheepwash (Mt Lindesay)	1,330	pt 203	pt 68			yes		SF to NP
283	Sheepwash (Mt Lindesay)	4,540	pt 203		146			yes	SF to NP
284	Hay (Mt Lindesay)	1,560					yes		SF, UCL to NP
284A	Hay	730						yes	SF, UCL to FCA
285	Sheepwash (Mt Lindesay)	2,010			145				SF to NP
286	Hay	910						yes	TR to FCA

CP: Conservation park
Ex Dir: Executive Director of the Department of Conservation and Land Management
FCA: Forest conservation area. An FCA is SF classified as such through Section 62(1) of the CALM Act
FCA interim: A transitory classification as FCA prior to proceeding to a formal reserve category
Misc res: Land vested in Executive Director or former National Parks and Nature Conservation Authority
New: New conservation reserve proposal under the *Protecting our old-growth forests* policy
New class'n: Previous conservation reserve proposal reclassified under the *Protecting our old-growth forests* policy
NP: National park
NR: Nature reserve
Other: Crown reserve not vested in the Conservation Commission
Reinstated: Previous conservation reserve proposal removed under the RFA, but reinstated by the *Protecting our old-growth forests* policy
s5(1)(g): CALM Act Section 5(1)(g) – land vested under the *Land Act 1933*
s5(1)(h): CALM Act Section 5(1)(h) – land vested under the *Land Administration Act 1997*
SF: State forest
TR: Timber reserve
UCL: Unallocated Crown land
WAPC: Western Australian Planning Commission
WRC: Water and Rivers Commission

APPENDIX 3

Informal reserves

The purpose of this appendix is to set out the requirements for informal reserves established by this plan. The requirements in this appendix will be incorporated into Guidelines for the Management of Informal Reserves.

On commencement of the plan, the requirements in this appendix will be used as operational practice until the completion of the Guidelines for the Management of Informal Reserves.

Proposed informal reserves

The informal reserves are those areas identified in the Department's corporate database as informal reserves, of the kind set out in Table 5:

Table 5: 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 late mature to senescent growth stage, and where the effects of disturbance (e.g. dieback, timber production, grazing) are either absent or now negligible.
Areas previously classified as old-growth forest	To protect and retain these areas as informal reserves despite their reclassification from old-growth forest.	Areas in the corporate database classified as old-growth forest on the commencement of the plan that are subsequently determined not to be old-growth forest or any other type of informal reserve (see Actions 3.2 and 3.3).
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[4] 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.

[4] Classification system for width and importance of streams, varying from one for minor streams, to five for major streams or rivers.

Informal reserve type	Purpose	Criteria for inclusion in Department's corporate database
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[5]. 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 in the corporate database as at December 2001 are shown 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.
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: (i) less than five per cent of their pre-European area in existing or proposed formal and informal reserves; or (ii) 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.
Regional Forest Agreement 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.

[5] Classification system for viewer sensitivity levels. Level one includes highways and other main roads with high (e.g. greater than 75 vehicles per day) levels of usage (sealed or unsealed). Level two includes main roads with moderate levels of usage (sealed or unsealed). Except for the Bibbulmun Track, travel route zones apply only in the Warren Region.

The fauna habitat zones introduced under the plan are not informal reserves (see Appendix 4).

Identification in the field

Pre-planning

During the pre-planning of any disturbing activity, base plans of the target area will be produced from the Department's corporate database, which identifies those areas of forest that are informal reserves.

Field confirmation and demarcation

At the reconnaissance stage of planning, operational staff are required to inspect the area to determine whether there are:

(a) any areas which they consider meet the criteria for inclusion in the Department's corporate database as an informal reserve, but are not identified in that database; or

(b) any areas that are identified in the Department's corporate database as informal reserves that they consider do not meet the criteria for inclusion in that database.

Once these areas are identified:

(a) Areas considered to meet the criteria for inclusion in the corporate database, but which are not identified in that database, will be treated as informal reserves until they are added to the corporate database. These areas will be demarcated as informal reserves in the field and on operational plans.

(b) Areas that are identified in the corporate database, but are not considered to meet the criteria for inclusion, may be treated as if they were not informal reserves. These areas need not be demarcated as informal reserves in the field or on operational plans.

In these cases, the relevant Regional Manager of the Department must approve proposed variations to the boundaries and locations of informal reserves in writing before any disturbance to these areas take place. A Variation to Coupe Plan form must be completed and submitted to the relevant Regional Manager for this purpose.

All proposed amendments to the boundaries and locations of informal reserves must be added to the Department's corporate database.

Different criteria need to be considered for the various types of informal reserves. These are outlined below.

Stream zones, travel route zones and diverse ecotype zones
Operational staff must inspect the target area to determine the presence of additional first order streams and diverse ecotype zones or the absence of first order streams and diverse ecotype zones identified in the corporate database. No additional checking of travel route zones is required.

Old-growth
The proposed operational target area must be checked against Departmental records for the presence of areas that meet the criteria for old-growth forest that have not been identified in the corporate database.

The areas adjacent to any old-growth forest patches identified in the corporate database will be inspected by applying, where practicable, a systematic grid survey spaced at approximately 100-metre intervals. If the boundaries of the old-growth patch are found to be more extensive than the database indicates, the survey is to be extended until the true boundaries of the area that meets the criteria for old-growth forest reserve are identified, and the Department's corporate database amended accordingly.

Areas identified in the corporate database at the commencement of the plan as old-growth forest that are subsequently assessed as non old-growth will remain excluded from timber harvesting and be reclassified as another type of informal reserve. Where no other type (e.g. diverse ecotype zone) is appropriate, the area will be reclassified to the informal reserve type 'Areas previously classified as old-growth forest'.

Less well reserved vegetation complexes, poorly reserved forest ecosystem, DFA accredited informal reserves and linkages between formal reserves

The boundary of the less well reserved vegetation complexes will be marked in the field using the boundary indicated in the Department's corporate database and field interpretation based on the description of the vegetation complex from Mattiske Consulting (2000). The Darling Scarp forest ecosystem will be marked in the field using the boundary indicated in the Department's corporate database and field interpretation. The DFA accredited informal reserve and the linkages between formal reserves will be marked from the boundary indicated in the Department's corporate database.

Forest with impeded access

In some forest areas, particularly in the southern forests, the heavy nature of the understorey makes it impracticable to undertake during the planning stage a complete survey for the presence of land meeting the criteria for inclusion in the corporate database as informal reserves. It is important therefore that at all stages of the preparation of a proposed disturbance operation, operational staff remain alert for potential variation to occur. For example, in the case of road construction, field verification of road alignments prior to roads being cleared and constructed may be an opportune time for further inspection to occur. In forests with a heavy understorey, verification of proposed new road alignments is achieved through blade up scrub rolling of understorey. This allows for an increased area to be accessible for inspection before more significant disturbance, such as road building activity, takes place.

Demarcation of boundaries

Demarcation of river and stream zones, travel route zones and diverse ecotype zones will be as described in the specifications, (as amended from time to time), in the Forest Products Commission's Manual of Management Guidelines for Timber Harvesting in WA. Specified distances are to be measured from the stream bank for stream zones, from the road formation for travel route zones and from the boundary of diverse ecotype zones.

Demarcation of confirmed old-growth patches and less well reserved vegetation complexes will be as defined for other informal reserves in the Forest Products Commission's Manual of Management Guidelines for Timber Harvesting in WA. This involves painting white crosses on trees, with the cross facing away from the reserved area and into the harvesting area. No buffers are to be placed on the old-growth forest patch boundary.

All informal reserves are to be identified and demarcation completed before operations commence.

Disturbance of informal reserves

General

The following activities are not permitted in informal reserves:

(a) timber harvesting other than:

(i) permitted thinning in travel route zones that:

- are not identified on the Department's corporate database as being accredited in the RFA as contributing to the representativeness of the reserve system;
- contain regrowth forest; and
- in the opinion of the relevant Regional Manager of the Department, will occur in a manner that will enhance in the long term the visual quality of the landscape;

(ii) salvage from road clearing and salvage of individual trees removed for safety reasons;

(b) extraction of basic raw materials;

(c) craftwood collection; and

(d) firewood collection.

Road and trail construction

In general, new road, walking trail or other track construction should not occur in informal reserves. However, in some cases the construction of a new road, walking trail or other track in an informal reserve is necessary. Examples occur where stream crossings are required in timber harvesting operations or when the upgrade of an existing track through an informal reserve may be more environmentally acceptable than other options. Road, walking trail or other track construction within an informal reserve, other than old-growth forest reserve, shall not occur without the approval of the relevant Regional Manager of the Department.

Construction or upgrading of new roads, walking trails and other tracks in old-growth forest reserve is to occur only with the approval of the Director of Forests, who will give that approval only where the construction of that road, walking trail or other track in old-growth forest reserve is considered essential.

The placement of roads, walking trails and other tracks upslope from informal reserves other than stream zones is generally to be avoided, particularly in the case of roads to be used in all weather conditions, in order to reduce the risk of introducing *Phytophthora* to the informal reserve.

Timber harvesting

Timber harvesting will not occur in informal reserves, and harvesting machinery is prohibited from crossing informal reserve boundaries except where:

(a) the relevant Regional Manager of the Department approves in writing:

- permitted thinning in travel route zones;
- the removal of trees in the course of the construction of a road, walking trail or other tracks; and
- the removal of individual trees for safety reasons along public access roads, around recreation sites or adjacent to work sites.

(b) a tree within the boundary of an informal reserve, other than old-growth forest, presents a safety hazard to workers in the area subject to harvesting, and has been tree-marked by a forest officer of the Department before it is felled. Where an unsafe tree exists in old-growth forest reserve adjacent to a harvesting coupe the tree is not to be felled and the hazard will be avoided by establishing an adequate buffer around the hazardous tree.

Trees within the harvesting area leaning into informal reserves may only be felled using a tree-jacking system. Where a tree accidentally falls into an informal reserve, other than old-growth forest reserve, it is to be left where it falls unless the log can be extracted without compromising the integrity of the reserve. In the case of old-growth forest, such trees are to be left where they fall in all cases.

Fire

A burn prescription for an area that includes an informal reserve must identify the informal reserve and any special requirements with respect to prescribed burning. However, the inclusion of informal reserves in areas burnt by low intensity prescribed fire to meet general fuel reduction or biodiversity objectives is generally acceptable with no special precautions to be applied.

The inclusion of informal reserves in both jarrah and karri regeneration burning is to be avoided where practicable. Where this is not practicable due to burn security or the need for excessive disturbance to keep fire out of the informal reserve, prescribed burning of informal reserves may occur. This should be clearly defined in the prescribed burn concept plan for approval by the relevant Regional Manager of the Department and the objective should be for a low intensity fire.

In the event of wildfire, protection of informal reserves will be considered in the context of broader environmental values and other values threatened by the fire. For example, it is not sensible to protect an informal reserve if this would require track construction with greater risk of long-term environmental consequences or lead to higher value losses elsewhere.

The felling of burning trees for burn security reasons in informal reserves, including old-growth, requires the approval of the incident commander.

Wildflower harvesting

Management of flora harvesting is through the Departmental District Manager endorsement of the picker's licence for specific species and areas from which harvesting may occur. Informal reserves will generally not be endorsed areas for wildflower harvesting. However, some wildflower species currently sought occur naturally in stream zones or diverse ecotype zones. The Department will prepare a list of such species and District Managers may endorse harvesting in informal reserves for these species, where the harvesting would not significantly impact on the values of the informal reserve.

The authority for approving wildflower harvesting in informal reserves will be retained by the relevant District Manager of the Department or their delegated officer.

Recreation sites

In general, new recreation sites should not be located in informal reserves. Proposals to locate a recreation site in an informal reserve will be assessed on a case-by-case basis and require the approval in writing of the relevant Regional Manager of the Department. Proponents will need to demonstrate that the proposal will not significantly impact on the values for which the informal reserve was established.

Apiary sites

In general, new apiary sites should not be located in informal reserves. Proposals to locate an apiary site in an informal reserve will be assessed on a case-by-case basis and require the approval in writing of the relevant Regional Manager of the Department. Proponents will need to demonstrate that the proposal will not significantly impact on the values for which the informal reserve was established. Existing apiary sites may be relocated out of informal reserves at the discretion of the relevant Regional Manager of the Department.

Basic raw material extraction

Extraction of basic raw material is excluded from informal reserves and machinery involved in extraction of basic raw materials is prohibited from crossing informal reserve boundaries, unless the approval in writing of the relevant Regional Manager of the Department has been obtained. Existing extraction sites in informal reserves should, where reasonable and practicable, be closed and rehabilitated.

Mining and petroleum operations (including exploration)

The Department will make submissions in relation to mining and petroleum proposals submitted to it for comments or advice which seek to reduce the impact of those proposals on informal reserves.

Utilities

The Department will make submissions in relation to proposals for the establishment of infrastructure submitted to it for comments or advice which seek to reduce the impact of those proposals on informal reserves.

Specific informal reserves

Travel routes in the Department's corporate database (December 2001)

Level 1 travel routes (all or part of the following roads)

Andrew Road
Bibbulmun Track
Big Tree Road
Boorara Road
Cascades Track
Channybearup Road
Chindalup Trail
Mordalup Road
Muir Highway
Old Vasse Road
Pemberton North Road
Pemberton-Northcliffe Road
Pemberton-Northcliffe Tramway
Perup Road

Collins Road
Cormint Road/un-named track
Coronation Road
Cutting Road
Diamond Tree Road
Davidson/Graphite Road
Deeside Coast Road
Dog Road
Donnelly Mill Road
Donnelly Drive (Panda, Gordon, Mobil Roads)
Eastbourne Road
Eastbrook Road
Glauders Road
Kuranda Road
Middlesex Road
Mockerdillup Road
Pine Creek Road
Peppermint Grove Road
Ritter Road
River Road
Rainbow Trail
Sears Road
Seven Day Road
Smith Road
South West Highway
Spencer Road
Stirling Road
Tom Road
Tramway Trail
Vasse Highway
Wheatley Coast Road

Level 2 travel routes (all or part of the following roads)

Allis Road
Corballup Road
Grays Road
Hughes Road
Malimup Track
Moons Crossing Road
Nornalup Road
Orchid Road
Pozzi Road
Richardson Road
River Road
Seaton Ross Road
Scott Road
Thompson Road
West Palgarup Road

Less well reserved vegetation complexes

Vegetation complexes with less than five per cent of pre-European area in existing and proposed formal plus informal reserves and that occur on State forest.

BLf (Balingup valley floors) - 0.7 per cent reserved, 5 per cent remaining, informally reserve 7 hectares on State forest
BT (Bridgetown) - 1.7 per cent reserved, 12 per cent remaining, informally reserve 301 hectares on State forest
Fo (Forrestfield) - 4.0 per cent reserved, 25 per cent remaining, informally reserve 12 hectares on State forest
ML (Mumballup) - 0.9 per cent reserved, 4 per cent remaining, informally reserve 1 hectare on State forest
NWg1 (Newgalup) - 4.2 per cent reserved, 6 per cent remaining, informally reserve 10 hectares on State forest
SC (Sidcup) - 4.3 per cent reserved, 31 per cent remaining, informally reserve 82 hectares on State forest
Wi (Williams) - 0.5 per cent reserved, 11 per cent remaining, informally reserve 2 hectares on State forest
Yd (Yelverton sandy deposits) - 2.8 per cent reserved, 12 per cent remaining, informally reserve 8 hectares on State forest
Yw (Yelverton valleys and depressions) - 1.8 per cent reserved, 12 per cent remaining, informally reserve 111 hectares on State forest
TP (Toponup) - 2.7 per cent reserved, 98 per cent remaining, informally reserve 121 hectares on State forest

Vegetation complexes with between five per cent and 10 per cent of pre-European area in existing and proposed formal plus informal reserves, and less than 15 per cent of pre-European area remaining and that occur on State forest.

NWf2 (Newgalup) - 5.7 per cent reserved, 9 per cent remaining, informally reserve 23 hectares on State forest

APPENDIX 4

Fauna habitat zones

The purpose of this appendix is to set out the implementation and management requirements for fauna habitat zones established by the plan. The Department will develop the requirements in this appendix into Guidelines for the Selection and Management of Fauna Habitat Zones.

Objective of fauna habitat zones

The principal purpose of fauna habitat zones is to provide a strategy to meet the plan's objective of ensuring that biodiversity recovers between one rotation and the next. The zones fulfil this purpose by providing a sufficiently extensive network of areas excluded from timber harvesting in the mid-term within State forest and timber reserves. The design of the network of zones therefore applies at the landscape scale, with implementation then occurring at the forest block and coupe scales. The zones are intended to maintain both fauna populations within themselves, and to provide a source for the recolonisation of nearby areas after timber harvesting.

Identification of indicative fauna habitat zones

Indicative fauna habitat zones of a minimum 200-hectare size will be located across all forest types. Where the shape becomes elongated, the minimum width at the narrowest point should be 150 metres.

Generally the boundaries of these indicative fauna habitat zones will be between two and four kilometres apart. They may, where considered appropriate, be located wholly or partly in informal reserves. In addition, the boundaries of an indicative fauna habitat zone should generally be between two and four kilometres from the nearest formal reserve.

However, in Warrup, Corbal, Mersea, Dudijup and Kingston forest blocks adjacent to the proposed Greater Kingston National Park, where there will be a greater concentration of indicative fauna habitat zones, separation distances between zones, and between zones and the nearest formal reserve may be less than two kilometres. In addition, the separation distances between zones, and between zones and the nearest formal reserve, may be more than four kilometres:

- in areas surrounded or largely surrounded by cleared land in which opportunities to recolonise surrounding forest are limited;
- in forest blocks where more than 20 per cent of the area in the block is already contained within existing and proposed formal and informal reserves;
- in areas where the Department, in consultation with the Conservation Commission, considers that a higher separation distance would capture a wider variety of habitat types; and
- to accommodate the greater concentration of indicative fauna habitat zones in Warrup, Corbal, Mersea, Dudijup and Kingston forest blocks adjacent to the proposed Greater Kingston National Park.

The area of indicative fauna habitat zones outside informal reserves will be between 50,000 and 55,000 hectares.

Where a fauna habitat zone is identified in the Department's corporate database, the map of indicative fauna habitat zones will be updated to reflect the Department's database.

Location of indicative fauna habitat zones

Indicative fauna habitat zones will be spread over the landscape to overlay a broad range of soil and landforms to capture a variety of habitat types.

In considering their location, the Department will, where appropriate, have regard to the following considerations:

- the presence of threatened species and mature habitat elements;
- where it is not reasonable and practicable to locate indicative fauna habitat zones in only mature forest, areas of regrowth may be included;
- contiguous areas providing enhanced linkage to other areas of lesser disturbed forest are preferable;
- the perimeter to area ratio should be as low as reasonable and practicable;
- heavily roaded areas should be avoided;
- proximity to cleared property should be as low as reasonable and practicable; and
- where reasonable and practicable, areas which are less impacted by, or at risk from, dieback should be preferred.

Disturbance activities in indicative fauna habitat zones

Where reasonable and practicable, the Department and Forest Products Commission will seek to avoid the location of new roads or the clearing of significant areas of native vegetation in indicative fauna habitat zones.

Otherwise, no special provisions will apply to indicative fauna habitat zones.

Identification of fauna habitat zones

Fauna habitat zones are those areas identified on the Department's corporate database as fauna habitat zones.

The Department will identify on its corporate database any fauna habitat zones proposed to be located in areas the subject of an annual timber harvesting plan or a rolling three-year indicative timber harvesting plan, before those plans are implemented. In identifying those zones on the corporate database the Department will, where appropriate, have regard to the considerations set out in relation to the identification and location of indicative fauna habitat zones.

Disturbance activities in fauna habitat zones

The provisions for disturbance activities are the same as for stream zones identified in Appendix 3.

Rotation of zones over time

Areas identified as fauna habitat zones can be rotated over time as alternative areas of regenerating forest are able to replace the purpose of fauna habitat zones.

Economic and social considerations

The principle of least cost should be used and, where different configurations of fauna habitat zones are identified as meeting the criteria, the configuration that imposes the least cost on the community should be adopted.

APPENDIX 5

Silviculture Guidelines

The purpose of this appendix is to set out the amendments to the jarrah, karri and wandoo Silviculture Guidelines that have been developed by the Department. The changes summarised in this appendix will be incorporated into the jarrah, karri and wandoo Silviculture Guidelines as soon as practicable after the commencement of the plan, and no later than 31 December 2004.

Reduced impact of silvicultural operations on flora diversity and abundance

Issue
Mechanical disturbance of the vegetation and soil occurs incidentally during commercial timber harvesting but may also be undertaken after commercial timber harvesting to reduce competition to jarrah advance growth and to enable jarrah seedlings to establish following germination. The shelterwood silvicultural treatment is often accompanied by such disturbance to ensure jarrah seedlings are able to establish and develop a lignotuber.

However, the Kingston research project found disturbance reduced the species richness and abundance of understorey plants compared to undisturbed areas in the short term (Burrows *et al.* 2002). Understorey species are an important source of food and shelter for fauna hence there needs to be a balance between regeneration and the conservation of biodiversity.

While it is still the intention of the silvicultural treatment to disturb the ground and reduce the competition from understorey species, the impact on flora diversity and abundance can be reduced to acceptable levels with appropriate guidelines.

Implementation
The following measures are to be included in the jarrah Silviculture Guidelines:

- Pushing of understorey species to promote regeneration of jarrah will only be undertaken in areas where there is clear evidence of the past presence of jarrah, such as old stumps.

- Balga (*Xanthorrhoea* preissii) thickets should generally be preserved.

- Push down treatments of the understorey will focus on groups or clumps of species such as bull banksia (*Banksia grandis*) and sheoak (*Allocasuarina fraiseriana*) that are impeding regeneration establishment. Approximately 20 per cent of these groups or clumps of species should be retained as small clumps (0.02 hectare) or as scattered individuals. Avoid push down where these species occur as scattered (greater than 10 metres apart) individuals rather than clumps.

- Retain scattered mature individuals of species such as balga, woody pear *(Xylomelum occidentale)*, river banksia *(Banksia verticillata)*, snottygobble *(Persoonia longifolia)*, *Persoonia elliptica*, Western Australian peppermint *(Agonis flexuosa)*, Western Australian Christmas tree *(Nuytsia floribunda)*.

- Disturbance of the top soil is to be avoided where reasonable and practicable in order to protect the potentially valuable understorey seed store, except in the situation where heavy rootstock regenerating understorey occurs (e.g. tea tree thickets in the southern forest). In this situation, physical disturbance of the top-soil to remove competing rootstock is necessary up to a limit of 50 per cent of the harvested area in a configuration to facilitate even seedling establishment.

Marri to be retained due to a reduction in the chipwood market

Issue

Where the silvicultural objective is to regenerate following harvesting, it is necessary to ensure there is a sufficient area free from the competition exerted by surrounding trees for the regeneration to establish and grow. Selection harvesting of karri from about 1940 to 1967 failed to do this and as a result very little of the regrowth from that era will contribute to future production. Ensuring the release of established regeneration and the growth of crop trees also requires reducing the competition from surrounding trees.

Where reasonable and practicable, the removal of trees inhibiting regeneration establishment or release, or competing with crop trees, is achieved as part of a commercial operation where they are felled and sold. However, this is difficult if only one species in a mixed stand is commercially desirable. This is the potential situation with karri/marri and jarrah/marri stands, due to very few marri trees being suitable for sawlogs. The availability of a market for marri as chipwood resolved that issue from the mid 1970s until recently when the original market ceased but a smaller one opened up.

Where trees cannot be removed as part of the commercial operation, additional work is required to reduce the competition on developing regeneration or retained crop trees to reasonable levels. This is generally referred to as culling or felling to waste and the trees to be removed are referred to as culls. They may be large trees, intermediate trees or small-sized trees depending on the particular situation.

With the reduced market for marri chipwood, there is a requirement to manage marri in harvesting operations. This must balance:

(a) the cost and waste, and the loss of biodiversity, resulting from culling; and

(b) the requirement to reduce competition to enable regeneration of karri and jarrah removed as sawlogs.

Implementation

Basal area guidelines for culling are to be included in the jarrah and karri Silviculture Guidelines. The guidelines will result in some marri being culled to facilitate regeneration while accepting that a large component of the marri will be left to grow on as part of the resulting forest structure.

The objective is to maximise the area suitable for regeneration with the minimum amount of culling. Guidelines will reflect the following:

Karri clearfell

- No culling is to be done where the basal area of marri greater than 50 centimetres diameter after the harvesting operation is more than 12 square metres per hectare as this will result in excessive waste.

- Where the basal area of marri greater than 50 centimetres diameter is between 6 and 12 square metres per hectare, culling can be undertaken to enhance gaps that have been created by harvesting karri to create gaps of a minimum of 120 metres wide (1.4 hectares). Enhancing gaps should be achieved by:

    - removing all trees less than 30 centimetres diameter;
    - removing marri trees greater than 30 centimetres diameter to reduce the basal area to less than six square metres per hectare; and

- retaining trees that have obvious habitat potential.

- Where the basal area of marri trees greater than 50 centimetres diameter is less than six square metres per hectare, culling can be undertaken by:

  - removing all trees less than 30 centimetre diameter; and
  - removing those trees greater than 30 centimetres in diameter that have poor crowns, are dying, have hollow-butts, are leaning and trees containing 'widow makers' in the crown.

Jarrah gap

- No culling is to be done where the total basal area of retained trees remaining after the harvesting operation is more than 17 square metres per hectare as this will result in excessive waste.

- No culling is to be done where the total basal area of retained trees remaining after the harvesting operation is six square metres per hectare or less as it is unnecessary.

- Where the total basal area of retained trees remaining after the harvesting operation is between 17 square metres per hectare and six square metres per hectare then culling is acceptable:

  - in gaps of less than two hectares in area, remove trees less than 50 centimetres diameter that are located more than five metres from a habitat tree;
  - in gaps greater than two hectares in area, remove trees less than 50 centimetres diameter that are located more than five metres from a habitat tree, while maintaining the total basal area above five square metres per hectare.

Crop tree release

- Remove all culls within four metres of a crop tree that are located more than five metres from a habitat tree.

Other key changes to the existing jarrah guidelines

Exclusion of old-growth areas from harvesting

A separate management guideline has been developed for this in Appendix 3.

Revised habitat retention requirements

Results from the Kingston research project indicated the need to increase the retention of primary habitat trees from the level of four trees per hectare. A figure of six trees per hectare was proposed, but given the subsequent initiative to introduce fauna habitat zones, a retention rate of five habitat trees per hectare has been adopted. The characteristics required for these trees will also change, having the effect of retaining less vigorous more senescent trees than before. A further six to eight secondary habitat trees per hectare will be retained in addition to the five primary habitat trees.

An additional requirement to explicitly mark for retention of balga (grass trees) is introduced, to provide greater diversity of retained habitat for, in particular, ring-tail possums. The work that has been completed in Kingston has identified balga as an important refuge site for this species. Where available, four large balga per hectare will be marked for retention.

A requirement to retain all natural hollow logs with a pipe of more than 10 centimetres diameter, and length of more than three metres will be introduced.

A greater emphasis will be placed on the protection of retained habitat from fire applied during the regeneration process.

Predator control
A significant addition is the fox baiting to achieve predator control. This complements the greater emphasis on habitat retention at the coupe level and is intended to remove predator pressure on sensitive species during the period of regeneration of the forest when they are most vulnerable.

Planting jarrah in gaps in the southern high rainfall forest
Results of research conducted in the high rainfall southern forests have shown that planted jarrah seedlings can successfully grow into well formed saplings and poles without passing through a prolonged lignotuber phase. One silvicultural issue that has been identified in the high rainfall southern forests is the proliferation of marri regeneration following harvesting, which can preclude adequate jarrah regeneration. The introduction of planting jarrah seedlings will allow for a means of ensuring adequate, successful regeneration of jarrah on these sites.

Refinement to shelterwood retained basal area
Based on the results achieved with the application of the current guideline, the retained basal area in shelterwood treatments will be reduced from 15 square metres per hectare, to eight to 10 square metres per hectare. This will reduce competition from the retained overstorey, allowing more seedlings to establish successfully.

Management of areas infested with Phytophthora cinnamomi
A more precautionary approach to silvicultural treatment on sites where any intensification of dieback is likely to result in high impact to forest values is introduced. On these sites 15 square metres per hectare of overstorey cover will be retained.

On those sites where intensification of dieback is unlikely, as defined by rainfall and vegetation complex, silvicultural application would be the same as for forest uninfested with dieback.

Definition of an eastern jarrah type
The definition of eastern jarrah type forest in the Silviculture Guidelines has been modified to identify specific vegetation complexes located in a specific rainfall zone.

Application of coppice treatments
Greater emphasis is now placed on applying coppice treatments in gap application to achieve acceptable stocking levels. Coppice treatments have the advantage that the coppice regeneration already has a very well-developed root system, which means the growth of coppice shoots is rapid.

Jarrah planting
A guideline for jarrah planting is introduced, with two seed collection zones, north and south of the Preston River. This represents a precautionary approach as current data on genetic variability suggest minimal variation within the main jarrah belt.

Landing rehabilitation
Explicit requirements and success criteria for landing rehabilitation are introduced.

Regeneration surveys
All gaps greater than two hectares are to be monitored for regeneration success.

A measurement of retained forest structure (thinned forest) or measure of retained basal area is also introduced, particularly for establishment surveys in areas harvested to shelterwood. The requirement for this has been introduced on the basis that if the forest has been subject to a thinning or remains at full stocking of overstorey, establishment of regeneration cannot be expected and is not required. The retained basal area suggested is 12 square metres per hectare.

Management of fire damaged regrowth
Where wildfire has seriously damaged the growth potential of regrowth jarrah forest, guidelines for remedial treatments are introduced. Where damage is serious coppice treatments are suggested.

Other key changes to the existing karri guidelines

Exclusion of old-growth areas from harvesting
A separate management guideline has been provided for this in Appendix 3.

Management of two-tiered stands to conserve growing stock
The proposed management of these stands is to retain as much regrowth growing stock as is reasonable and practicable within harvesting constraints. The intent of this is to increase the amount of potential sawlog available in the mid-term. Previously only regrowth patches that met full stocking requirements or minimum patch dimensions, e.g. one to two hectares, have been considered.

Management of mature and two-tiered mixed forest
Currently these stands are harvested by clearfelling with the emphasis in regeneration focusing on the karri component. The new guideline proposes to manage these stands within the context of the jarrah Silviculture Guidelines, i.e. retention of habitat trees and crop trees with a more balanced approach to the maintenance of the mix of species in the regeneration phase. The effect would be that the regenerating forest would have greater structural diversity, and the regeneration a greater component of marri and jarrah relative to karri.

Limitations to clearfell patch size
The recommendation of the Ministerial Advisory Group on Karri and Tingle 1999 has been included. This limits the clearfell patch size in mature and two-tiered forest to 40 hectares, and 20 hectares in regrowth forest.

Marking of potential habitat trees
The marking of two potential habitat trees per hectare in clearfell coupes where marri is not retained is introduced to provide for continual recruitment of habitat in developing regrowth.

Landing rehabilitation
Explicit requirements and success criteria for landing rehabilitation are introduced.

Thinning with stump removal where Armillaria *is present*
Research has shown that *Armillaria* has the potential to be a significant concern for regrowth management. As recommended by research, stump pulling at the time of first thinning is prescribed for those areas where severe damage to regrowth stems from the fungus is evident.

Post-thinning burning
Guidelines prescribing conditions under which post-thinning burning can be carried out are introduced to reduce the risk of damage to retained stems.

Response to fire damage in regrowth
A decision matrix is introduced for management of regrowth stands suffering damage from wildfire. The aim of this matrix is to sustain the productive capacity of the stand.

Structural goal and 400-metre rule
The structural goal for karri that required retention of a minimum of 40 per cent of the forest in the mature and senescent stage and the growing on to senescent stage of a portion of the regrowth is removed. Similarly, the rule requiring a minimum of 400 metres between patches of forest with mature characteristics is removed.

The large increase in reservation of mature and regrowth forest, the informal reserves of old-growth and the retention of marri have made these measures superfluous.

Other key changes to the existing wandoo guidelines

Increased emphasis on habitat
A greater emphasis on retention of habitat is introduced. The guideline is similar, but less prescriptive, than the requirements described for jarrah.

Acceptable regeneration standard
There has been an amendment to the acceptable standard for successful regeneration. This has changed from 10 seedlings on 50 per cent of ashbed, to 10 seedlings on 70 per cent of ashbeds.

APPENDIX 6

Protection of soil in native forest harvesting

The purpose of this appendix is to set out the key requirements for the soil protection measures established by the plan. The requirements in this appendix will be incorporated into Soil and Water Conservation Guidelines that will be developed by the Department.

On commencement of the plan, the requirements in this appendix will be used as operational practice until the completion of the Soil and Water Conservation Guidelines.

Implementation

Defining acceptable soil moisture conditions for the operation of heavy machinery

1. The Soil Dryness Index (SDI) is a measure of soil moisture and will be used to set a threshold for the following risk levels for soil damage:
    - High risk is when the SDI is less than 250 in spring or less than 100 in autumn. Soils are wet and soil damage is likely in parts of most coupes for operations that involve snigging.
    - Medium to high risk is when the SDI is between 250 and 500 in spring or 100 and 500 in autumn. Soils are moist and soil damage is likely in parts of most coupes unless intensive management action is taken to avoid such damage and attention to soil type, topography and position in the landscape is given.
    - Medium risk is when the SDI is between 500 and 1000. Soils may be moist enough that soil damage could occur, depending on the specific soil, management and vehicle factors.
    - Low risk is when the SDI is greater than 1000. Soils are dry enough that operations with heavy machinery can proceed under normal conditions.

2. The SDI to be used to determine the risk level will be that estimated for the location of the harvesting operation. A method has been developed to correlate the SDI at the field location with that of the nearest weather record site.

3. The Director of Forests or a delegated officer will have the authority to set more specific SDI thresholds for particular soil types and the Conservation Commission will be notified when this occurs.

Management requirements associated with the risk levels for soil damage

Permissible management activities within the risk thresholds are:

<u>High risk</u>

- Harvesting with heavy machinery that includes snigging is not allowed.

- First thinning of young (less than 35-year-old) regrowth karri forest is allowable on the basis that a harvester/forwarder operation that does not involve snigging is used and that soil damage thresholds are not approached. The monitoring, survey and reporting requirements identified below will be satisfied.

- The loading and haulage of stockpiled logs on landings is permissible as long as either the landing is corduroyed or static boom loaders are employed, dieback management conditions are maintained and hard-surfaced all-weather roads are used.

Medium to high risk
Harvesting with heavy machinery is permissible subject to the following conditions:

- Landings and primary snig tracks are to be corduroy roaded to reduce compaction, unless otherwise approved by the Director of Forests or a delegated officer. Approval will only be given when the Director or the delegate is satisfied that corduroying is unnecessary, and the Conservation Commission will be notified.

- Harvest areas will be selected on the basis of characteristics that make the area more suitable for operations during periods of moist soil in terms of landforms and soil types.

- The Forest Products Commission is to brief harvesting contractors before they start operating in each harvest area.

- The Forest Products Commission is to ensure that:

    - the layout of primary and secondary snig tracks is planned prior to extraction, including if necessary the preparation of a map;
    - a herringbone pattern is adopted;
    - the use of old snig tracks is maximised and tracks are physically marked; and
    - duplicate, parallel and criss-crossing snig tracks are not constructed.

- The Forest Products Commission is to monitor soil damage visually on a daily basis – if the daily visual monitoring indicates that thresholds are being approached the formal survey should be initiated immediately and the Department should be notified.

- The Forest Products Commission is to monitor soil damage at least once per week, except for periods of low risk, using a formal survey which is to be completed and a copy provided to the Department.

- If the survey result indicates the threshold is exceeded or is likely to be exceeded if the operation continues, the operation should cease and the Department should be notified.

- If operations cease due to soil damage then they cannot recommence until the SDI has increased by 300.

- The Department will check soil damage following the opening of the harvest season and at critical points during the harvest period, e.g. after significant rainfall events.

- The Department will monitor Forest Products Commission compliance regarding delivery of reports and completion of assessments, and spot check field interpretation of soil damage.

Medium risk
Harvesting with heavy machinery is permissible subject to the same conditions as during the medium to high risk period, except that:

- establishment of corduroy roads is not required;
- snig tracks do not need to be physically marked; and
- landforms and soil types suitable for moist soil do not need to be used.

Low risk
Harvesting with heavy machinery is permissible subject to the following condition:

- If significant rainfall events (SDI reduced by 400) occur then the conditions that apply to medium risk should be applied.

Measuring soil damage

Soil damage is to be assessed in terms of visible disturbance, landings, rutting and erosion. The following limits will be defined in the Soil and Water Conservation Guidelines. Measurement will be on the basis of feller's block or sub coupe:

Table 6: Soil disturbance limits

Type of disturbance	Measure	Limit
Very severe visible soil disturbance*	For all areas other than landings, the percentage of the total area impacted.	0 per cent
Defined as the subsoil removed and parent material exposed or mixed with subsoil parent material.	For landings, the area of landings impacted as a percentage of the total harvest area.	1.5 per cent in jarrah
		1 per cent in karri thinning
		3.5 per cent in karri clearfall
	For rutting, the depth and length of the rutting.	150 mm maximum depth for gravel and sand soils, 300 mm maximum depth for other soils; depths not to be exceeded over 20 m length of feeder snig tracks.
	Erosion	Erosion control measures installed as per Contractors Timber Harvesting Manual for South West Native Forests and only minor erosion occurs and is limited to between erosion control measures.
Severe visible soil disturbance*	For all areas other than landings the percentage of the total area impacted.	2 per cent in jarrah
Defined as the topsoil completely removed and subsoil exposed or the topsoil mixed with subsoil (B horizon), or the subsoil disturbed, or subsoil mixed with parent material, or the subsoil partially removed.		1 per cent in karri thinning
		1 per cent in karri pre-logging
		2 per cent in karri clearfall (including pre-logging)
	Landings, rutting and erosion.	As for the limits of the 'very severe visible soil disturbance' category.

Type of disturbance	Measure	Limit
Moderate visible soil disturbance*	For all areas other than landings the percentage of the total area impacted.	8 per cent in jarrah
		8 per cent in karri thinning
		5 per cent in karri pre-logging
Defined as the topsoil mixed with subsoil (A horizon) or the topsoil partially removed.		15 per cent in karri clearfall (including pre-logging)
	Landings, rutting and erosion.	As for the limits for the 'very severe visible soil disturbance' category.

* Visible soil disturbance will be further defined in the Soil and Water Conservation Guidelines (see Raison and Rab 2001, Whitford 2001).

The Director of Forests or a delegate will have the authority to set more specific rutting depth thresholds for particular soil types, and the Conservation Commission will be notified when this occurs.

Review of implementation

The Forest Products Commission will collate its monitoring, formal survey records and other relevant information after a one-year trial of this new system, together with a summary of all incidents recorded through the Forest Products Commission's EMS related to soil values, and provide a written report to the Department and the Conservation Commission, to allow the effectiveness of the system to be evaluated. In addition, auditing of compliance with the proposed new requirements will be undertaken as part of the annual management audit process for forest operations. The new soil protection measures will be reviewed and revised if appropriate to achieve the objective.

APPENDIX 7

Departmental policies relevant to forest management

No.	Title	Issued or amended
	Approved policies	
1A	Planning	1986
2	Local Government Authority access to Basic Raw Materials from State forest and timber reserves	1993
3	Management of *Phytophthora* and disease caused by it	1998
9	Conservation of threatened flora in the wild	1992
10	Rehabilitation of disturbed land	1986
13	Commercial flora harvesting	1993
14	Weeds on CALM lands	1986
15	Community involvement	2001
18	Recreation, tourism and visitor services	1991
19	Fire management	1987
22	Taking, keeping and display of live reptiles	1992
25	Community education and interpretation	1988
29	Translocation of threatened flora and fauna	1995
31	Management of reserves for the conservation of nature	1990
33	Conservation of endangered and specially protected fauna in the wild	1991
34	Visual resource management of lands and waters managed by CALM	1989
40	Road management	1991
41	Beekeeping on public land	1992
44	Wildlife management programs	1992
50	Setting priorities for the conservation of Western Australia's threatened flora and fauna	1994
53	Visitor risk management policy	1997
54	Defence force training on CALM managed lands and waters	1996
55	Commercial filming on CALM managed lands and waters	1998
56	Risk management	2000
	Draft policies	
	Management of pest animals on CALM managed land	1999
	Environmental weed management	1999
	Public Participation Policy	2000
	Aboriginal involvement in nature conservation and land management	2000
	Management of non-indigenous cultural heritage on CALM estate	2001

APPENDIX 8

Area reservation levels of forest ecosystems

	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (ha)	Present extent on all lands vested in the Conservation Commission in the three regions (ha)	CAR Target (ha)	Formal reserves Area of ecosystem representation (hectares) Existing gazetted as at 30.6.2003 (Additions proposed)				FCA (ha)	CAR Informal (ha)	CAR Total (ha)	Other Informal (ha)	Available for timber harvesting (ha)
					NP	NR	CP	5(1)(g),(h)					
Jarrah dominant													
Jarrah Blackwood	347,200	281,810	269,560	52,080	8,190	220	0	20	0	6,110	14,540	25,420	149,340
					(64,950)	(1,790)	(6,340)	(0)	(7,180)		(80,260)		
Jarrah Leeuwin	56,400	19,550	9,520	8,460	2,520	60	0	0	0	270	2,850	50	750
					(5,330)	(0)	(0)	(0)	(540)		(5,870)		
Jarrah Mt Lindesay	126,600	37,570	22,860	18,990	830	730	0	0	0	0	1,560	20	290
					(16,760)	(0)	(0)	(0)	(4,230)		(20,990)		
Jarrah North East	717,100	350,240	259,570	107,570	22,800	4,570	4,180	0	0	6,270	37,820	15,220	126,700
					(40,330)	(4,500)	(34,770)	(0)	(230)		(79,830)		
Jarrah North West	670,600	499,600	446,600	100,590	29,480	1,170	8,250	12,520	0	17,920	69,320	39,960	294,860
					(30,610)	(1,820)	(6,790)	(230)	(3,010)		(42,460)		
Jarrah Rates's Tingle	1,500	1,250	1,160	1,250	990	0	0	0	0	0	990	0	0
					(170)	(0)	(0)	(0)	(0)		(170)		
Jarrah Red Tingle	350	270	230	270	150	0	0	0	0	0	150	0	0
					(80)	(0)	(0)	(0)	(0)		(80)		
Jarrah Sandy	107,900	71,090	63,890	16,190	8,400	230	0	0	0	1,320	9,950	5,040	33,110
					(7,380)	(0)	(8,180)	(0)	(230)		(15,790)		
Jarrah South	557,300	438,920	420,120	83,600	51,940	350	0	0	0	8,590	60,880	32,640	146,800
					(169,510)	(960)	(1,070)	(10)	(8,250)		(179,800)		
Jarrah Unicup	81,000	29,460	16,320	12,150	1,260	3,940	0	0	0	10	5,210	40	50
					(9,810)	(40)	(0)	(0)	(1,170)		(11,020)		

APPENDIX 8 (cont.)

Area reservation levels of forest ecosystems

	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (ha)	Present extent on all lands vested in the Conservation Commission in the three regions (ha)	CAR Target (ha)	Formal reserves Area of ecosystem representation (hectares) Existing gazetted as at 30.6.2003 (Additions proposed)				FCA (ha)	CAR Informal (ha)	CAR Total (ha)	Other Informal (ha)	Available for timber harvesting (ha)
					NP	NR	CP	5(1)(g),(h)					
Jarrah Woodland	106,400	67,220	51,030	15,960	8,790	2,520	230	160	0	14,890	26,650	7,750	0
					(12,540)	(600)	(2,640)	(0)	(910)		(16,690)		
Jarrah Yellow Tingle	11,600	9,670	8,390	1,740	1,770	0	0	0	0	0	1,770	0	0
					(5,920)	(0)	(0)	(0)	(690)		(6,610)		
Sub total	**2,783,950**	**1,806,650**	**1,569,250**		**137,120**	**13,790**	**12,660**	**12,700**	**0**	**55,360**	**231,630**	**126,140**	**751,910**
					(363,390)	**(9,710)**	**(59,790)**	**(240)**	**(26,440)**	**(0)**	**(459,570)**	**(0)**	
Karri dominant													
Karri Main Belt	193,000	163,910	152,940	28,950	36,910	220	10	0	0	7,820	44,960	14,970	59,870
					(31,510)	(100)	(400)	(0)	(1,130)		(33,140)		
Karri Rate's Tingle	1,100	860	790	860	790	0	0	0	0	0	790	0	0
					(0)	(0)	(0)	(0)	(0)		(0)		
Karri Red Tingle	7,200	5,860	5,230	1,080	4,920	0	0	0	0	0	4,920	0	0
					(310)	(0)	(0)	(0)	(0)		(310)		
Karri West Coast	14,500	6,270	4,560	2,180	3,880	30	0	0	0	0	3,910	20	70
					(520)	(20)	(0)	(0)	(20)		(560)		
Karri Yellow Tingle	15,800	13,260	11,730	2,370	2,410	0	0	0	0	0	2,410	0	60
					(8,740)	(0)	(0)	(0)	(520)		(9,260)		
Sub total	**231,600**	**190,160**	**175,250**		**48,910**	**250**	**10**	**0**	**0**	**7,820**	**56,990**	**14,990**	**60,000**
					(41,080)	**(120)**	**(400)**	**(0)**	**(1,670)**	**(0)**	**(43,270)**	**(0)**	

APPENDIX 8 (cont.)

Area reservation levels of forest ecosystems

	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (ha)	Present extent on all lands vested in the Conservation Commission in the three regions (ha)	CAR Target (ha)	Formal reserves Area of ecosystem representation (hectares) Existing gazetted as at 30.6.2003 (Additions proposed) NP	NR	CP	5(1)(g),(h)	FCA (ha)	CAR Informal (ha)	CAR Total (ha)	Other Informal (ha)	Available for timber harvesting (ha)
Wandoo dominant													
Western Wandoo forest	363,200	146,600	101,620	54,480	15,250	3,790	7,670	0	0	2,190	28,900	5,720	28,720
					(21,440)	(700)	(16,100)	(0)	(50)		(38,290)		
Western Wandoo woodland	163,000	72,080	44,080	24,450	11,400	1,510	760	0	0	980	14,650	1,990	7,750
					(10,320)	(210)	(9,160)	(0)	(0)		(19,690)		
Sub total	**526,200**	**218,680**	**145,700**		**26,650**	**5,300**	**8,430**	**0**	**0**	**3,170**	**43,550**	**7,710**	**36,470**
					(31,760)	**(910)**	**(25,260)**	**(0)**	**(50)**	**(0)**	**(57,980)**	**(0)**	
Other													
Bullich and Yate	2,800	2,440	2,160	2,440	1,510	0	0	0	0	0	1,510	0	0
					(650)	(0)	(0)	(0)	(0)		(650)		
Darling Scarp	29,000	9,940	2,620	4,350	1,220	110	0	40	0	30	1,400	220	0
					(430)	(460)	(40)	(0)	(70)	(0)	(1,000)		
Peppermint and Coastal Heath	80,100	70,830	58,090	12,020	52,160	1,420	0	10	0	200	53,790	10	0
					(4,290)	(0)	(0)	(0)	(0)		(4,290)		
Rocky Outcrops	26,400	12,440	12,670	3,960	4,320	50	80	50	0	1,810	6,310	2,510	0
					(3,400)	(0)	(400)	(0)	(50)		(3,850)		
Sand Dunes	11,100	11,070	11,070	1,660	10,860	0	0	0	0	0	10,860	0	0
					(210)	(0)	(0)	0)	(0)		(210)		

APPENDIX 8 (cont.)

Area reservation levels of forest ecosystems

	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (ha)	Present extent on all lands vested in the Conservation Commission in the three regions (ha)	CAR Target (ha)	Formal reserves Area of ecosystem representation (hectares) Existing gazetted as at 30.6.2003 (Additions proposed)				FCA (ha)	CAR Informal (ha)	CAR Total (ha)	Other Informal (ha)	Available for timber harvesting (ha)
					NP	NR	CP	5(1)(g),(h)					
Shrub, Herb, and Sedgelands	429,900	293,780	254,460	64,490	88,470	5,070	170	400	0	19,390	113,500	12,370	0
					(116,640)	(1,010)	(990)	(20)	(9,930)		(128,590)		
Swamps	15,300	8,070	6,540	2,300	4,270	880	0	20	0	130	5,300	270	0
					(750)	(70)	(130)	(0)	(20)		(970)		
Sub total	**594,600**	**408,570**	**347,610**		**162,810**	**7,530**	**250**	**520**	**0**	**21,560**	**192,670**	**15,380**	**0**
					(126,370)	**(1,540)**	**(1,560)**	**(20)**	**(10,070)**	**(0)**	**(139,560)**		
Total	**4,136,350**	**2,624,060**	**2,237,820**		**375,490**	**26,870**	**21,350**	**13,220**	**0**	**87,910**	**524,840**	**164,220**	**848,380**
					(562,600)	**(12,280)**	**(87,010)**	**(260)**	**(38,230)**	**(0)**	**(700,380)**	**(0)**	

Notes:
1. All area figures are confined to the Department's three forest regions (Swan, South West, Warren) where they fall within the RFA boundary.
2. Ecosystem and land category datasets have been updated since the RFA.
3. Pre-1750 extent of some ecosystems has not been revised to accommodate minor editing/update of contributing datasets.
4. Jarrah Mt Lindesay and Shrub, Herb, and Sedgelands reported in the RFA extended into the Department's South Coast region.
5. The 60 hectares of karri yellow tingle available for timber harvesting are regrowth forest on land held under title by the Executive Director.

APPENDIX 9

Percentage reservation levels of forest ecosystems

	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (% pre-1750)	Present extent on all lands vested in the Conservation Commission in the three regions (% pre-1750)	CAR Target (% pre-1750)	Formal reserves Ecosystem representation as a percentage of pre-1750 extent Existing gazetted as at 30.6.2003 (Additions proposed)				FCA (% pre-1750)	CAR Informal (% pre-1750)	CAR Total (%pre-1750)	Other Informal (% pre-1750)	Available for timber harvesting (% pre-1750)
					NP	NR	CP	5(1)(g),(h)					
Jarrah dominant													
Jarrah Blackwood	347,200	81	78	15	2.4	0.1	0.0	0.0	0.0	1.8	4.2	7.3	43.0
					(18.7)	(0.5)	(1.8)	(0.0)	(2.1)	(0.0)	(23.1)		
Jarrah Leeuwin	56,400	35	17	15	4.5	0.1	0.0	0.0	0.0	0.5	5.1	0.1	1.3
					(9.5)	(0.0)	(0.0)	(0.0)	(1.0)	(0.0)	(10.4)		
Jarrah Mt Lindesay	126,600	30	18	15	0.7	0.6	0.0	0.0	0.0	0.0	1.2	0.0	0.2
					(13.2)	(0.0)	(0.0)	(0.0)	(3.3)	(0.0)	(16.6)		
Jarrah North East	717,100	49	36	15	3.2	0.6	0.6	0.0	0.0	0.9	5.3	2.1	17.7
					(5.6)	(0.6)	(4.8)	(0.0)	(0.0)	(0.0)	(11.1)		
Jarrah North West	670,600	75	67	15	4.4	0.2	1.2	1.9	0.0	2.7	10.3	6.0	44.0
					(4.6)	(0.3)	(1.0)	(0.0)	(0.4)	(0.0)	(6.3)		
Jarrah Rates's Tingle	1,500	83	77	100% extant	79.2	0.0	0.0	0.0	0.0	0.0	79.2	0.0	0.0
					(13.6)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(13.6)		
Jarrah Red Tingle	350	77	66	100% extant	55.6	0.0	0.0	0.0	0.0	0.0	55.6	0.0	0.0
					(29.6)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(29.6)		
Jarrah Sandy	107,900	66	59	15	7.8	0.2	0.0	0.0	0.0	1.2	9.2	4.7	30.7
					(6.8)	(0.0)	(7.6)	(0.0)	(0.2)	(0.0)	(14.6)		
Jarrah South	557,300	79	75	15	9.3	0.1	0.0	0.0	0.0	1.5	10.9	5.9	26.3
					(30.4)	(0.2)	(0.2)	(0.0)	(1.5)	(0.0)	(32.3)		
Jarrah Unicup	81,000	36	20	15	1.6	4.9	0.0	0.0	0.0	0.0	6.4	0.0	0.1
					(12.1)	(0.0)	(0.0)	(0.0)	(1.4)	(0.0)	(13.6)		

APPENDIX 9 (cont.)

Percentage reservation levels of forest ecosystems

	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (% pre-1750)	Present extent on all lands vested in the Conservation Commission in the three regions (% pre-1750)	CAR Target (% pre-1750)	Formal reserves Ecosystem representation as a percentage of pre-1750 extent Existing gazetted as at 30.6.2003 (Additions proposed)				FCA (% pre-1750)	CAR Informal (% pre-1750)	CAR Total (% pre-1750)	Other Informal (% pre-1750)	Available for timber harvesting (% pre-1750)
					NP	NR	CP	5(1)(g),(h)					
Jarrah Woodland	106,400	63	48	15	8.3	2.4	0.2	0.2	0.0	14.0	25.0	7.3	0.0
					(11.8)	(0.6)	(2.5)	(0.0)	(0.9)	(0.0)	(15.7)		
Jarrah Yellow Tingle	11,600	83	72	15	15.3	0.0	0.0	0.0	0.0	0.0	15.3	0.0	0.1
					(51.0)	(0.0)	(0.0)	(0.0)	(5.9)	(0.0)	(57.0)		
Sub total	**2,783,950**	**65**	**56**										
Karri dominant													
Karri Main Belt	193,000	85	79	15	19.1	0.1	0.0	0.0	0.0	4.1	23.3	7.8	31.0
					(16.3)	(0.1)	(0.2)	(0.0)	(0.6)	(0.0)	(17.2)		
Karri Rate's Tingle	1,100	78	72	100% extant	91.9	0.0	0.0	0.0	0.0	0.0	91.9	0.0	0.0
					(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)		
Karri Red Tingle	7,200	81	73	15	68.3	0.0	0.0	0.0	0.0	0.0	68.3	0.0	0.0
					(4.3)	(0.0)	(0.0)	(0.0)	(0.0)	0.0)	(4.3)		
Karri West Coast	14,500	43	31	15	26.8	0.2	0.0	0.0	0.0	0.0	27.0	0.1	0.5
					(3.6)	(0.1)	(0.0)	(0.0)	(0.1)	(0.0)	(3.9)		
Karri Yellow Tingle	15,800	84	74	15	15.3	0.0	0.0	0.0	0.0	0.0	15.3	0.0	0.4
					(55.3)	(0.0)	(0.0)	(0.0)	(3.3)	(0.0)	(58.6)		
Sub total	**231,600**	**82**	**76**										

APPENDIX 9 (cont.)

Percentage reservation levels of forest ecosystems

	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (% pre-1750)	Present extent on all lands vested in the Conservation Commission in the three regions (% pre-1750)	CAR Target (% pre-1750)	Formal reserves Ecosystem representation as a percentage of pre-1750 extent Existing gazetted as at 30.6.2003 (Additions proposed)				FCA (% pre-1750)	CAR Informal (% pre-1750)	CAR Total (% pre-1750)	Other Informal (% pre-1750)	Available for timber harvesting (% pre-1750)
					NP	NR	CP	5(1)(g),(h)					
Wandoo dominant													
Western Wandoo forest	363,200	40	28	15	4.2	1.0	2.1	0.0	0.0	0.6	8.0	1.6	7.9
					(5.9)	(0.2)	(4.4)	(0.0)	(0.0)	(0.0)	(10.5)		
Western Wandoo woodland	163,000	44	27	15	7.0	0.9	0.5	0.0	0.0	0.6	9.0	1.2	4.8
					(6.3)	(0.1)	(5.6)	(0.0)	(0.0)	(0.0)	(12.1)		
Sub total	**526,200**	**42**	**28**										
Other													
Bullich and Yate	2,800	87	77	100% extant	61.9	0.0	0.0	0.0	0.0	0.0	61.9	0.0	0.0
					(26.6)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(26.6)		
Darling Scarp	29,000	34	9	15	4.2	0.4	0.0	0.1	0.0	0.1	4.8	0.8	0.0
					(1.5)	(1.6)	(0.1)	(0.0)	(0.2)	(0.0)	(3.4)		
Peppermint & Coastal Heath	80,100	88	73	15	65.1	1.8	0.0	0.0	0.0	0.2	67.2	0.0	0.0
					(5.4)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(5.4)		
Rocky Outcrops	26,400	47	48	15	16.4	0.2	0.3	0.2	0.0	6.9	23.9	9.5	0.0
					(12.9)	(0.0)	(1.5)	(0.0)	(0.2)	(0.0)	(14.6)		
Sand Dunes	11,100	100	100	15	97.8	0.0	0.0	0.0	0.0	0.0	97.8	0.0	0.0
					(1.9)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(1.9)		

APPENDIX 9 (cont.)

Percentage reservation levels of forest ecosystems

	Total pre-1750 extent (ha)	Present extent on all lands in the three regions (% pre-1750)	Present extent on all lands vested in the Conservation Commission in the three regions (% pre-1750)	CAR Target (% pre-1750)	Formal reserves Ecosystem representation as a percentage of pre-1750 extent Existing gazetted as at 30.6.2003 (Additions proposed)				FCA (% pre-1750)	CAR Informal (% pre-1750)	CAR Total (% pre-1750)	Other Informal (% pre-1750)	Available for timber harvesting (% pre-1750)
					NP	NR	CP	5(1)(g),(h)					
Shrub, Herb, and Sedgelands	429,900	68	59	15	20.6	1.2	0.0	0.1	0.0	4.5	26.4	2.9	0.0
					(27.1)	(0.2)	(0.2)	(0.0)	(2.3)	(0.0)	(29.9)		
Swamps	15,300	53	43	15	27.9	5.8	0.0	0.1	0.0	0.8	34.6	1.8	0.0
					(4.9)	(0.5)	(0.8)	(0.0)	(0.1)	(0.0)	(6.3)		
Sub total	**594,600**	**69**	**58**										
Total	**4,136,350**	**63**	**54**										

Notes:
1. All area figures are confined to the Department's three forest regions (Swan, South West, Warren) where they fall within the RFA boundary.
2. Ecosystem and land category datasets have been updated since the RFA.
3. Pre-1750 extent of some ecosystems has not been revised to accommodate minor editing/update of contributing datasets.
4. Jarrah Mt Lindesay and Shrub, Herb, and Sedgelands reported in the RFA extended into the Department's South Coast region.
5. Totals of rows and columns within the table may not be consistent due to rounding.

APPENDIX 10

Reservation of old-growth forest (within the RFA area)

Forest ecosystem	Area of old-growth on public land at 31.12.01	CAR Target		Area of old-growth in formal reserves				Area of old-growth in informal reserves		Total area set aside from timber harvesting (confined to land vested in the Conservation Commission)	
				Existing reserves at 30.06.03		Additional proposed reserves at 1.12.03					
	(ha)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Jarrah dominant											
Jarrah Blackwood	45,647	27,388	60	4,866	10.7	37,733	82.7	3,016	6.6	45,615	100.0
Jarrah Leeuwin	472	472	100	392	82.9	81	17.1	0	0.0	472	100.0
Jarrah Mt Lindesay	11,928	7,157	60	379	3.2	11,548	96.8	0	0.0	11,926	100.0
Jarrah North East	12,558	12,558	100	1,911	15.2	9,510	75.7	1,136	9.0	12,557	100.0
Jarrah North West	8,095	8,095	100	5,586	69.0	1,848	22.8	636	7.9	8,070	99.7
Jarrah Rate's Tingle	1,091	1,091	100	927	85.0	164	15.0	0	0.0	1,091	100.0
Jarrah Red Tingle	221	221	100	140	63.6	80	36.4	0	0.0	221	100.0
Jarrah Sandy	2,205	2,205	100	2,120	96.1	84	3.8	2	0.1	2,205	100.0
Jarrah South	151,104	90,662	60	43,734	28.9	97,590	64.6	9,769	6.5	151,093	100.0
Jarrah Unicup	4,205	2,523	60	1,057	25.1	3,127	74.4	21	0.5	4,205	100.0
Jarrah Woodland	11,966	7,179	60	4,336	36.2	6,754	56.4	827	6.9	11,918	99.6
Jarrah Yellow Tingle	7,053	4,232	60	1,620	23.0	5,432	77.0	0	0.0	7,052	100.0
Sub total	**256,544**			**67,068**		**173,949**		**15,407**		**256,424**	
Karri dominant											
Karri Main Belt	51,824	31,095	60	25,107	48.4	20,264	39.1	6,448	12.4	51,819	100.0
Karri Rate's Tingle	731	731	100	731	100.0	0	0.0	0	0.0	731	100.0
Karri Red Tingle	3,286	1,972	60	3,080	93.7	206	6.3	0	0.0	3,286	100.0
Karri West Coast	520	520	100	470	90.4	48	9.3	0	0.0	519	100.0
Karri Yellow Tingle	6,909	4,145	60	2,007	29.0	4,902	71.0	0	0.0	6,909	100.0
Sub total	**63,270**			**31,394**		**25,421**		**6,448**		**63,263**	

APPENDIX 10 (cont.)

Reservation of old-growth forest (within the RFA area)

Forest ecosystem	Area of old-growth on public land at 31.12.01	CAR Target		Area of old-growth in formal reserves				Area of old-growth in informal reserves		Total area set aside from timber harvesting (confined to land vested in the Conservation Commission)	
				Existing reserves at 30.06.03		Additional proposed reserves at 1.12.03					
	(ha)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Wandoo dominant											
Western Wandoo Forest	8,462	8,462	100	1,749	20.7	5,843	69.1	864	10.2	8,456	100.0
Western Wandoo Woodland	3,229	3,229	100	860	26.6	2,017	62.5	352	10.9	3,229	100.0
Sub total	**11,691**			**2,610**		**7,860**		**1,215**		**11,685**	
Total	**331,505**			**101,072**		**207,230**		**23,071**		**331,373**	

Notes:
1. All area figures are confined to the Department's three forest regions (Swan, South West, Warren) where they fall within the RFA boundary, and based on old-growth data at 31.12.01.
2. Ecosystem and land category datasets have been updated since the RFA.
3. Jarrah Mt Lindesay and Shrub, Herb, and Sedgelands reported in the RFA extended into the Department's South Coast region.
4. Totals of rows and columns within the table may not be consistent due to rounding.

APPENDIX 11

Beard-Hopkins vegetation associations within the plan area

* Vegetation associations that occur within the plan area and have greater than 75 per cent of their occurrence in the plan area outside the RFA area

		Pre-1750 extent of vegetation associations						
		All land					Public land	
Beard-Hopkins Code	**Description of vegetation association**	**Total within plan area (ha)**	**Within RFA (ha)**	**% of Total**	**Outside RFA (ha)**	**% of Total**	**Outside RFA (ha)**	**% of Total**
* E18Mi	Medium woodland; river gum (E. rudis)	81	0	0	81	100	66	82
* PLc	Low forest; cypress pine (Callitris preisii)	1,919	0	0	1,919	100	1,389	72
* ASZc	Shrublands; A. scrub-heath unknown spp	4,479	0	0	4,479	100	3,081	69
* M4Zc	Shrublands; melaleuca heath	2,082	0	0	2,082	100	1,238	59
* bli	Low woodland; banksia on limestone	58,020	0	0	58,020	100	31,280	54
* XSZc	Shrublands; scrub-heath	2,926	0	0	2,926	100	1,098	38
* E4Mr	Medium open woodland; tuart (E. gomphocephala)	1,083	0	0	1,083	100	394	36
* bLi/mSc	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	41,144	0	0	41,144	100	14,015	34
* E4Mi	Medium woodland; tuart (E. gomphocephala)	41,033	0	0	41,033	100	12,341	30
* a23,32m 3Sc/a26m	Mosaic: Shrublands; A. rostellifera, A. cyclops (S) & Melaleuca cardiophylla (N) thicket / Shrublands; A. lasiocarpa & Melaleuca a	27,531	0	0	27,531	100	6,615	24
* X14SZc	Shrublands; scrub-heath on the Swan Coastal Plain	9,742	0	0	9,742	100	1,882	19
* A1Lr1Ci	Succulent steppe with open low woodland; mulga (A. aneura) over saltbush	378	0	0	378	100	72	19
* X9SZc	Shrublands; scrub-heath Dryandra-Calothamnus assoc. with B. prionotes on limestone in the northern Swan Region	9,010	0	0	9,010	100	1,588	18
* M5Sc k3Ci	Succulent steppe with thicket; Melaleuca thyoides over samphire	1,339	0	0	1,339	100	232	17
* x14SZc/ dZc	Mosaic: Shrublands; scrub-heath on the Swan Coastal Plain / Shrublands; dryandra heath	14,224	0	0	14,224	100	1,944	14
* e2,3Mi/ bLi/mLc/	Mosaic: Medium forest; jarrah (E. marginata), marri (E. calophylla) / Low woodland; banksia / Low forest; teatree / Low woodland;	14,074	0	0	14,074	100	1,147	8
* X8SZc	Shrublands; scrub-heath on yellow sandplain banksia-xylomelum alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions	17,784	0	0	17,784	100	1,310	7
* K3Ci	Succulent steppe; samphire	1,151	0	0	1,151	100	61	5

APPENDIX 11 (cont.)

Beard-Hopkins vegetation associations within the plan area

* Vegetation associations that occur within the plan area and have greater than 75 per cent of their occurrence in the plan area outside the RFA area

		Pre-1750 extent of vegetation associations						
		All land					Public land	
Beard-Hopkins Code	**Description of vegetation association**	**Total within plan area (ha)**	**Within RFA (ha)**	**% of Total**	**Outside RFA (ha)**	**% of Total**	**Outside RFA (ha)**	**% of Total**
* E8,9Mi	Medium woodland; salmon gum (E. salmonophloia) & morrel (E. longicornis)	370	0	0	370	100	4	1
* e5,6,8,9, 34Mi	Medium woodland; wandoo (E. wandoo), York gum (E. loxophleba), salmon gum (E. salmonophloia), morrel (E. longicornis) & gimlet (E.	22,813	0	0	22,813	100	70	0
* e6,8Mi	Medium woodland; York gum (E. loxophleba) & salmon gum (E. salmonophloia)	15,322	0	0	15,322	100	27	0
* bLi/dZc	Mosaic: Low woodland; banksia / Shrublands; dryandra heath	1,525	0	0	1,525	100	0	0
* c3Sc	Shrublands; Allocasuarina campestris thicket	1,408	0	0	1,408	100	0	0
* e3,4Mr	Medium open woodland; marri (E. calophylla) & tuart (E. gomphocephala)	1,212	0	0	1,212	100	0	0
* e4Mr/bLi	Mosaic: Medium open woodland; tuart (E. gomphocephala) / Low woodland; banksia	513	0	0	513	100	0	0
* e3Mr/ mSc	Mosaic: Medium open woodland; marri (E. calophylla) / Shrublands; teatree thicket	465	0	0	465	100	0	0
* e5,6,8Mi	Medium woodland; York gum (E. loxophleba), wandoo (E. wandoo) & salmon gum (E. salmonophloia) (E. salmonophloia)	229	0	0	229	100	0	0
* e64,45Mi	Medium woodland; powderbark & mallet	35	0	0	35	100	0	0
* bli	Low woodland; banksia on low sandhills, swamps in swalles with teatree and paperbark	112,966	276	0	112,690	100	56,817	50
* e4Ti	Tall woodland; tuart (E. gomphocephala) (E. gomphocephala)	3,151	8	0	3,143	100	2,286	73
* e3,18Mr	Medium woodland; marri (E. calophylla) & river gum (E. rudis) (E. camaldulensis)	6,676	24	0	6,652	100	368	6
* e2Mb cbLi	Medium very sparse woodland; jarrah (E. marginata), with low woodland; banksia & casuarina	57,636	222	0	57,415	100	6,649	12
* e3Mr	Medium open woodland; marri (E. calophylla)	4,554	51	1	4,503	99	117	3
* sl	Bare and poorly vegetated areas; salt lakes, lagoons &claypans	6,937	153	2	6,784	98	4,655	67
* e2,3Mi/ bLi/mLc	Mosaic: Medium forest; jarrah (E. marginata), marri (E. calophylla) / Low woodland; banksia / Low forest; teatree (Melaleuca Spp.)	99,150	4,357	4	94,793	96	9,299	9

APPENDIX 11 (cont.)

Beard-Hopkins vegetation associations within the plan area

* Vegetation associations that occur within the plan area and have greater than 75 per cent of their occurrence in the plan area outside the RFA area

		Pre-1750 extent of vegetation associations						
		All land					Public land	
Beard-Hopkins Code	**Description of vegetation association**	**Total within plan area (ha)**	**Within RFA (ha)**	**% of Total**	**Outside RFA (ha)**	**% of Total**	**Outside RFA (ha)**	**% of Total**
* b1,2Li	Low woodland; Banksia attenuata & B. menziesii	2,956	144	5	2,811	95	849	29
* e2,4Mi	Medium woodland; tuart (E. gomphocephala) & jarrah (E. marginata)	63,793	3,443	5	60,350	95	16,011	25
* e2,3Mr bLi/e2,3	Mosaic: Medium open woodland; jarrah (E. marginata) & marri (E. calophylla), with low woodland; banksia / Medium sparse woodland;	39,788	6,757	17	33,032	83	8,041	20
* e6Mi	Medium woodland; York gum (E. loxophleba)	228,115	44,074	19	184,041	81	2,511	1
* e3Mi	Medium woodland; marri (E. calophylla)	140,632	27,683	20	112,948	80	2,698	2
* bli	Low woodland; banksia	29,617	6,636	22	22,981	78	2,860	10
* MSc	Shrublands; teatree thicket	17,985	4,177	23	13,808	77	2,409	13
e2,3Mi	Medium woodland; jarrah (E. marginata) & marri (E. calophylla)	2,547	740	29	1,807	71	1,390	55
MLc	Low forest; paperbark (Melaleuca rhaphiophylla)	3,579	1,158	32	2,421	68	232	6
e3Mi (e2,5,18,c	Medium woodland; marri (E. calophylla) with some jarrah (E. marginata), wandoo (E. wandoo), river gum (E. rudis) and casuarina	56,869	20,499	36	36,370	64	1,766	3
XZc	Shrublands; mixed heath	4,357	1,626	37	2,731	63	2,708	62
c5e6Li	Low woodland; Allocasuarina huegeliana & York gum (E. loxophleba)	6,798	3,446	51	3,353	49	0	0
e5Mi	Medium woodland; wandoo (E. wandoo)	8,885	4,569	51	4,317	49	476	5
e18mMi	Medium woodland; E. rudis & Melaleuca rhaphiophylla	23,472	14,622	62	8,850	38	435	2
e2,3,5Mi	Medium woodland; jarrah (E. marginata), marri (E. calophylla) & wandoo (E. wandoo)	90,868	63,546	70	27,322	30	774	1
Fl	Bare and poorly vegetated areas; freshwater lakes	12,819	9,161	71	3,658	29	2,045	16
ChSc	Shrublands; Calothamnus quadrifidis & Hakea trifircata (Cape Naturaliste)	2,589	2,182	84	408	16	318	12
e2,63Mi	Medium woodland, jarrah (E. marginata) & E. haematoxylon (Whicher Ra.)	19,337	16,592	86	2,745	14	1,742	9
AgLc	Low forest: peppermint (Agonis flexuosa)	17,291	14,837	86	2,454	14	467	3
XGc	Sedgeland; reed swamps, occasionally with heath	40,216	35,476	88	4,740	12	1,720	4
Ds	Bare and poorly vegetated areas; sand	11,849	10,547	89	1,301	11	833	7

APPENDIX 11 (cont.)

Beard-Hopkins vegetation associations within the plan area

* Vegetation associations that occur within the plan area and have greater than 75 per cent of their occurrence in the plan area outside the RFA area

		Pre-1750 extent of vegetation associations						
		All land					Public land	
Beard-Hopkins Code	**Description of vegetation association**	**Total within plan area (ha)**	**Within RFA (ha)**	**% of Total**	**Outside RFA (ha)**	**% of Total**	**Outside RFA (ha)**	**% of Total**
e2,3Mc/e3, 5Mi	Mosaic: Medium forest; jarrah (E. marginata), marri (E. calophylla) / Medium woodland; marri (E. calophylla)-wandoo (E. wandoo)	5,612	5,150	92	462	8	14	0
e3,5Mi	Medium woodland; marri (E. calophylla) & wandoo (E. wandoo)	489,421	461,080	94	28,341	6	3,277	1
Mli	Low woodland; paperbark (Melaleuca sp.)	123,702	117,716	95	5,986	5	1,979	2
e2,3Mp	Medium sparse woodland; jarrah (E. marginata) & marri (E. calophylla)	791	755	95	36	5	0	0
e2,3Mr bLi	Medium open woodland; jarrah (E. marginata) & marri (E. calophylla), with low woodland; banksia	17,308	16,527	95	781	5	0	0
McLc	Low forest; paperbark & casuarina	23,297	22,291	96	1,006	4	300	1
e2,3Mc/e2 Lc	Mosaic: Medium forest; jarrah (E. marginata), marri (E. calophylla) / Low forest; jarrah (E. marginata)	17,677	16,929	96	748	4	136	1
e2Lc	Low forest; jarrah (E. marginata)	68,487	65,972	96	2,515	4	335	0
e1Tc	Tall forest; karri (E. diversicolor) (E. diverscolor)	67,826	65,935	97	1,892	3	827	1
R	Bare and poorly vegetated areas; rock outcrops	5,595	5,469	98	126	2	95	2
AgLi	Low woodland; peppermint (Agonis flexuosa)	2,742	2,692	98	50	2	5	0
AgSi	Shrublands; peppermint scrub, Agonis flexuosa	32,841	32,550	99	292	1	176	1
e2bLi	Low woodland; jarrah (E. marginata)-banksia	40,626	40,297	99	328	1	104	0
e2,3Mc	Medium forest; jarrah (E. marginata)-marri (E. calophylla)	2,307,318	2,291,306	99	16,011	1	2,027	0
e5,45Mi	Medium woodland; wandoo (E. wandoo) & powderbark (E. accedens)	6,149	6,110	99	39	1	0	0
e2Mi	Medium woodland; jarrah (E. marginata) (south coast)	38,065	37,934	100	131	0	107	0
e2,5,45Mi	Medium woodland; jarrah (E. marginata), wandoo (E. wandoo) & powderbark	35,942	35,827	100	115	0	109	0
e2Li	Low woodland; jarrah (E. marginata)	4,172	4,160	100	12	0	9	0
JZc	Shrublands; Jacksonia horrida heath	6,953	6,948	100	5	0	4	0

APPENDIX 12

Representation on public land of Beard-Hopkins vegetation associations that occur predominantly outside the RFA area

Beard-Hopkins Code	Description	Pre-1750 extent (ha)	Extant (ha)	Exist/prop reserves (ha)	% of pre-1750 extent in existing and proposed reserves	% of Extant	Other Cons. Comm. land (ha)	Other public land (ha)
e2,3Mr bLi/e2,3	Mosaic: Medium open woodland; jarrah (E. marginata) & marri (E. calophylla), with low woodland; banksia / Medium sparse woodland;	8,041	8,027	7,556	94	94	0	471
e4Mr	Medium open woodland; tuart (E. gomphocephala)	394	352	335	85	95	17	0
XSZc	Shrublands; scrub-heath	1,098	1,094	931	85	85	0	164
M4Zc	Shrublands; melaleuca heath	1,238	1,205	1,040	84	86	0	165
MSc	Shrublands; teatree thicket	2,409	2,011	1,831	76	91	30	150
ASZc	Shrublands; A. scrub-heath unknown spp	3,081	3,006	2,170	70	72	0	837
a1Lr k1Ci	Succulent steppe with open low woodland; mulga (A. aneura) over saltbush	72	50	50	70	100	0	0
bLi/mSc	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	14,015	13,573	9,578	68	71	2,458	1,536
e4Ti	Tall woodland; tuart (E. gomphocephala) (E. gomphocephala)	2,286	1,822	1,534	67	84	288	0
Bli	Low woodland; banksia	2,860	2,355	1,671	58	71	0	685
Bli	Low woodland; banksia on low sandhills, swamps in swalles with teatree and paperbark	56,817	41,418	31,983	56	77	4,156	5,279
E4Mi	Medium woodland; tuart (E. gomphocephala)	12,341	7,911	5,651	46	71	41	2,219
E3Mi	Medium woodland; marri (E. calophylla)	2,698	1,698	1,041	39	61	5	653
X14SZc	Shrublands; scrub-heath on the Swan Coastal Plain	1,882	1,070	701	37	66	0	368
E2,3Mi/bLi/mLc	Mosaic: Medium forest; jarrah (E. marginata), marri (E. calophylla) / Low woodland; banksia / Low forest; teatree (Melaleuca Spp.)	9,299	6,379	3,205	34	50	1,320	1,855
Bli	Low woodland; banksia on limestone	31,280	23,560	9,664	31	41	12,456	1,441
Sl	Bare and poorly vegetated areas; salt lakes, lagoons &claypans	4,655	2,000	1,403	30	70	0	597
e2,4Mi	Medium woodland; tuart (E. gomphocephala) & jarrah (E. marginata)	16,011	6,566	3,944	25	60	1,213	1,409
x8SZc	Shrublands; scrub-heath on yellow sandplain banksia-xylomelum alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions	1,310	1,299	293	22	23	14	993

APPENDIX 12 (cont.)

Representation on public land of Beard-Hopkins vegetation associations that occur predominantly outside the RFA area

Beard-Hopkins Code	Description	Pre-1750 extent (ha)	Extant (ha)	Exist/prop reserves (ha)	% of pre-1750 extent in existing and proposed reserves	% of Extant	Other Cons. Comm. land (ha)	Other public land (ha)
a23,32m3Sc/a 26m	Mosaic: Shrublands; A. rostellifera, A. cyclops (S) & Melaleuca cardiophylla (N) thicket / Shrublands; A. lasiocarpa & Melaleuca a	6,615	5,388	912	14	17	0	4,476
k3Ci	Succulent steppe; samphire	61	12	8	13	64	0	4
e3Mr	Medium open woodland; marri (E. calophylla)	117	67	14	12	21	0	53
e2Mb cbLi	Medium very sparse woodland; jarrah (E. marginata), with low woodland; banksia & casuarina	6,649	2,551	745	11	29	177	1,630
x14SZc/dZc	Mosaic: Shrublands; scrub-heath on the Swan Coastal Plain / Shrublands; dryandra heath	1,944	1,680	149	8	9	0	1,531
e6Mi	Medium woodland; York gum (E. loxophleba)	2,511	1,066	121	5	11	0	946
e2,3Mi/bLi/mLc/	Mosaic: Medium forest; jarrah (E. marginata), marri (E. calophylla) / Low woodland; banksia / Low forest; teatree / Low woodland;	1,147	848	28	2	3	0	819
e3,18Mr	Medium woodland; marri (E. calophylla) & river gum (E. rudis) (E. camaldulensis)	368	259	2	1	1	122	135
PLc	Low forest; cypress pine (Callitris preisii)	1,389	1,389	0	0	0	0	1,389
e6,8Mi	Medium woodland; York gum (E. loxophleba) & salmon gum (E. salmonophloia)	27	27	0	0	0	0	27
e8,9Mi	Medium woodland; salmon gum (E. salmonophloia) & morrel (E. longicornis)	4	4	0	0	0	0	4
M5Sc k3Ci	Succulent steppe with thicket; Melaleuca thyoides over samphire	232	232	0	0	0	0	232
x9SZc	Shrublands; scrub-heath Dryandra-Calothamnus assoc. with B. prionotes on limestone in the northern Swan Region	1,588	1,492	0	0	0	1,381	111
e18Mi	Medium woodland; river gum (E. rudis)	66	66	0	0	0	0	6
b1,2Li	Low woodland; Banksia attenuata & B. menziesii	849	635	0	0	0	0	635
e5,6,8,9,34Mi	Medium woodland; wandoo (E. wandoo), York gum (E. loxophleba), salmon gum (E. salmonophloia), morrel (E. longicornis) & gimlet (E. salubris)	70	70	0	0	0	0	70

APPENDIX 13

Management of significant flora values

Background

Significant flora values are areas of high flora species richness, centres of endemic flora, centres of relictual flora, centres of disjunct flora, threatened ecological communities, and declared rare flora. The occurrences of the first four of these values were identified through the Comprehensive Regional Assessment part of the RFA, and the Department maintains databases for the latter two values.

Hearn *et al*. (2003) reviewed the management of significant flora values and found that these flora values have adequate to high levels of representation in the existing and proposed formal and informal conservation reserve system, ranging from 57 per cent reserved for centres of disjunct flora to 98 per cent reserved for the national estate values of high flora species richness and centres of relictual flora.

They made a number of recommendations regarding improved protection of significant flora values on areas not managed by the Department, as these are the areas where the protection of these values is under greatest threat, and on the conservation reserve estate.

Notwithstanding that the primary conservation issues associated with significant flora values are outside State forest and timber reserves, the protection of endemic, disjunct and declared rare flora and threatened ecological communities values that occur in State forest and timber reserves can be enhanced.

Implementation of plan action

Proposed improvements to forest management practices in the plan will increase the protection of significant flora values in State forest and timber reserves, but the following four additional measures will be undertaken within the first two years of implementation of the plan:

(a) The 23 endemic taxa and two disjunct taxa that are rare or priority taxa and have no document to guide their management:

- will be managed according to the management principles outlined in flora management plans;
- will have conservation statements prepared for them as a priority;
- flora management plans prepared for administrative regions will address these taxa when these plans are prepared or reviewed; and
- where disturbance activities may impact known populations of these taxa, advice will be sought from the Department's Regional Ecologist, Regional Nature Conservation Leader, Principal Botanist or another person with relevant expertise, so that the latest knowledge on the taxon and the impacts of disturbance activities are considered.

(b) Planning checklists for disturbance activities will be revised to identify specifically the need to address the management requirements identified in Hearn *et al*. (2003) for known populations of endemic and disjunct taxa that occur in State forest areas that may be impacted by disturbance activities. Known populations of the 12 identified endemic taxa will be considered and managed as if Priority 4 taxon. Known populations of the eight identified disjunct taxa will be considered and managed as if those taxa were listed as

Priority 3 taxon. Advice will also be sought from the Department's Regional Ecologist, Regional Nature Conservation Leader, Principal Botanist or another person with relevant expertise, so that the latest knowledge on the taxon and the impacts of disturbance activities are considered. The cost of monitoring (pre-disturbance and soon after the disturbance activity) of the population subject to the disturbance activity will be directed to the proponent of the activity.

(c) Planning checklists will be revised to include specific triggers and requirements to exclude the location of threatened ecological communities and declared rare flora from timber harvesting.

(d) The protection of areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora will be included in guidelines for the development of area management plans for conservation reserves to be developed by the Conservation Commission.

The following measures will be undertaken during the life of the plan:

(e) Maps of areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora and associated data-bases will be periodically updated at intervals of about 10 years to better reflect the status of current understanding of these values. Maps of centres of disjunct flora is the highest priority for updating.

(f) The tables included in the report of Hearn *et al*. (2003) will be reviewed to include information for each taxon on the occurrence/s of the value to which the taxon contributes.

(g) The Department will work to improve the protection of areas of high flora species richness, centres of endemic flora species, centres of disjunct flora species, and centres of relictual flora species, on lands not managed by the Department through land purchase, covenants, other cooperative arrangements and input to regional planning processes.

(h) Analysis of the impacts of fire on areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora will be undertaken as part of the Department's fire and biodiversity project.

(i) Consideration will be given to a revision of the priority flora list to recognise the need for monitoring and ongoing conservation management of taxa with a very narrow range and/or disjunctions in distribution.

(j) A number of locally endemic taxa and taxa with disjunct distributions that do not occur within State forest will be considered for addition to the list of threatened and priority taxa.

APPENDIX 14

Indicative timeframes for Actions

The following table identifies the indicative timeframes for the commencement and conclusion of those Actions proposed in this plan that do not have a specific timeframe and for which an indicative timeframe can be given. These are *indicative* timeframes only, and the timing of the commencement and conclusion of each Action may vary from those identified below for a variety of reasons, including the availability of resources. A failure to adhere to these indicative timeframes should not be regarded as a failure to act in accordance with this plan.

Table 7: Indicative timeframes for the implementation of Actions

ACTION	COMMENCEMENT	CONCLUSION
1.1.1	On plan commencement	Ongoing
1.1.2	On plan commencement	End of Year 2
1.1.3	On plan commencement	Ongoing
1.2	On plan commencement	Ongoing
1.3	On plan commencement	Ongoing
2.1	In Year 1	Ongoing
2.2	On plan commencement	Ongoing
2.3	In Year 1	End of Year 1
3.1.1	On plan commencement	End of Year 1
3.2.1	In Year 1	Ongoing
3.2.2	In Year 1	Ongoing
3.2.3	In Year 1	Ongoing
3.3	In Year 1	Ongoing
3.4	On plan commencement	Ongoing
4.2	In Year 5	Ongoing
5.1	In Year 1	Ongoing
6.1	In Year 2	Ongoing
6.2	On plan commencement	Ongoing
7.2.1	On plan commencement	End of Year 1
7.2.2	In Year 2	Ongoing
7.4	On plan commencement	Ongoing
8.1	On plan commencement	Ongoing
8.2	On plan commencement	Ongoing
8.3	In Year 1	End of Year 2
8.4	On plan commencement	End of Year 1
8.5.1	On plan commencement	Ongoing
8.6.1	On plan commencement	Ongoing

ACTION	COMMENCEMENT	CONCLUSION
9.1.1	By Year 5	Ongoing
9.1.2	As required	As required
9.2.1	On plan commencement	Ongoing
9.2.2	On plan commencement	Ongoing
9.2.3	In Year 2	Ongoing
9.2.4	In Year 1	Ongoing
10.1	As required	As required
10.2	On plan commencement	Ongoing
10.3	By Year 5	Ongoing
10.4.1	On plan commencement	Ongoing
10.4.2	As required	As required
11.1	In Year 1	End of Year 10
11.2	As required	As required
11.3	On plan commencement	Ongoing
11.4.1	In Year 1	Ongoing
11.4.2	In Year 1	Ongoing
11.5	In Year 2	Ongoing
11.6.1	On plan commencement	Ongoing
11.6.2	On plan commencement	Ongoing
11.7	As required	As required
11.8	On plan commencement	Ongoing
11.9	On plan commencement	Ongoing
11.10	As required	As required
11.11	On plan commencement	Ongoing
12.1	On plan commencement	Ongoing
13.1.1	On plan commencement	Ongoing
13.1.2	By Year 5	Ongoing
13.1.3	By Year 5	Ongoing
13.1.4	As required	As required
13.2	In Year 1	End of Year 1
13.3	In Year 2	Ongoing
14.1.1	In Year 2	End of Year 2
14.1.2	As required	As required
14.2.1	On plan commencement	Ongoing
14.2.2	On plan commencement	Ongoing
15.1.1	On plan commencement	Ongoing
15.1.2	On plan commencement	Ongoing
15.2	On plan commencement	Ongoing
15.3.1	As required	As required
15.4.1	On plan commencement	Ongoing
15.4.2	As required	As required
15.4.3	On plan commencement	Ongoing

ACTION	COMMENCEMENT	CONCLUSION
16.1.1	On plan commencement	Ongoing
16.1.2	On plan commencement	Ongoing
16.1.3	On plan commencement	Ongoing
16.1.4	On plan commencement	Ongoing
16.1.5	In Year 2	Ongoing
17.1.1	On plan commencement	Ongoing
17.1.2	In Year 1	Ongoing
17.1.3	On plan commencement	Ongoing
17.1.4	On plan commencement	Ongoing
17.2.1	In Year 2	End of Year 2
17.2.2	On plan commencement	Ongoing
17.3.1	On plan commencement	End of Year 1
17.3.2	In Year 2	End of Year 2
17.4.1	In Year 2	End of Year 2
17.4.2	In Year 2	End of Year 2
17.4.3	On plan commencement	Ongoing
18.1	In Year 1	End of Year 1
18.2	On plan commencement	Ongoing
18.2.2	As required	As required
18.3.1	In Year 2	End of Year 5
18.3.2	By Year 5	End of Year 10
18.4.1	On plan commencement	Ongoing
18.4.2	On plan commencement	Ongoing
18.4.3	On plan commencement	Ongoing
18.4.4	On plan commencement	Ongoing
18.4.5	As required	As required
18.5	On plan commencement	Ongoing
18.6.1	On plan commencement	Ongoing
18.6.2	On plan commencement	Ongoing
18.6.3	On plan commencement	Ongoing
18.6.4	On plan commencement	Ongoing
19.1	On plan commencement	Ongoing
19.2	In Year 1	Ongoing
20.1.1	On plan commencement	End of Year 2
20.1.2	In Year 2	End of Year 2
20.2	In Year 2	End of Year 2
20.3	By Year 5	End of Year 6
20.4	On plan commencement	Ongoing
20.5.1	On plan commencement	Ongoing
20.5.2	On plan commencement	Ongoing
21.1.1	On plan commencement	End of Year 1
21.1.2	In Year 2	Ongoing
21.2	By Year 5	End of Year 10

ACTION	COMMENCEMENT	CONCLUSION
21.3	As required	As required
21.4.1	As required	As required
21.4.2	As required	As required
21.4.3	On plan commencement	Ongoing
21.4.4	As required	As required
21.4.5	As required	As required
21.5.1	On plan commencement	Ongoing
21.5.2	On plan commencement	Ongoing
21.5.3	As required	As required
22.1	On plan commencement	Ongoing
23.1.1	In Year 2	Ongoing
23.1.2	On plan commencement	Ongoing
23.1.3	On plan commencement	Ongoing
24.1.1	In Year 1	End of Year 1
24.1.2	In Year 1	End of Year 2
24.1.3	On plan commencement	Ongoing
25.1.1	On plan commencement	Ongoing
25.1.2	On plan commencement	Ongoing
25.2	On plan commencement	Ongoing
25.3.1	On plan commencement	Ongoing
25.3.2	On plan commencement	Ongoing
26.1.1	In Year 2	End of Year 5
26.1.2	On plan commencement	Ongoing
26.1.3	On plan commencement	Ongoing
26.1.4	By Year 5	Ongoing
26.1.5	On plan commencement	Ongoing
27.1.1	On plan commencement	Ongoing
27.1.2	By Year 5	End of Year 5
27.1.3	As required	As required
27.2	On plan commencement	Ongoing
28.1.1	As required	As required
28.1.2	As required	As required
28.1.3	As required	As required
29.1	On plan commencement	Ongoing
29.2	In Year 2	End of Year 2
29.3	As required	As required
29.4	In Year 2	End of Year 10
30.1	On plan commencement	Ongoing

ACTION	COMMENCEMENT	CONCLUSION
31.1	On plan commencement	Ongoing
32.1.1	On plan commencement	Ongoing
32.1.2	On plan commencement	Ongoing
32.2	On plan commencement	Ongoing
32.4	In Year 2	Ongoing
32.5	In Year 1	Ongoing
32.6	In Year 1	End of Year 1
32.7	On plan commencement	Ongoing
32.8	On plan commencement	Ongoing
33.1	In Year 2	End of Year 5
33.2	By Year 5	Ongoing
33.3	In Year 2	Ongoing
34.1.1	On plan commencement	Ongoing
34.1.2	In Year 2	Ongoing
34.1.3	As required	As required
34.1.4	In Year 8	End of Year 9
34.1.5	As required	As required
34.1.6	As required	As required
35.1	As required	As required
35.2.1	On plan commencement	Ongoing
35.2.2	On plan commencement	Ongoing
35.2.3	On plan commencement	Ongoing
35.2.4	On plan commencement	Ongoing
36.1	In Year 2	Ongoing
36.2	On plan commencement	Ongoing
37.1.1	In Year 2	End of Year 2
37.1.2	In Year 2	End of Year 2
38.1	On plan commencement	Ongoing
38.2.1	In Year 2	End of Year 2
38.2.2	In Year 2	Ongoing
38.2.3	In Year 2	Ongoing

Acronyms

AS/NZS	Australian/New Zealand Standard
BRM	Basic Raw Materials
CALM	Conservation and Land Management
CAR	Comprehensive, adequate and representative – as applied to the conservation reserve system
CP	Conservation park
DEZ	Diverse Ecotype Zone
DFA	Deferred Forest Assessment
ISO	International Organisation for Standardisation
EMS	Environmental Management System
EPA	Environmental Protection Authority
ESFM	Ecologically Sustainable Forest Management
FCA	Forest Conservation Area
FHZ	Fauna Habitat Zone
FMP	Forest Management Plan
FP	Forest Products
FPC	Forest Products Commission
JANIS	Joint Australian and New Zealand Environment and Conservation Council/ Ministerial Council on Forestry Fisheries and Aquaculture National Forest Policy Statement Implementation Sub-Committee
KPI	Key Performance Indicator
NP	National Park
NR	Nature Reserve
NRS	National Reserve System
RFA	Regional Forest Agreement
SDI	Soil Dryness Index
SILREC	SILviculture RECording system
TR	Timber Reserve
UCL	Unallocated Crown Land
VLM	Visual Landscape Management
WRC	Water and Rivers Commission

Glossary

Adaptive management	A process of responding positively to change. The term adaptive management is used to describe an approach to managing complex natural systems that builds on common sense and learning from experience, experimenting, monitoring, and adjusting practices based on what was learned.
Advance growth	Young trees that have established themselves in openings in the forest, or under the forest cover, before regeneration harvesting is undertaken.
Basal area	The sum of the cross-sectional areas of trees in a given stand measured at 1.3 metres above the ground. It is usually expressed as square metres per hectare.
Biological diversity (Biodiversity) (described in CALM Act)	The variability among living biological entities and the ecosystems and ecological complexes of which those entities are a part and includes: (a) diversity within native species and between native species; (b) diversity of ecosystems; and (c) diversity of other biodiversity components.
Biological diversity component (described in CALM Act)	Includes habitats, ecological communities, genes and ecological processes
Block	A named administrative subdivision of the forest, varying in size from about 3,000 to 8,000 hectares.
Bole	The tree trunk from the ground to the crown break. The bole does not include the major branches supporting the crown.
Bole sawlog	The bole of the felled tree but docked at each end so that there is a minimum of one second grade sawlog.
Buffer strip	A strip of vegetation retained on the edge of a feature such as a stream or rock outcrop. Buffer strips can serve a variety of purposes in the landscape, including protection of the feature from a disturbing activity, and provide flora and fauna habitat and aesthetic values.
Catchment	The surface area from which water runs off to a river or any other collecting reservoir.
Clearfelling	A silvicultural system in which the trees are removed at one time to allow regeneration to establish and develop as an even-aged stand.
Code of practice	A document defining and prescribing practices for economically viable operations and good standards of safe work while protecting the environment.

Conservation dependent taxa	Taxa that are the focus of a continuing taxon-specific or habitat-specific program, the cessation of which would result in the taxon qualifying for one of the threatened categories within a period of five years.
Coppice	A shoot (or shoots) arising from adventitious buds at the base of a woody plant that has been cut near the ground or burnt back.
Coupe	An area of forest that is planned for timber harvesting as a single unit. It may contain more than one silvicultural objective, such as a number of discrete gaps or clearfells or a combination of both.
Corduroy	The process of matting the ground with small logs and branch material to provide flotation for heavy vehicles and to protect the soil from being damaged by the repeated passage of vehicles.
Criterion	A category of conditions or processes by which sustainable forest management may be assessed. A criterion is characterised by a set of related indicators that are monitored periodically to assess change.
Culling	The deliberate felling, poisoning or pushing down of unwanted overstorey or understorey species, usually to reduce competition to retained crop trees or establishing regeneration.
Critically endangered	A taxon is critically endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
Dieback	In the south-west of Western Australia a disease of plants caused by infection by the soil-borne organisms of the genus *Phytophthora.*
Disturbance	Any range of conditions affecting the condition of a natural area. Disturbance may be natural (e.g. fire) or human induced (e.g. timber harvesting).
Diverse ecotype zone	Areas of the forest, generally but not always with little tree cover, that are identified at the operational management scale to be protected from activities associated with timber harvesting because of their importance for the conservation of biodiversity. They include sedge and herb vegetation, rock outcrops, heath, wetlands, etc.
Ecological community	An integrated assemblage of species that inhabit a particular area.
Ecologically sustainable forest management (ESFM)	Forest management and use consistent with the principles described in section 19(2) of the CALM Act.
Ecosystem	A community or an assemblage of communities of organisms, interacting with one another and the environment in which they live.
Ecotone	A transition area between different plant communities.

Endangered	A taxon is endangered when it is not critically endangered but is facing a very high risk of extinction in the near future.
Endemic	Flora or fauna that is confined in its natural occurrence to a particular region.
Environmental Management System	A framework for the systematic management of an organisation's environmental obligations and targets. Often conforming to a standard, the most popular being AS/NZS ISO 14001.
Epicormic	Vegetative shoots arising on the bole or branches of a tree as a consequence of damage to its crown.
Evapotranspiration	Loss of water from an area of land through the transpiration of plants and evaporation from the soil.
Exotic species	Any species growing or living outside its natural range of occurrence. Normally this refers to species purposely or accidentally introduced into countries or regions where they do not historically occur.
Fauna	The animals inhabiting an area; including mammals, birds, reptiles, amphibians and invertebrates. Usually restricted to animals occurring naturally and excluding feral or introduced animals. With respect to the Wildlife Conservation Act, fauna is: (a) any animal indigenous to any State or Territory of the Commonwealth or the territorial waters of the Commonwealth; (b) any animal that periodically migrates to and lives in any State or Territory of the Commonwealth or the territorial waters of the Commonwealth; and (c) any animal declared as fauna pursuant to subsection (2), and includes in relation to any such animal – (d) any class or individual member thereof; (e) the eggs, larvae or semen; (f) the carcass, skin, plumage or fur thereof, but does not include any prescribed animal or prescribed class of animal.
Fee simple land	Also known as Freehold land. The greatest estate that can be held by a person without being the absolute owner, which is the Crown.
Feral	An introduced or domestic animal now living in the wild.
First grade sawlog jarrah	A log cut from the bole of a jarrah tree that is a minimum of 2.1 metres in length, has a minimum under bark diameter of 200 mm and has a minimum of 50% millable timber on the worst end face.

First grade sawlog karri	A log cut from the bole of a karri tree that is a minimum of 2.4 metres in length, a minimum under bark diameter of 300 mm and has a minimum of 50% millable timber on the worst end face. NB: this is the normal specification and individual contracts will vary.
Fire regime	The combination of season, intensity, interval, extent and patchiness of fire in a given area over a period of time.
Flora	The plants growing in an area; including flowering and non-flowering plants, ferns, mosses, lichens, algae and fungi. Usually restricted to species occurring naturally and excluding weeds. With respect to the Wildlife Conservation Act flora is any plant (including any wildflower, palm, shrub, tree, fern, creeper or vine) which is: (a) native to the State or (b) declared to be flora pursuant to subsection (4), and includes any part of flora and all seeds and spores thereof.
Floristic	Of or relating to flowers, a flora, or the phytogeographical study of plants and animals.
Forest	An area, incorporating all living and non-living components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding two metres and with existing or potential crown cover of overstorey strata about equal to or greater than 20 per cent.
Forest ecosystem	An indigenous ecosystem with an overstorey of trees that are greater than 20 per cent crown cover. These ecosystems should normally be discriminated at a resolution requiring a map-standard scale of 1:100,000. Preferably these units should be defined in terms of floristic composition in combination with substrate and position within the landscape.
Forest operations	Work activities undertaken in the forest to achieve the management objectives for that forest.
Forest produce	For the purposes of the CALM Act includes trees, parts of trees, timber, sawdust, chips, firewood, charcoal, gum, kino, resin, sap, honey, seed, bees-wax, rocks, stone and soil but, subject to the foregoing, does not in Division 1 of Part VIII include minerals within the meaning of the Mining Act 1978.
Forest products	For the purposes of the CALM Act and the Forest Products Act: (1) Subject to subsection (2) trees or parts of trees; timber, sawdust or chips; charcoal, gum, resin, kino or sap; and firewood. If they are located on public land or sharefarmed land. (2) When something referred to in subsection (1) has been removed under contract or arrangement entered into by the Commission, any residues that remain are not forest products for the purposes of this (FP Act) Act.

Forest regeneration	The renewal of a forest arising from planting or from seed or the young plants on a site. The process by which a forest is renewed.
Gap	A discrete opening in the overstorey canopy created to reduce competition to allow seedlings to become established and or develop.
Guideline	Principles, standards and practices for meeting goals that have been established as desirable outcomes for management. They can be quantitative or qualitative.
Habitat	A component of an ecosystem providing food and shelter to a particular organism.
Heritage	Something inherited from past generations that is valued.
High rainfall zone	Areas where the average annual rainfall exceeds 1100 millimetres per year.
Hygiene – in relation to dieback	Actions that decrease the risk of the pathogen being introduced spread or intensified.
Indicator	A measure (measurement) of an aspect of a criterion. A quantitative or qualitative variable that can be measured or described and that, when observed periodically, demonstrates trends.
Intermediate rainfall zone	Areas where the average annual rainfall is between 900 and 1100 millimetres per year.
Land category	Section 5 of the CALM Act specifies the categories of land to which the Act applies and section 6 defines those land categories. For the purposes of the plan the land categories are; State forest, timber reserves, national parks, conservation parks, nature reserves, any other land reserved under the Land Act 1933 and vested by order under that Act in the Conservation Commission and any other land other than excluded waters, reserved under Part 4 of the Land Administration Act 1997, the care control and management of which are placed by order under that Part with the Conservation Commission.
Landform	All the physical, recognisable, naturally formed features of land having a characteristic shape. Includes major forms such as a plain, mountain or plateau, and minor forms such as a hill, valley or alluvial fan.
Landscape	The visual elements of both the natural and the built environment and including landforms, vegetation, waterform, land-use and architecture.
Lignotuber	A woody swelling formed at the base of some eucalypts that has the ability to produce new shoots when the existing ones are destroyed.
Low rainfall zone	Areas where the average annual rainfall is less than 900 millimetres per year.

Monitoring	Regular assessment of a management program and of the resources being managed, checking that desired outcomes are achieved, and adjusting the new plan where necessary.
National estate	Those elements of the natural environment, the Aboriginal environment and the historic environment which are of special value to the Australian community, present and future.
Non-bole log	Timber from the branches of a tree above the crown break on the bole. Non-bole material is not included in inventory and is additional to the sustained yield.
Old-growth forest	Ecologically mature forest where the effects of unnatural disturbance are now negligible. The definition focuses on forest in which the upper stratum or overstorey is in a late mature to senescent growth stage.
Other bole log	A log cut from the bole of a tree that is below second grade sawlog specifications. May also be referred to as third grade sawlog.
Patch	A group of trees resulting from a natural regeneration event or a past management activity such as gap creation and regeneration.
Performance measure	Qualitative or quantitative measures developed to assess progress toward attainment of an objective.
Pest	Troublesome or destructive animals including insects, either introduced or native.
Phytogeographic	The biogeography of plants.
Plantation	State forest and timber reserve planted with exotic species.
Plantation management area	The total area within a defined management boundary that includes all of the areas planted with exotic species.
Prescribed burning	The planned application of fire under selected fuel and weather conditions to a defined area to achieve specific management objectives.
Prescription	A detailed specification of the objectives, area, procedures and standards for a task to be undertaken.
Policy	The course of action to be followed to achieve an organisation's objectives.
Rare species	Taxa which are uncommon, not widely distributed, or occurring sparsely across their range.
Recovery plan	A plan that describes the actions required to achieve the recovery of threatened species or ecological community from the current threat of extinction or destruction.
Rehabilitation	The process necessary to return disturbed land to a predetermined surface, vegetational cover, land-use or productivity.

Reserve – conservation	An area set aside primarily for the conservation of natural ecosystems but which may allow a level of recreation consistent with the proper maintenance and restoration of the natural environment.
Reserve – formal	One of the land category categories of national park, nature reserve, conservation park, or CALM Act sections 5(1)(g) or 5(1)(h) reserves for the purpose of conservation.
Reserve – informal	An area set aside for conservation under an approved management plan; has had opportunity for the public to comment on changes to reserve boundaries; able to be accurately defined on a map; and is of an area and design sufficient to sustain the values it seeks to protect.
Riparian	Pertaining to the banks of streams, rivers or lakes.
Rotation	The planned number of years between the establishment of a crop and its felling.
Second grade sawlog jarrah	A log cut from the bole of a jarrah tree that is a minimum of 2.1 metres in length, has a minimum under bark diameter of 250 mm and has a minimum of 30% millable timber on the worst end face.
Second grade sawlog karri	A log cut from the bole of a karri tree that is a minimum of 2.4 metres in length, has a minimum under bark diameter of 300 m and has a minimum of 30% millable timber on the worst end face.
Shelterwood system	A jarrah silvicultural system that involves a partial removal from the overstorey of some mature trees and action to establish regeneration under the remaining mature trees. When the regeneration is sufficiently established most of the remaining mature trees are removed to allow the regeneration to develop.
Silviculture	The theory and practice of managing forest establishment, composition and growth to achieve specified management objectives.
Snig track	A track along which logs are pulled from the felling point to a landing or point of loading.
Soil Dryness Index	A predictor of the deficiency of soil moisture in a hypothetical soil profile having 200 mm capacity. The predictor uses rainfall input, run-off, evaporation and transpiration by plants. The measure is zero when soils are at field capacity and 2000 when completely dry.
Specially protected	Those species declared under the Wildlife Conservation Act to be specially protected because they are deemed otherwise in need of special protection.
Stand	A group of trees or patch of forest that can be distinguished from other groups on the basis of size, age, species composition, condition or other attribute.
Structure	When applied to a forest is the vertical and spatial distribution of the vegetation.

Sustained yield	The yield that a forest can produce continuously at a given intensity of management.
Susceptible taxa	Taxa that are of concern because their range is restricted (typically less than 100 square kilometres) and/or they are found in few locations rendering them prone to the effects of human activities or to introduced plants, animals or diseases.
Taxa (taxon)	A defined unit (for example, species or genus) in the classification of plants and animals.
Tenure (land)	
Thinning	A felling made in an immature stand for the purpose of improving the growth of trees that remain without permanently breaking the canopy and encouraging regeneration.
Threatening process	Those processes which may result in the long-term reduction of biodiversity. Examples include predation and habitat change by introduced animals; competition and displacement by introduced plants and destruction and modification of habitat.
Threatened ecological community	Ecological communities approved by the Minister for the Environment and Heritage as threatened and listed on the Department's Threatened Ecological Community Database.
Threatened taxa	Taxa that are vulnerable, endangered, critically endangered or presumed extinct. Taxa which are naturally rare or geographically restricted, or have become so as a result of human activities, and are in danger of declining further, or becoming extinct, unless adverse factors acting on them can be identified and ameliorated.
Timber harvesting	The cutting, felling, and gathering of forest timber undertaken as part of a planned sequence of silvicultural activities including the regeneration of the forest.
Treemarking	The silvicultural system in which trees are marked for retention prior to harvesting in a forest.
Turbidity	Discolouration of water due to suspended silt or organic matter.
Vegetation complex	A combination of distinct site vegetation types, usually associated with a particular geomorphic, climatic, floristic and vegetation structural association.
Vulnerable taxa	A taxon is vulnerable when not critically endangered or endangered, but facing a high risk of extinction in the wild in the medium term.
Weed	A plant, often a self-sown exotic, growing where it is not wanted.
Weed – environmental	A naturalised non-indigenous plant species outside the agricultural context that adversely affects the survival or regeneration of indigenous species in natural vegetation communities.

Woodflows	Projected annual supply of timber arising from scheduling the area of forest available and the sequence of harvesting operations over an extended period of time.
Yield	The amount of product produced from the forest by a particular management strategy.
Yield regulation	The process by which the yield of any product is controlled to achieve the stipulated levels in a management plan.

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