



Forest Management Plan 2004-2013

Mid-term audit of performance report

24 December 2008

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1. Introduction

This document is the Conservation Commission of Western Australia's (Conservation Commission) report on the mid-term audit of the Forest Management Plan 2004-2013 (FMP) to be submitted to the Environmental Protection Authority for assessment and subsequent advice to the Minister for the Environment. The mid-term audit of the FMP was undertaken by the Conservation Commission in accordance with Ministerial Condition 2-2 (Ministerial statement no. 000641, 2003) which requires that:

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

This condition is reflected in Action 32.3 of the FMP:

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.

As the nominated proponent of the FMP, the Conservation Commission is responsible for the submission of this report. The Department of Environment and Conservation¹ (the Department) and the Forest Products Commission (Forest Products Commission) are responsible for implementing and complying with the provisions of the FMP and have provided a report to the Conservation Commission on the implementation status of the FMP. The Department and the Forest Products Commission's report forms the majority of information provided in chapters three to ten.

Where appropriate the Conservation Commission's comments and advice have been included separately.

Information from a range of sources has been used to develop the mid-term audit of performance report. Sources include:

- annual FMP implementation status reports prepared by the Department, the Forest Products Commission and the Conservation Commission for years ending 2004, 2005, 2006 and 2007²;
- analysis of data collected by the Department and the Forest Products Commission against the KPIs for the years 2004, 2005, 2006 and 2007 (where available and applicable);
- audit reports prepared by the Department and the Forest Products Commission and performance assessments prepared by the Conservation Commission; and
- compliance data gathered and prepared by the Department and the Forest Products Commission³.

The objective of this mid-term audit is to provide the Environmental Protection Authority with advice regarding the extent to which management of land to which the plan applies has been undertaken in accordance with the plan. This will be achieved by:

 an assessment of implementation of the FMP in relation to how well implementation of the FMP is achieving ecologically sustainable forest management (ESFM) and the objectives of the FMP;

¹ As of 1 July 2006 the Department of Environment and Conservation became responsible for management of the land to which the *Conservation and Land Management Act 1984* applies. These responsibilities include implementation of FMP actions allocated to the former Department of Conservation and Land Management.

² The 2007 report had not been published as of 24 December 2008.

³ The Forest Products Commission has an Environmental Management System (EMS) accredited to ISO 14001: 2004 which is referred to in this report.

- an examination of the status of implementation of the actions proposed in the FMP; and
- a report on key performance indicators (KPIs) that are designed to assess implementation of the plan and the extent to which KPI targets have been achieved.

It should be noted that although this audit reports on KPIs and has identified a small number of shortfalls in KPI performance targets, this report does not constitute the Conservation Commission's formal or comprehensive response to shortfalls as required under the FMP (where such a response is required a separate report will be prepared as provided for under the FMP). Response to shortfalls in KPI performance targets will be ongoing as part of the Conservation Commission's audit function. Furthermore, whilst this report refers to other, more specific audits and performance assessments undertaken as part of the plan implementation, it does not constitute a report on those investigations. Full reports on the Conservation Commission's performance assessments can be accessed via the Conservation Commission website (www.conservation.wa.gov.au). Further reports will be placed on the website as they are prepared over the remaining term of the FMP.

The report commences with an overview of the Conservation Commission's assessment of the implementation of the FMP. The following chapters are structured, in a manner that is consistent with the FMP, according to the framework of the Montreal Criteria of sustainability. With respect to the individual criteria, the chapters provide information on:

- the overall aims, objectives and actions proposed within the FMP;
- the status of implementation of actions proposed to meet those objectives; and
- a summary of any issues regarding monitoring, compliance and implementation.

For each chapter this information is followed by a report on significant KPI data and then a summary of issues to be addressed from 2009 that were identified through the mid-term audit process. Finally, where the Conservation Commission has determined that a specific response to a performance issue is required, this has been provided as advice at the conclusion of each chapter. The most significant of these are drawn together in Chapter 2 as advice to the Environmental Protection Authority.

The Conservation Commission has nominated key dates for provision of additional information by the Department, the Forest Products Commission and the Conservation Commission. Where the Conservation Commission considers the information may be important in allowing the Environmental Protection Authority to formulate its findings, it has nominated a reporting date of 31 July 2009. It will be necessary in some instances for the Department and the Forest Products Commission to report to the Conservation Commission before the Conservation Commission provides its advice to the Environmental Protection Authority; where this is the case the Department and the Forest Products Commission have been given a date of 30 March 2009. While not forming part of the Environmental Protection Authority's public consultation phase of the mid-term audit, this information will be made available to the public.

2. Overview of FMP implementation

This chapter presents an overview of the Conservation Commission's assessment of the implementation of the FMP and is based on the information in the chapters that follow. Although the main aim of this chapter is to address the key issues identified through the audit process and provide advice to the Environmental Protection Authority, it is important to note at the outset that the Conservation Commission acknowledges the positive outcomes in a range of areas. Some examples include:

- the creation of the 30 national parks proposed under the *Protecting our old-growth forests* policy;
- the opportunity for the public to nominate areas for old-growth assessment and the review of old-growth areas in the Department's corporate database. The Conservation Commission has developed and applied a consistent rule set to areas of old-growth that have been assessed;
- the implementation of fauna habitat zones to maintain fauna populations. To date there
 have been 42 zones finalised. While the process requires some refinements, the
 Conservation Commission acknowledges that there has been a considerable effort put in
 by the Department and community stakeholders involved with finalising the zones; and
- the generally positive outcomes in relation to soil management. The Conservation Commission's purpose in framing the FMP's proposed actions relating to soils was to protect soils from the damage that had previously occurred due to timber harvesting activities taking place under wet soil conditions. The provisions of the FMP, and especially of Appendix 6, have been applied as intended and management has been adapted. This has resulted in better outcomes through improvements in coupe planning, the alignment of snig tracks and other mitigation techniques.

The information in the remainder of this chapter provides an outline of the objectives and principles that guide the FMP, and hence this assessment, followed by a summary of the key issues and advice arising in relation to each of the Montreal Criteria.

The Conservation Commission's overall objectives in formulating the FMP were 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. The principles of ecologically sustainable forest management can be found in section 19(2) of the *Conservation and Land Management Act 1984*:

- that the decision-making process should effectively integrate both long-term and shortterm economic, environmental, social and equitable considerations [sustainability];
- 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];
- 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];
- that the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making [conservation of biodiversity and ecological integrity]; and
- that improved valuation, pricing and incentive mechanisms should be promoted.

When the FMP was prepared over 2001-2003 these principles were relied upon to inform the overall direction of the plan and, in particular, to assist the Conservation Commission to

find an appropriate balance between the range of uses provided for through the FMP. In preparing this mid-term audit of performance report the Conservation Commission has returned to these principles and has judged progress with implementation of the FMP in the light of these principles.

The Conservation Commission has sought, and continues to seek, an approach to forest management that respects intergenerational equity, biological diversity and ecological integrity while providing for as full a range of forest values and uses as reasonable. In particular, the Conservation Commission has applied the precautionary principle to both the preparation of the FMP itself and in formulating its advice in this mid-term audit of performance report. As a result, where the Conservation Commission has concluded that there are threats of serious or irreversible environmental damage, it has adopted a precautionary position and recommended action in advance of the preparation and adoption in 2014 of the next plan.

Since the early 2000s climate change has become more widely accepted as a serious environmental, social and economic challenge requiring both immediate and long-term responses. The Conservation Commission has recognised the importance of a precautionary response to climate change to ensure that the health, diversity and productivity of the environment for future generations are maintained, together with the conservation of biological diversity and ecological integrity.

It is with these thoughts in mind that the Conservation Commission provides the following overview of the implementation of the FMP.

Implementation of the FMP

One issue that is recurrent throughout the report is the Department's capacity to implement the FMP's proposed actions due to resource constraints. The Conservation Commission accepts that a greater level of resourcing is required to implement all actions in their proposed time-frames, however, the Conservation Commission does not accept that progress on outstanding actions can be delayed any further. The Conservation Commission considers that it may be necessary for the Department, in consultation with the Conservation Commission, to reconsider priorities and allocate resources accordingly. Furthermore, if additional resources are not forthcoming for the preparation and implementation of the next forest management plan, then it follows that forest management will need to be scaled back to reconcile resourcing levels with requirements for implementation of the plan.

Biological diversity

Since 2004 difficulties have been experienced with regard to implementation of proposals for the establishment of new conservation reserves. While good progress was made initially with the creation of the new national parks included in the previous Government's *Protecting our old-growth forests* policy, progress since then has been slow. It appears to the Conservation Commission that at least part of the reason for this reduced progress is a lack of collaboration between different Government agencies. A whole-of-government approach to the establishment of formal reserves is clearly required. The expectation of the Conservation Commission is that, since the FMP was provided with endorsement at a whole-of-government level, this should mean that all agencies facilitate its implementation.

The Conservation Commission will review the causes of delays to the implementation of the proposed formal conservation reserves and publicly report to the Minister for Environment by the 31 December 2009 with recommended actions to address this issue.

The underlying approach to the design of the comprehensive, adequate and representative conservation reserve system has given greater weight to conservation values other than

fauna. The FMP therefore contained a number of important proposed actions to support fauna conservation both within the conservation reserves themselves, and also within State forest and timber reserves. These complementary measures are critical components of the FMP.

Since 2004 a number of issues relating to the selection and management of fauna habitat zones have emerged.

One of these is the absence of the final Guidelines for the Selection of Fauna Habitat Zones. These guidelines were due to be completed by the Department and approved by the Minister for the Environment by the end of 2004. Later in this chapter the Conservation Commission provides its view on, and a response to, the delays experienced to date in the finalisation of the FMP's subsidiary management guidelines.

A second issue relates to a difference of interpretation of some key provisions in Appendix 4 of the FMP between the Conservation Commission and the Department. Appendix 4 identifies a minimum area for indicative fauna habitat zones of 200 hectares, with a total area (outside of any included informal reserves) of between 50,000 and 55,000 hectares. Under Action 7.3, the Department, in consultation with the Conservation Commission, prepared the 30 June 2004 map of indicative fauna habitat zones, which identified a total of 283 zones (in addition to the amalgamated zones in the vicinity of Kingston forest block). The extent to which zones should be altered has, in the past, been a point of difference between the Conservation Commission and the Department.

The Department is of the view that the minimum size, total number and spatial distribution of indicative fauna habitat zones should not be significantly altered as these are fundamental settings that provide for the greatest number of zones at the closest spacing throughout the forest and have been applied in the calculation of timber sustained yields for the FMP. The Department recognises, however, that where there may be demonstrated improvements to habitat quality and management practicality for a modest extension to the size of a zone, with a commensurate reduction in the overall number of zones, then these variations would be acceptable.

The Conservation Commission's interpretation of Appendix 4 is that the area of an individual zone should be allowed to exceed the 200 hectare minimum to a greater extent for fauna habitat conservation reasons, even if the consequence of this is ultimately fewer zones. The Department and the Conservation Commission agree that the mechanism to resolve this issue is the completion of the Guidelines for the Selection of Fauna Habitat Zones.

In providing its advice on the Guidelines for the Selection of Fauna Habitat Zones during 2009 the Conservation Commission will clarify its expectations and criteria for fauna habitat zone selection.

The Conservation Commission acknowledges that issues have arisen on some occasions as to the timeliness of the finalization of individual fauna habitat zones, and hence the completion of harvest planning, to enable the Forest Products Commission to access areas of forest. However, it is essential that activities that foreclose options for fauna habitat zone finalization should not occur prematurely as has occurred on a few occasions.

The Conservation Commission, the Department and the Forest Products Commission will work together to improve planning timeframes to ensure that this problem does not recur.

Information systems relating to fauna – in particular, the Fauna Distribution Information System (FDIS) – represent an essential part of the FMP's provisions for fauna conservation. Whilst supportive of the principle of the system, a review of FDIS by the Conservation Commission has identified a series of issues related to the integrity of the data and its

custodianship. Of particular concern is whether FDIS has the capacity to generate an effective management response to the presence of threatened fauna.

The Conservation Commission will work with the Forest Products Commission and the Department during 2009 to address these concerns.

In this mid-term audit of performance report information has been collated concerning a number of shortfalls in the KPIs that relate to fauna conservation; for example, KPI 2 where species have been moved to a higher category of threat. In situations where management activities may be the cause the FMP requires that the Department prepare a report for the Conservation Commission and the Minister for Environment. In response the Conservation Commission evaluates the need to change forest management practices. It is the Conservation Commission's view that a precautionary approach should be taken with respect to fauna conservation irrespective of whether the cause can be attributed to management activities or not, since a response to a species being moved to a higher category of threat is essential. Wherever the Department has indicated that a shortfall is unrelated to management activities, the Conservation Commission expect that such a conclusion will be substantiated.

Similarly, the Conservation Commission expects that the possibility that lack of management action is implicated in the shortfall be addressed in the Department's reports.

The Conservation Commission expects that the responses for shortfalls relating to fauna give serious consideration to going beyond a call for further research and monitoring and, where practicable, the Conservation Commission expects the Department to provide a proposed management response.

Productive capacity

The Conservation Commission is aware of the economic issues facing some parts of the timber industry. Some of these issues are external to the FMP; for example, increases in fuel costs and a reduced demand for high-value furniture products affecting the demand for some grades of sawn timber. Other issues are more closely associated with the quantity and quality of the resource that is made available under the FMP. When the FMP was being prepared the Conservation Commission was aware that the average size of sawlogs would be less than in the past; however, this does not reduce the importance of this issue. The Conservation Commission understands that the industry has proposed a new grading system for sawlogs to address at least some of its concerns. If the proposed system is adopted the Conservation Commission is aware that the Department and the Forest Products Commission will need to ensure that the process of grading will be adequately monitored and that a new grading system may require the FMP's sustained yields to be recalculated to reflect the new grades.

The Conservation Commission will provide its advice to the Minister for Environment as these proposals are progressed.

Annual removals of karri other bole logs have exceeded the upper limit specified in the FMP by between 123% and 146%. This is because the volume per hectare yielded from first thinning of karri regrowth stands has been in excess of the volumes estimated in the modelling undertaken for the FMP. The reason may be associated with the first thinnings to date being in areas with higher site quality or that were originally seeded or hand-planted. The thinning of regrowth karri stands is provided for in the FMP and subject to a KPI (KPI 12). There is thus a potential inconsistency between the plan's requirements for karri thinning and the allowed volumes.

The Conservation Commission advises that a detailed analysis of the causes for the greater volumes being produced needs to be undertaken by the end of March 2009.

The Conservation Commission will work with the Department and the Forest Products Commission to achieve this outcome. On the basis of the detailed analysis, the Conservation Commission will then report to the Environmental Protection Authority on its recommendations by 31 July 2009.

The yield of jarrah sawlogs per hectare being realized from harvesting operations has been less than expected. A figure of 15% less volume than predicted averaged across all Regions is reported. When the FMP was being prepared the Conservation Commission was concerned by an apparent trend emerging where a shortfall of actual versus predicted sawlog volume was becoming common. At the time the Conservation Commission responded to its concern by including a KPI (KPI 11) to monitor this trend and deciding to revisit the issue mid-term.

A range of factors have contributed to the variance. These include the fact that areas have been deferred from harvest by the Forest Products Commission because of neighbour issues or because they contained insufficient saleable log product, more trees containing sawlog material were retained as crop or habitat trees than predicted, a higher proportion of areas have been harvested to silvicultural objectives that yield a lower volume (e.g., shelterwood instead of gap creation) than predicted and some available sawlogs were not removed from the forest due to poor utilisation practices.

Some of these factors can be addressed through closer attention by the Forest Products Commission to the detailed management of treemarking and harvesting operations. Other factors appear to be more systemic and should therefore be factored into the calculation of future sustained yields. The central question is one of timing, in particular, the point at which this should occur in relation to the development of the next FMP. The Department has advised the Conservation Commission that it may be unnecessary to adjust the sustained yields until the period of the next plan, in part on the basis that the trees left behind that could have been harvested are still standing and therefore available for future harvesting.

If the shortfall continues there will be an impact on sustained yields. The Conservation Commission accepts that further analysis of the data is required to determine the extent to which the yields need to be adjusted, but is of the view that adjustment cannot be continuously deferred.

The Conservation Commission advises that a detailed analysis of the causes for the actual versus predicted sawlog shortfall needs to be undertaken by the end of March 2009. The Conservation Commission will work with the Department and the Forest Products Commission to achieve this outcome. On the basis of the detailed analysis, the Conservation Commission will then report to the Environmental Protection Authority on its recommendations by 31 July 2009.

When the FMP was prepared, the Conservation Commission was concerned about a range of issues pertaining to regeneration and regrowth. These issues included; the length of time taken to complete harvesting operations in individual coupes, the subsequent regeneration of the coupe and delays in thinning schedules.

The Conservation Commission supports the Forest Products Commission in reviewing its performance and in requesting the Department to review its performance in conducting timely regeneration burns and will monitor this issue.

The Conservation Commission remains concerned with performance in the areas of regeneration, regrowth and thinning schedules and advises that it will consider undertaking future specific performance assessments during the remainder of the plan's duration.

Ecosystem health and vitality

The Conservation Commission notes that the forest, particularly the jarrah forest, is currently subject to an array of threatening processes; extending from climate change and including declining rainfall, fire and dieback and species-specific issues. These factors in combination pose a risk to the overall health and vitality of the forest.

The Conservation Commission is concerned that the Department is giving inadequate weighting to biodiversity as an objective for fire management. The Conservation Commission has not yet been convinced that a clear and demonstrated link between special biodiversity requirements and the details of individual fire prescriptions has become a routine outcome of fire management planning. The Conservation Commission would also like to see post-burn monitoring and review become part of the routine outcome of prescribed burns. More generally, the Conservation Commission has not accepted the 'negative exponential target' as a general principle. Whilst the target may be appropriate at some scales and in some contexts, the Conservation Commission does not consider it appropriate in all circumstances for the conservation of biodiversity. For example, where there is a need for long unburnt habitat, a negative exponential target is not appropriate. Whilst the Conservation Commission has generally supported the thrust of the fire management policy and is aware that there is evidence that biodiversity is being addressed in fire planning, the Conservation Commission would like to see further refinement in the implementation of policy.

The Conservation Commission will maintain its performance assessment of fire management as a priority within its work program.

Proposed Action 18.1 committed the Conservation Commission to develop a whole-ofgovernment policy framework for the management of dieback. While this action is being implemented through the Dieback Response Group and Dieback Consultative Council (of which the Conservation Commission is a member), progress has been slow.

The Conservation Commission reiterates its view, first expressed in 2002 that *Phytophthora* dieback management and dieback hygiene requirements will not be solved by the efforts of the Department and the Forest Products Commission alone. The issue requires a whole-of-government approach to be applied across all lands. There is a need for a set of consistent measures to be developed that applies to all Government and non-government bodies, industry and the general public. The Conservation Commission is of the view that these need to be made binding through a whole-of-government statutory policy and/or regulations. This may be achieved under the current framework of the *Environmental Protection Act 1986*; however, if not then the appropriate legislation should be amended to enable this action.

Commencing in 2009, the Conservation Commission will undertake a comprehensive performance assessment of dieback management and policy for vested lands that will lead to the provision of advice to the Environmental Protection Authority and the Minister for Environment.

Soil and water

With respect to Objective 20 – Soil, one potentially significant unforeseen issue for wet soil management regards dieback hygiene management. As a consequence of the wet soil requirements, timber harvesting activities during the wetter months have become concentrated in areas higher in the landscape which are more protectable from dieback spread. To avoid unintended consequences it will be essential for dieback hygiene to achieve and maintain the highest standards.

The Conservation Commission is of the view that there is enough flexibility in the current moist soils approval system for the Department and the Forest Products Commission to work through the soil and hygiene management issue.

The Conservation Commission should be kept informed of their progress.

The Conservation Commission is concerned that the trend to increased use of machinery for timber harvesting will lead to further shortfalls in the area of soil disturbance (KPI 21).

The Forest Products Commission is requested to provide the Conservation Commission with its proposed response to this issue by 31 March 2009 for consideration leading to the Conservation Commission's response to the target shortfall to be completed by 31 July 2009.

With respect to Objective 21 – Water, it is the view of the Conservation Commission that the FMP's Objective 21 for water may be overly ambitious with regard to the desire to protect the ecological integrity and quality of streams, wetlands and their associated vegetation, and increase the flow of water in the context of a drying climate. The Conservation Commission notes the now considerable uncertainty regarding the streamflow benefits from a program of active catchment management aimed to increase streamflow.

The Conservation Commission recommends that the Government as a whole should address the question of whether it is reasonable to expect that forests can or should be managed to maintain or enhance water supply in the current drying climate. This recommendation should be read in the context of the Conservation Commission's advice in the Global carbon cycles chapter.

The Conservation Commission notes that the performance assessment of the Wungong Catchment trial, which is expected to be completed by 31 July 2009, will provide an analysis of management of catchments to increase water run-off.

Global carbon cycles

When the FMP was prepared the challenge of climate change was not as central to policymaking within Australia as it is now. In preparing this mid-term audit of performance report the Conservation Commission has considered the consequences for forest management of climate change at length.

The Conservation Commission acknowledges that the current FMP has already incorporated climate change in two broad ways:

- the Department's calculation of sustained yield for the present plan took climate change into account by assuming no further growth on standing crop trees, and by incorporating the effects of declining rainfall up to the then present time when determining future growth; and
- other measures in the FMP, while not explicitly included as responses to climate change, are nevertheless consistent with accepted adaptation strategies: for example, seeking to ensure connectivity of habitat through the network of formal and informal reserves and fauna habitat zones.

In considering the adequacy of these measures, the Conservation Commission has been mindful of the significant changes that have occurred in climate change science and policy since 2004. These changes include changes to the predictions of future climate patterns in terms of higher temperatures, declining rainfall and changes to the severity and seasonality of weather events, as well as changes to community understanding and expectations of how we need to respond to the challenges ahead.

The Conservation Commission recognises that, while conclusions with respect to these matters should be based on evidence, climate change responses need to address predicted

effects – as much as or more than past events – and be based upon the principles of ecologically sustainable forest management, especially the precautionary principle.

The Conservation Commission's consideration of climate change has addressed two aspects of the climate change challenge: what work needs to be commenced now to better inform decisions leading into the next FMP and what changes to management practices are required between now and 2014 when the next plan commences.

With respect to the first of these, the Conservation Commission is aware of significant work being undertaken across the country in terms of carbon balances in native forests and encourages the Department to develop similar work programs to inform the preparation of the next plan.

The Conservation Commission also supports the work being undertaken by the Department and the Forest Products Commission with respect to Objective 23 – Enhanced greenhouse effect.

Nevertheless, the Conservation Commission has concluded that a more strategic review of forest management under a changing climate is required. This review should be at a whole-of-government level and provide for wide public consultation.

To this end the Conservation Commission will seek support from Government, relevant agencies and stakeholders for a wide-ranging and public discussion of forest management under a changing climate. The Conservation Commission recommends that the first step should be the preparation of a paper by the Conservation Commission to identify and scope the issues that need to be canvassed. An indication of the Conservation Commission's current thinking is that the following matters need to be included:

- the adequacy of the conservation reserve system and its management under a changing climate;
- the adequacy of the formal and informal reserve and fauna habitat zone system in establishing a sufficiently connected landscape scale network. This work will need to acknowledge the matrix of forest within which the network is located, while also identifying any emerging issues;
- the range of values and uses that the forest can support under a changed climate. One particular focus here should be on the eastern jarrah forest where the Conservation Commission has previously been concerned as to the adequacy of regeneration of future crop trees and where ecosystem restoration postharvesting may become increasingly difficult. This analysis should be informed by an understanding of the recent past and future shifts in critical isohyets;
- the quantity and quality of water for human and ecosystem use that can be provided by forest environments under a drying climate (see also the Soil and water chapter);
- the need to review the management of weeds, pests and disease so as to reduce the threats that the forest is subject to, as an adaptation strategy to build ecosystem resilience; and
- the need to review the impact of fire both planned and unplanned on forest and community values, and to consider whether current practice will remain appropriate as the climate dries and temperatures increase.

These matters reflect the Conservation Commission's concern that the health and vitality of our forest ecosystems may be at considerable risk from the cumulative threats of weed and pest incursions, the continuing and inevitable spread of dieback, disturbances caused by prescribed fire, wildfire and timber harvesting combined with the impacts of climate change. The Conservation Commission acknowledges that this approach will involve a significant amount of work and require commensurate resources to be provided. The FMP provides for an independent expert review of silvicultural practices and their impacts on biodiversity during the second half of the life of the plan, and therefore there is already a commitment to undertake some of the work proposed.

The Conservation Commission recommends that this independent expert review be enlarged into an independent task force charged with the responsibility of undertaking the work proposed here.

It is through an approach such as this that the key policy settings for the next FMP can be identified in advance, through an explicit and public process, thereby guiding the development of the next plan. To not follow a process along the lines of the one outlined here risks a situation in which the next FMP will, by default, be based upon an incomplete understanding of how the public would like to see their forests managed and protected over the following decade.

To achieve this end the following timeline is proposed:

- the Conservation Commission to publish its discussion paper by 31 July 2009;
- any action required to be undertaken prior to the adoption of the next FMP to be identified by the 31 December 2009 and considered by Government for immediate implementation (see below);
- the final report to be completed by 31 December 2010 to inform the development of the next FMP from 2011.

The Conservation Commission has also considered the need to change forest management practices in advance of the adoption of the next FMP. The Conservation Commission is aware that some sections of the community are of the view that action should be taken immediately rather than in five years time. The Conservation Commission has considerable sympathy with this view and believes that, should the long-term strategy recommended here identify issues requiring an immediate response to avoid future opportunities being lost, then these measures should be implemented prior from the end of 2009, through amendment to the FMP, its associated guidelines, or in other ways.

The Conservation Commission also advises that, in the light of the precautionary principle, it has requested the Department to give greater weight to climate change whenever it makes management decisions from the beginning of 2009.

Natural and cultural heritage

With respect to natural and cultural heritage, the mid-term performance of assessment found that the approach to consultation with Nyoongar representatives has developed in a slightly different way to that envisaged at the time when the FMP was prepared. However, this approach addresses the objective and the intent of the action.

The Conservation Commission supports the alternative approach and the continued consultation with Nyoongar representatives.

With respect to the identification and protection of cultural heritage, there is a lack of information provided for KPI 23. This has resulted in an inadequate assessment of whether the performance target has been met.

The Conservation Commission requests that the Department collate statistics on the number of existing and new heritage sites identified in planning and the number protected for the next KPI report. The Conservation Commission will ask the

Department to review the protocol for this KPI if data availability continues to be a concern.

Socio-economic benefits

The Conservation Commission is concerned by the increasing pressures associated with recreational pursuits such as mountain bike riding, car rallies, motorcycling and 4WD use on land within the FMP area. The Conservation Commission is of the view that a policy is required to ensure that adventure activities and events occur in the most appropriate location. For example, the most intensive of these activities that do not need to be held in sensitive conservation areas may be located in State forest instead.

The Conservation Commission will work with the Department to develop a policy for adventure activities and events on land vested in the Conservation Commission.

Plan implementation

The Conservation Commission has identified a number of issues in relation to plan implementation that require attention.

The Conservation Commission has undertaken several FMP performance assessments since commencement of the plan. Appendix B contains a list of these performance assessments and a summary of the key findings, along with responses by the Department, the Forest Products Commission and the Conservation Commission. A common thread of the performance assessments is the difficulty in operationalising the requirements of the FMP. A primary example relates to the importance of having policy incorporated at the operational level. The extent to which policy is communicated from the administrative level to managers and implemented in the field is a cause for concern.

The Conservation Commission's future FMP performance assessments will continue to focus attention on the importance of having policy incorporated at the operational level.

Significant delays in the development and reporting of the KPIs have occurred. The Conservation Commission is concerned that there has been a considerable delay in the development of the protocols, with some protocols still to be put forward to the Conservation Commission for comment. This has meant that the reporting of the KPIs to date has not complied with the requirements of the FMP with respect to frequency of reporting. As a result the Conservation Commission has found it difficult to adequately monitor plan implementation. The Conservation Commission is particularly concerned that incidences of significant shortfall in meeting KPI targets have not been brought to the attention of the Conservation Commission in a timely manner. The Conservation Commission's ability to respond to these shortfalls has therefore been restricted.

The Conservation Commission requests that the Department and the Forest Products Commission complete those KPIs that the Department and the Forest Products Commission are responsible for by 31 July 2009. For KPIs which require other agencies involvement, the Conservation Commission will work with the Department to finalise the protocols by 31 December 2009.

Of considerable concern is the lack of progress with the preparation through to final approval of the subsidiary management guidelines required under the FMP. In many cases these guidelines had timelines attached to them as a consequence of the Environmental Protection Authority's assessment of the proposed FMP and the subsequent Ministerial conditions. The Conservation Commission acknowledges that close compliance with deadlines is not always possible given limited resources and competing priorities. Nevertheless, the development of some guidelines has been subject to major delays of up to four years. In some cases the absence of approved guidelines may not have had a

significant environmental consequence because of improved practice. However, the Conservation Commission is concerned that in other situations the absence of approved guidelines has been less benign. The Conservation Commission does not believe it is appropriate to simply extend the deadlines and wait for compliance to occur at some time in the future.

The Conservation Commission considers the lack of timely attention to subsidiary management guidelines by the Department to be unsatisfactory and requests that those guidelines listed in Appendix C be completed by 31 July 2009. The Conservation Commission will make some resources available to assist the Department in meeting these deadlines.

The Conservation Commission notes that many Works Improvement Notices and Management Letters issued to the Forest Products Commission by the Department remain outstanding.

The Conservation Commission expects a more timely response to Works Improvement Notices and Management Letters by the Forest Products Commission and will continue to monitor this issue.

The Conservation Commission has also found that the relationship between the Department and the Forest Products Commission has, in some cases, impeded the implementation of the FMP, as time and resources have been directed to interagency issues. The resources invested in the relationship could well have been better directed elsewhere: for example, towards the preparation of subsidiary management guidelines.

In view of this finding, the Conservation Commission supports the finalisation of Working Arrangements between the Department and the Forest Products Commission as a priority.

The Department has raised with the Conservation Commission an issue concerning the adequacy of the Department's powers with respect to compliance with the FMP by its implementing agencies.

The Conservation Commission offers the Department support in seeking appropriate powers under the *Conservation and Land Management Act 1984.*

While the Conservation Commission should not become an enforcement agency in its own right, circumstances may arise when there appears to be a risk of substantial noncompliance with the FMP that could lead to serious environmental consequences. Such circumstances are highly unlikely to occur but give rise to a public expectation that the Conservation Commission, as the vested body, act in some way. One option is to create a statutory duty for the Conservation Commission to provide advice to the Minister for Environment and for the Minister to table that advice in Parliament.

The Conservation Commission will provide advice to the Minister for Environment concerning amendments to the *Conservation and Land Management Act 1984* to create a statutory duty for the Conservation Commission to provide advice to the Minister for Environment, and for its tabling in Parliament, when substantial non-compliance with the FMP leading to serious environmental consequences appears likely.

3. Biological diversity

Overall aim

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to conserve biodiversity and seeking to conserve selfsustaining 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:

Objective 1. Formal reserves

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:

Action	Status of implementation
1.1 The Department will initiate the processes required	Implemented in part.
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 (on plan commencement & ongoing ⁴); 1.1.2 facilitating the Government's community consultation process on fine-scale reserve design (on plan commencement & end year 2); and 1.1.3 consulting with the Conservation Commission and then advising the Minister for the Environment on final reserve boundaries (on plan commencement & ongoing).	The national parks proposed under the <i>Protecting our</i> old-growth forests policy were created via three Reserves Acts that were passed in November and December 2004. Implementation of a further 10 land category changes affecting seven reserves that fall within State Agreement Act mining leases, and were provided for in the Reserves Acts, has been delayed pending the removal of three areas from the Register of the National Estate (further explanation of this issue is provided in the Implementation issues section below). To date 141 of the 305 land category changes have been implemented, with a further 85 currently in progress. Refer to the report on KPI 1 at the end of this chapter and to Appendix A for further details. See also the section at the end of this chapter detailing Issues that
	need to be addressed from 2009.
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 (on plan commencement & ongoing).	Implemented and ongoing. Timber harvesting ceased on proposed conservation reserves from 2004. The Department manages these areas in accordance with the proposed land category.
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 (on plan commencement & ongoing).	Implemented and ongoing. The Department continues to work with the Department of Planning and Infrastructure and other agencies to implement the Bush Forever Program. Since the commencement of the FMP, the Department (and previously the Department of Environment) has undertaken work as part of the Swan Bioplan initiative, covering the area of the Swan Coastal Plain beyond the Bush Forever initiative. This project will help identify areas for addition to the formal comprehensive, adequate and representative reserve system and provide a framework to manage significant areas that are not within secured conservation tenure. Work undertaken to date has included floristic survey work through the Whicher Scarp and Darling Scarp.

⁴ Each action in the FMP includes either an actual (in the text of the action) or indicative (in Appendix 14 of the FMP) timeline for its implementation and completion. Indicative timelines for commencement and conclusion from Appendix 14 have been provided in parentheses after each Action.

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

Significant progress has been achieved with implementation of proposals in the FMP to establish a comprehensive, adequate and representative reserve system. Most of this progress was in the first few years of implementation of the FMP, with little further progress since then. A number of proposals remain outstanding due to issues outside the control of the Conservation Commission and the Department relating to:

- the Department of Industry and Resources stance in recent years that all reserves should be limited to a depth of 30 metres below the natural ground surface, and reluctance by the Department of Industry and Resources to support the creation of conservation reserves (especially national parks and nature reserves) due to public perception that mining and exploration should not occur in these reserves;
- native title requirements (future act processes) associated with changes in land tenure for the creation of reserves;
- the removal from the Register of the National Estate of three listed areas which were not supported for reservation under the Regional Forest Agreement. In line with an understanding given to companies holding State Agreement Act mining leases during consultation for the Regional Forest Agreement, no new conservation reserve proposals within these lease areas will be created without the support of the lease holders until the three areas that were not supported for reservation under the Regional Forest Agreement, but which have subsequently been entered in the Register, are removed from the Register. The Department has been pursuing the delisting of these areas with the Australian Government. Recent advice from the Australian Department of Agriculture, Forestry and Fisheries suggests that this may not be resolved until 2012; and
- the agreement of current management bodies to relinquish management orders, pastoral leases (which in some cases may not occur until the leases expire on 30 June 2015) and freehold titles (in particular, the reluctance of the former Water and Rivers Commission to relinquish titles over areas that were proposed for inclusion in the conservation reserve system under the Regional Forest Agreement to achieve reservation targets for forest ecosystems).

Objective 2. Forest conservation areas

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:

Action	Status of implementation
2.1 The Department will initiate the processes required	Not commenced.
for the land classification changes proposed by the plan	
(in year 1 & ongoing).	There have been delays in progressing changes to forest
	conservation areas as the priority has been to finalise
	formal reserve areas.
2.2 The Department will manage the areas proposed by	Implemented and ongoing.
Appendix 2 to be classified as forest conservation areas	
consistently with their proposed classification and	Timber harvesting ceased on forest conservation areas
purpose and relevant Departmental policies until such	from 2004. The Department manages these areas in
time as they are formally classified. Timber production in	accordance with the proposed land category.
these areas will not be permitted, but other productive	
activities not involving harvesting of sawlogs or other	
residue logs may be allowed (on plan commencement &	
ongoing).	

2.3 The Department in consultation with the	Implemented in part.
Conservation Commission will consider classifying all	
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 (in year 1 & end of year 1).	A paper to progress this action was presented to the Conservation Commission in December 2004. The paper recommended classifying only the large and consolidated areas of old-growth forest as forest conservation areas. This approach was endorsed by the Conservation Commission and submitted to the then Minister for the Environment for approval. The Minister for the Environment requested further information on each of the individual areas. Desktop analysis of areas of old-growth forest with an area of 100 ha or greater was completed in 2005 and refined in early 2006. Identified areas need to be checked in the field prior to being recommended for classification as forest conservation areas. Field survey of the extent and status of these areas will be progressed as resources permit, to inform proposals for the next forest management plan. These areas are currently set aside from timber harvesting and other disturbance activities and are currently managed as conservation reserves.

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

Implementation of formal reserve proposals has been given priority over implementation of forest conservation areas, and hence the classification of forest conservation areas has not progressed.

Objective 3. Informal reserves

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:

Action	Status of implementation
3.1 The Department and the Forest Products	Implemented in part and ongoing.
Commission will conduct their operations within the	
informal reserves established by Appendix 3:	The Department and the Forest Products Commission
3.1.1 in a manner that has regard to the requirements set	manage operations within informal reserves in a manner
out in Appendix 3 where the operation occurs prior to the	that has regard for the requirements of Appendix 3.
approval of the Guidelines referred to in the following	Where operations are planned adjacent to informal
paragraph (on plan commencement & end of year 1);	reserves, appropriate procedures and approvals
and	provided by the Department are followed. However,
3.1.2 in accordance with the Guidelines for the	some incidents have been reported in the Forest
Management of Informal Reserves which are to:	Products Commission Environmental Management
be prepared by the Department with public consultation;	System (EMS), and have resulted in the issue of a
provide for the manner in which the requirements of	Works Improvement Notice or Management Letter ³ . The
Appendix 3 are to be met; and be submitted to the	most common incident identified was boundary
Conservation Commission for advice and approved by	incursions by harvesting machinery. Further information
the Minister for the Environment by 31 December 2004,	can be found in the Compliance monitoring section
when they will take effect and supersede Appendix 3.	below. In 2007 the Conservation Commission conducted
	a performance assessment on informal reserves; key
	findings and issues arising are presented below in the
	Conservation Commission performance assessment
	section (the full report can be found on the Conservation

⁵ A Works Improvement Notice is issued when there has been a failure to comply with an environmental standard, management requirement or condition of approval, or an unsatisfactory environmental outcome, and where remedial action in the field by the body responsible is possible and required. In addition to remediation work an improvement in compliance may also require changes to the planning or management system of the external agency. A Management Letter is issued where remedial action in the field by the body responsible is not possible, and/or not required. Improvement in further performance generally requires changes to the planning or management system of the external agency.

	Commission's website (<u>www.conservation.wa.gov.au</u>)).
	With regard to Action 3.1.2, the Department developed Advisory Notes as interim advice prior to development of the guidelines. Advisory Notes were developed for: Blade-up Access on State Forest and Timber Reserves (June 2006); Management of Access in Informal Reserves and Other Protected Areas Within State Forest and Timber Reserves (September 2006); Salvage of Logs in Association with Informal Reserves (June 2007).
	Guidelines to Protect the Values of Informal Reserves and Fauna Habitat Zones were released for public comment in March 2008 and it is anticipated that these will be finalised in 2009.
3.2 The Conservation Commission will:	Implemented and ongoing.
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.	In 2005 the Conservation Commission, in consultation with the Department and key stakeholders, produced and published Assessment Criteria and Process for the Conservation Commission Review of Old-growth amendments. This document includes the process for public nominations for review of potential old-growth forest areas on indicative timber harvest plans. The Conservation Commission has applied the assessment criteria and process for review of old-growth forest amendments to areas classified as old-growth forest in the Department's database in 1997 but which were not classified as old-growth forest at the commencement of the FMP, and to areas nominated by the public. Of the 863 ha of forest inspected by the Conservation Commission that were classified as old-growth forest in the Department's database in 1997 but which were not classified as old-growth forest at the commencement of the FMP approximately 22% has been verified as old-growth forest. Of the 984 ha of forest inspected by the Conservation Commission as a result of public nominations approximately 21% has been verified as old-growth forest. Findings of the Conservation Commission's old-growth forest assessments are
3.3 Where the Conservation Commission advises the	available on its website (www.conservation.wa.gov.au).
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 (in year 1 & ongoing).	The Conservation Commission continues to advise the Department of areas that require reclassification as old- growth forest and the Department is progressing the amendment of the relevant databases. Amendments are incorporated at regular intervals (at least annually) when corporate databases are updated.
 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 (on plan commencement & Ongoing). 	Implemented and ongoing. Since the commencement of the plan, two incidents relating to old-growth forest have been reported in the Forest Products Commission EMS; however, neither incident resulted in the loss of any areas of old-growth forest. Further information can be found in the Compliance monitoring section below.

Incidents relating to informal reserves

Field based monitoring by staff from the Department and the Forest Products Commission has detected a number of machine incursions into informal reserves, some of which resulted in the issue of a Works Improvement Notice or Management Letter. Incursion across demarcated boundaries most often involved stream zones, but also included travel route zones. Most were of minor environmental consequence and resulted in only minimal disturbance of vegetation or soil. Several major incidents that resulted in disturbance of soil and vegetation or felling and removal of trees from an informal reserve were also identified. There was one instance where a machine was cleaned in a stream zone. Audits conducted by the Department between 2004 and 2007 show that the length of informal reserve boundary affected by incursions represents 0.01 to 0.06% of the total length of reserve boundary adjacent to timber harvesting coupes.

This level and extent of incursion is viewed as acceptable by the Department.

Incidents relating to old-growth forest

Two incidents relating to old-growth forest were reported in the Forest Products Commission EMS. One was associated with a karri regrowth thinning operation and an area of old-growth under review. An area of 0.1 ha of old-growth under review was thinned prior to the Conservation Commission completing its determination of old-growth status. The area was determined not to have been old-growth. The second was associated with the upgrade of an existing road adjacent to an area of forest under assessment by the Conservation Commission for its old-growth status, as a result of public nomination, prior to that assessment being completed. The area of forest was subsequently determined to meet old-growth criteria however the roading operations did not result in the loss of old-growth area.

Actions taken by the Forest Products Commission to minimise the number of incidents affecting informal reserves and old-growth forest include re-training of personnel, improved boundary demarcation and comprehensive briefings prior to commencement of operations.

Implementation issues

Significant resources have been committed to monitoring compliance with informal reserve boundaries and with verification of old-growth forest. The Department and the Forest Products Commission are of the view that opportunities to refine procedures used to identify and verify old-growth forest should be sought in order to make more effective use of limited resources. The Department aims to apply its monitoring effort in a risk management framework and, given the high levels of compliance associated with informal reserves, there is an opportunity to focus monitoring effort to areas of higher risk. The procedures developed by the Conservation Commission to identify and verify old-growth forest include intensive ground based sampling. This method is significantly more resource intensive than methods used elsewhere in Australia to identify old-growth forest and the methods used in Western Australia when the comprehensive mapping of old-growth forest in the region was undertaken. The Department and the Forest Products Commission are of the view that methods based on aerial photographs and patch sizes consistent with the original mapping of oldgrowth forest would provide for more timely and efficient verification of old-growth forest, commensurate with the resources available to undertake these tasks.

Guidance documents, in the form of advisory notes, relating to key issues concerning management of informal reserves have been established. Guidelines to Protect the Values of Informal Reserves and Fauna Habitat Zones have been released for public consultation but are yet to be finalised.

Conservation Commission performance assessments

In 2007, the Conservation Commission undertook a performance assessment of the protection of informal reserves during timber harvesting operations. The performance assessment found that, for the most part, the protection of informal reserves was satisfactory. The system for managing informal reserve boundaries within the

corporate database was satisfactory, assessment of field demarcation and integrity of informal reserve boundaries indicated that field interpretation of informal reserve boundaries was satisfactory, and the demarcation of the field boundaries was clear.

An issue that remains outstanding relates to the lack of a documented procedure for determining the extent of old-growth forest boundaries in the field. The performance assessment identified that the old-growth field identification procedures used by the Department and the Forest Products Commission were inadequate.

As a response to the performance assessment finding the Department committed to "write a procedure for its staff to use when they are required to determine the extent of old-growth forest in jarrah, karri or wandoo. The procedure will be completed by 1 January 2007 and the Conservation Commission will be consulted on its content".

The draft procedure has not yet been made available to the Conservation Commission. The Conservation Commission has been advised of progress in relation to extra planning content for old-growth by the Forest Products Commission and the Department's efforts in relation to protection of areas of old-growth that are not identified in the Department's databases have improved. These measures have reduced the risk of unmapped areas of old-growth forest being logged.

Objective 4. Diversity in vegetation structure

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:

Progress with implementation of actions proposed

Action	Status of implementation
4.1 The Department will conduct its operations in a	Commenced.
manner that has regard to Goals for Understorey	
Structural Diversity, which are to be:	The Master Burn Planning process used by the
4.1.1 prepared by the Department with public	Department is consistent with the Fire Management
consultation; and	Policy (Policy 19) which recognises the need for a variety
4.1.2 submitted to the Conservation Commission for	of fire regimes to provide for an interwoven mosaic of
advice and approved by the Minister for the Environment	vegetation and habitats representing a range of fire
by 31 December 2005, when they will take effect.	intervals, fire intensities, seasons and scales that will
	help optimise the conservation of biodiversity. This is
	implemented in practice by managing the prescribed
	burning program to achieve a desired distribution of time
	since fire for each of a series of Landscape Conservation
	Units which have characteristic climate, landform and
	vegetation patterns.
	The Fire Management Policy provided a general setting
	from which the Goals for Understorey Structural Diversity
	have been dratted. The Goals for Understorey Structural
	Diversity have not yet been subject to public consultation
	or submitted to the Conservation Commission.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

Goals for Understorey Structural Diversity are yet to be submitted to the Conservation Commission for advice and approved by the Minister for the Environment.

Objective 5. Integrating forest management

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:

Progress with implementation of actions proposed

Action	Status of implementation
5.1 The Conservation Commission will cooperate with	Implemented and ongoing.
the Department of Industry and Resources and mining	
and petroleum companies in relation to forest	The Conservation Commission works with the
management and encourage them to act in a manner	Department of Industry and Resources and mining and
that is consistent with the plan (in year 1 & ongoing).	land vested in the Conservation Commission. The
	Conservation Commission endeavours to ensure that
	projects are undertaken having regard to best practice
	environmental management, including forest
	management in accordance with the FMP.
5.2 The Conservation Commission will prepare by 31	Implemented in part and ongoing.
December 2004, guidelines for the preparation of other	
management plans in a manner that integrates with	Early in the development of Guidelines for the
existing management plans, including this one.	Preparation of Area Management Plans for Conservation
	more useful if breadened to address monogement for
	terrestrial conservation reserves throughout the State
	rather than just the south-west forest region Accordingly
	the scope was expanded to provide a strategic
	framework for management plans for conservation
	reserves across Western Australia. In mid-2006 the
	Conservation Commission published Interim Guidelines
	for the Preparation of Terrestrial Conservation Reserve
	Management Plans. The interim guidelines are available
	on the Conservation Commission website
	(www.conservation.wa.gov.au). The Guidelines will be
	finalised by 31 July 2009.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

The Conservation Commission will finalise the Interim Guidelines for the Preparation of Terrestrial Conservation Reserve Management Plans by July 31 2009.

Objective 6. Operations and the conservation of flora

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:

Action	Status of implementation
6.1 The Department will undertake the measures identified in Appendix 13 (which relate to the protection	Implemented in part and ongoing.
of significant flora values) (in year 2 & ongoing).	Significant flora values identified in Appendix 13 are managed according to principles outlined in Regional Wildlife Management Programs (Flora). Regional ecologists are consulted during the harvest planning process with respect to values identified in Appendix 13. As part of this process further actions may be specified for a coupe, such as additional flora surveys, variation to the timing (season) and methodology of routine flora surveys, or the incorporation of supplementary data or information from other studies. The Department is endeavouring to implement a more structured process

	for addressing these values and has revised the relevant planning checklist (See also Action 8.3). The revised planning checklist has been field tested, but is not yet fully implemented as a standard operating procedure.
 6.2 The Forest Products Commission and its agents will conduct its silvicultural operations: 6.2.1 in accordance with the Department's Silvicultural 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. 	Implemented and ongoing. The Forest Products Commission recognises the requirement to conduct silvicultural operations in accordance with the Department's Silvicultural Guidelines. The Jarrah (2004), Karri (2005) and Wandoo (2004) Silvicultural Guidelines incorporate the requirements of

Annual audits on native forest harvesting (coupe management and environmental protection) are undertaken by the Department's Management Audit Branch to verify that field searches are conducted for the presence of threatened flora populations. Audits of the Pre Operations Checklist–South West Forests relating to operations conducted in the period 2004-2007 show that this requirement was complied with in 47 of 49 examples examined. In two cases there was no evidence to show that flora surveys had or had not been conducted.

Implementation issues

There are no significant issues affecting implementation of these actions.

Objective 7. Retention of habitat elements in harvesting operations 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:

	Status of Implementation
7.1 The Department will publish a map by 1 January	Completed.
2004 showing locations of indicative fauna habitat zones.	
	A map showing locations of indicative fauna habitat
	zones was published in 2004.
7.2 The Department may change the locations and areas	Implemented in part and ongoing.
of indicative fauna habitat zones in a manner that.	In finalizing found habitat zone houndaries the
where the change occurs prior to the approval of the	Department continues to comply with the objectives in
Guidelines referred to in the following paragraph (on plan	Appendix 4 Maps depicting the status of all fauna
commencement & end of year 1); and	habitat zones at 31 December 2007 have been
7.2.2 is in accordance with Guidelines for the Selection	published to the Department's website
and Management of Fauna Habitat Zones, (in year 2 &	(www.dec.wa.gov.au/forests/forest-management-
ongoing) which are to be:	planning/fauna-habitat-zones.html) The indicative
prepared by the Department with public consultation; and	location of 283 zones was identified in the FMP.
submitted to the Conservation Commission for advice	Selection of the final location of each zone is being
December 2004 when they will take effect and	disturbance operations. To October 2008, the locations
supercede Appendix 4	of 42 zones have been finalised design work for
	another 24 are in progress, and a further 12 have had
	preliminary analysis undertaken but not progressed as
	disturbance operations are unlikely to compromise the
	choice of final location. A table identifying fauna habitat
	zone statistics for completed zones to October 2008 is
	provided below in Table A. In 2005 the Conservation
	Commission conducted a performance assessment on
	rauna nabitat zones; key findings and issues arising
	performance assessment section (the full report can be
	found on the Conservation Commission's website -
	www.conservation.wa.gov.au).
commencement & end of year 1); and 7.2.2 is in accordance with Guidelines for the Selection and Management of Fauna Habitat Zones, (in year 2 & ongoing) 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.	habitat zones at 31 December 2007 have beer published to the Department's website (www.dec.wa.gov.au/forests/forest-management- planning/fauna-habitat-zones.html) The indicative location of 283 zones was identified in the FMF Selection of the final location of each zone is being progressed on a priority basis in advance of disturbance operations. To October 2008, the location of 42 zones have been finalised, design work for another 24 are in progress, and a further 12 have have preliminary analysis undertaken but not progressed a disturbance operations are unlikely to compromise the choice of final location. A table identifying fauna habitat zone statistics for completed zones to October 2008 i provided below in Table A. In 2005 the Conservation Commission conducted a performance assessment of fauna habitat zones; key findings and issues arisin are presented below in the Conservation Commission performance assessment section (the full report can b found on the Conservation Commission's website <u>www.conservation.wa.gov.au</u>).

	Guidelines for the Selection of Fauna Habitat Zones are planned to be released for public comment in 2009.
7.3 By 30 June 2004 the Department, in consultation with the Conservation Commission will complete a	Completed.
having regard to the criteria specified in Appendix 4, with a view to making appropriate changes to those locations under Action 7.2.1.	The location of all 283 indicative fauna habitat zones was reviewed within year 1 (2004).
7.4 The Department and Forest Products Commission will conduct their operations in indicative fauna habitat	Implemented and ongoing.
 win contact their operations in indicative ratina habitat zones, and in fauna habitat zones established under Appendix 4 and the Guidelines for the Selection and Management of Fauna Habitat Zones (on plan commencement & ongoing): 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 	The Department and the Forest Products Commission continue to conduct operations in fauna habitat zones in a manner that has regard to the requirements detailed in Appendix 4. There have been a small number of incidents relating to machine incursion across fauna habitat zone boundaries. Further details are provided below in the Compliance monitoring section.

Table A. Status and area statistics for fauna habitat zones to October 2008.

Background statistics – all fauna habitat zones (FHZ)			
Number of indicative FHZ excluding Kingston	283		
Total gross area of State forest included in all indicative FHZ	61,606 ha		
Total net area (State forest outside of informal reserves) included in all indicative FHZ	52,042 ha		
Total gross area of Kingston amalgamation of FHZ	4,144 ha		
Total net area of Kingston amalgamation of FHZ	3,572 ha		
Total gross area for all indicative FHZ excluding Kingston	57,462 ha		
Total net area for all indicative FHZ excluding Kingston	48,470 ha		
Average gross area of indicative FHZ excluding Kingston	203 ha		
Average net area of indicative FHZ excluding Kingston	171 ha		
Progress statistics – completed fauna habitat zones			
Number of zones finalised to date (FINAL plus INTERIM FINAL)	42		
Total gross area of zones finalised to date (FINAL plus INTERIM FINAL)	9,088 ha		
Total net area for zones finalised to date (FINAL plus INTERIM FINAL)	7,123 ha		
Average gross area of finalised/interim FHZ (FINAL plus INTERIM FINAL)	216 ha		
Average net area of finalised/interim FHZ (FINAL plus INTERIM FINAL)	170 ha		

Conservation Commission performance assessments

The Conservation Commission undertook a performance assessment of fauna habitat zones in 2005. This performance assessment focussed on the process for finalising fauna habitat zone locations. The assessment provided five key findings. Three key findings related to minor inadequacies in the planning and decision making process where there was an issue concerning selection criteria hierarchy and a potential for not identifying all values due to a lack of consultation. One key finding related to timeliness for the provision of data to key community stakeholders involved in the fauna habitat zone assessment process. It was envisaged that the development and publication of the Guidelines for the Selection of Fauna Habitat Zones would address these issues. Until the guidelines are published the planning process and checklist were amended to ensure that the criteria hierarchy and consultation processes were considered. The fifth key finding identified an inconsistency in demarcation of operational boundaries. Publication of Guidelines to Protect the Values of Informal

Reserves and Fauna Habitat Zones and the harvesting pre-operations checklist that the Department is revising (refer Action 6.1 and 8.3) are likely to improve this process.

The performance assessment was followed by a 12 month review. The 12 month review found that, for the most part, the recommendations arising from the initial assessment had been implemented by the Department. However, the production of guidelines relating to the selection and management of fauna habitat zones had been delayed. Furthermore, it was found that there had been two instances of incursion and harvesting in a fauna habitat zone. These incursions highlighted the need for the routine undertaking of demarcation of the fauna habitat zones to reduce the risk of such incursions. On the basis of this review, the Conservation Commission asserted that a priority should be placed on the development of guidelines relating to the fauna habitat zones that were due by 31 December 2004.

Compliance monitoring

Management letters were issued by the Department in relation to the two incidents of machine incursion across fauna habitat zone boundaries which resulted in harvesting of 3.2 ha of jarrah forest, and non-commercial thinning of approximately 10 ha of regrowth jarrah as part of an adjacent thinning operation. Actions taken by the Forest Products Commission to minimise the number of incidents affecting fauna habitat zones include improved boundary demarcation and comprehensive briefings prior to commencement of operations.

Implementation issues

There has been a considerable effort on the part of the Department, the Conservation Commission and key community stakeholder groups involved in the process of finalising fauna habitat zones. Nevertheless, since 2004 a series of issues in relation to the selection and management of fauna habitat zones have emerged.

Firstly, as part of the process leading to the finalisation of the location of fauna habitat zones the Conservation Commission has made recommendations on boundary alignments to the Department. While the Conservation Commission has often supported the Department's proposals, in some cases the Conservation Commission has recommended alternative locations. These recommendations have been based upon fauna habitat considerations and yet have not always been accepted by the Department for various reasons.

A second issue relates to a difference of interpretation of some key provisions in Appendix 4 of the FMP between the Conservation Commission and the Department. Appendix 4 identifies a minimum area for indicative fauna habitat zones of 200 hectares, with a total area (outside of any included informal reserves) of between 50,000 and 55,000 hectares. Under Action 7.3 the Department, in consultation with the Conservation Commission, prepared the 30th June, 2004 map of indicative fauna habitat zones with a total of 283 zones (in addition to the amalgamated zones in the vicinity of Kingston forest block). The extent to which zones should be altered has, in the past, been a point of difference between the Conservation Commission and the Department.

The Department is of the view that the minimum size, total number and spatial distribution of indicative fauna habitat zones should not be significantly altered as these are fundamental settings that provide for the greatest number of zones at the closest spacing throughout the forest, and have been applied in the calculation of timber sustained yields for the FMP. The Department recognises, however, that where there may be demonstrated improvements to habitat quality and management practicality for a modest extension to the size of a zone, with a commensurate reduction in the overall number of zones, then these variations would be acceptable.

The Conservation Commission's interpretation of Appendix 4 is that the area of an individual zone should be allowed to exceed the 200 hectare minimum to a greater extent for fauna habitat conservation reasons, even if the consequence of this is ultimately fewer zones. The Department and the Conservation Commission agree that the mechanism to resolve this issue is the completion of the Guidelines for the Selection of Fauna Habitat Zones.

A third issue that has affected the timely finalisation of fauna habitat zones is the changes in priorities for fauna habitat zone finalisation at short notice due to the rescheduling of coupes by the Forest Products Commission. This has limited the amount of time available for consultation and assessment of boundaries, and in some instances resulted in disturbance actions by the Forest Products Commission before zones are finalised. In some cases this has limited the choice of options for final boundaries.

Another issue relates to the inclusion of a step to engage community stakeholders in the process. This additional step has not always enabled timely finalisation of boundaries. The Department, the Conservation Commission and community stakeholders are working to improve the process through timely provision of consistent data by the Department and by specifying timeframes for community input. It is envisaged that once the guidelines are published it will no longer be necessary to seek community stakeholder input on every fauna habitat zone.

Clearly the development of Guidelines for the Selection of Fauna Habitat Zones is important for the fauna habitat zone finalisation process. The Conservation Commission's performance assessment of fauna habitat zones in 2005 highlighted the need for the development of fauna habitat zone management and selection guidelines. The 12 month review of the performance assessment found that the development of the guidelines had been delayed and recommended that a priority be placed on their development. The Department has indicated that Guidelines for the Selection of Fauna Habitat Zones are in preparation and will be released for public consultation in 2009. It is essential that this occur. Guidelines to Protect the Values of Informal Reserves and Fauna Habitat Zones have been released for public consultation but are yet to be finalised, although Conservation Commission understands that this is now imminent.

Objective 8. Threatened and priority species and ecological communities

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:

Action	Status of implementation
8.1 The Department will maintain a list identifying	Implemented and ongoing.
threatened and priority species of flora and fauna and	
threatened ecological communities. (Threatened species	The Department maintains lists of threatened and
and communities are those under risk of extinction.	priority species of flora and fauna and threatened
Priority species and communities are those that may be	ecological communities.
threatened but for which there are insufficient survey	
data, and those that are rare but not threatened) (on plan	Refer to the report on KPI 2 at the end of this chapter
commencement & ongoing).	and to Appendix A for further details.
8.2 The Department and the Forest Products	Implemented and ongoing.
Commission will conduct their operations having regard	
to the Department's Conservation of Endangered and	The Department and the Forest Products Commission
Specially Protected Fauna in the Wild policy and	conduct operations having regard to the Department's
Conservation of Threatened Flora in the Wild policy (on	Conservation of Endangered and Specially Protected
plan commencement & ongoing).	Fauna in the Wild policy (Policy 33) and Conservation
	of Threatened Flora in the Wild policy (Policy 9).
8.3 The Department and Forest Products Commission	Implemented in part and ongoing.

will revise planning checklists to identify actions to be taken in specified circumstances in which the declared rare flora species, threatened ecological communities, and other significant flora identified in Appendix 13 may be disturbed by their operations (in year 1 & end of year 2).	Current planning checklists used by the Department and the Forest Products Commission do identify declared rare flora species and threatened ecological communities. A revised planning checklist that addresses significant flora identified in Appendix 13 of the FMP has been field tested, but is not yet fully implemented as a standard operating procedure (see Action 6.1).
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 (on plan commencement & end of Year 1): 8.4.1 to the satisfaction of the Department; and 8.4.2 in consultation with the Conservation Commission (end year 2).	Implemented in part and ongoing. The Forest Products Commission and the Department undertake operations with regard to the Fauna Distribution Information System (FDIS). FDIS was developed for predicting the likely occurrence of fauna that might be impacted by timber harvesting and prescribed burning. The Forest Products Commission and the Department have applied the preliminary version of FDIS in planning and approval processes for timber harvesting operations since 2004. In 2006, the Forest Products Commission provided an enhanced version of FDIS to the Department for consideration. Following resolution of management, custodial and data integrity matters FDIS was presented to the Conservation Commission in August 2007. In November 2007 the Conservation Commission decided that an assessment should be undertaken on the general adequacy of FDIS for the protection of threatened and priority species and ecological communities. The assessment was undertaken by independent experts. During 2008 reports from the independent experts were provided to the Conservation Commission (key findings are identified in the Implementation issues section below). The reports were collated and the final consolidated report will be presented to the Conservation Commission for approval and forwarding to the Department by 31 March 2009.
 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. 	Implemented and ongoing. The Forest Products Commission uses a planning checklist (Pre Harvesting Checklist) and a weekly notification system to notify the Department of its harvesting activities. The Department notes that there have been incidents of plantations being accessed by the Forest Products Commission without prior approval for access by the Department. Whilst there have been improvements since 2004 in the planning and approvals system for access to plantations, the Department is of the view that further improvements are required
 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) (on plan commencement & ongoing). 	Implemented and ongoing. All declared rare flora that occur in State forest or timber reserves within the area covered by the FMP are covered by Regional Flora Wildlife Management Programs (with the exception of those species that were listed after Wildlife Management Programs were endorsed). Recovery plans and interim recovery plans for selected threatened species and ecological communities are developed and implemented as required and as resources allow.
	Baiting to control foxes has been conducted within the FMP area from 2004 as part of the Western Shield program. Broad scale baiting is achieved through aerial deployment, while ground baiting programs are conducted in localised areas to protect small vulnerable populations of threatened fauna, such as the quokka. From 2004 to 2007 performance targets for the Western Shield program were generally achieved. During the six months to June 2008, the aerial baiting program has been interrupted by issues of contract management and is now somewhat behind schedule. The Department, with advice from

Department of Treasury and Finance, is working to ensure contractual obligations are met so that the aerial baiting program can be implemented on schedule. The Department in conjunction with the Pest Animal Control Cooperative Research Centre, is investigating whether predation by cats may have increased in some areas following successful fox baiting. This project is also studying the response of native predators including the chuditch and large varanid lizards following fox baiting. The Western Shield program was reviewed in 2004 by Possingham <i>et al.</i> The review found the program to be very satisfactory as a threat abatement program.
satisfactory as a threat abatement program. Further details can be found in Possingham <i>et al</i> (2004).

Desktop audits are undertaken by the Department's Management Audit Branch to verify that the Fauna Distribution Information System database is used in the planning of harvest activities. Audits indicated that this action has been complied with and evidence that the Fauna Distribution Information System database had been referred to during harvest planning was available for all coupes sampled.

The Forest Products Commission EMS recorded several incidents in relation to small distances of road upgrade commencing prior to the completion of a flora search.

Implementation issues

The Conservation Commission has not yet completed its review and provided comments on FDIS in full (refer Action 8.4). The general outcome of the independent expert assessment undertaken for the Conservation Commission was that there was wide support for the concept and general principles of the system. It was considered that the effective implementation of such a system would lead to greatly enhanced decision making processes in the management of the forest and the protection of its nature conservation values. It was also found that there needed to be significant improvements in the upkeep of the system and the need to resolve widely differing views in order to ensure that the system established an adequate level of scientific rigour in its application. What has not as yet been assessed is the way in which FDIS is working in an operational capacity within the Department and the Forest Products Commission. In particular, whether FDIS has the capacity to trigger and generate an effective management response.

With respect to Action 8.5, the Department has concerns that the planning and approvals system for access to plantations is not well defined. The system as it is understood by the Department is not always followed by the Forest Products Commission and there appears to be a view within the Forest Products Commission that approval to access plantations on Department-managed land is not required.

Objective 9. Increasing knowledge

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:

Action	Status of implementation
9.1 The Department will undertake biological surveys,	Commenced.
which will be:	
9.1.1 of priority areas determined in consultation with the	Development of a program to undertake biological
Conservation Commission (by year 5 & ongoing); and	survey has been highlighted as a Sustainable Forest
9.1.2 used, where appropriate, to assist in evaluating the	Management Division service priority for Science

extent to which biodiversity is being conserved and the need for any review of the reserve system. (as required).	Division. Preliminary scoping has been undertaken by Science Division with the intention to incorporate knowledge gained from the first five years of the FORESTCHECK ⁶ monitoring project about the distribution of plants and animals particularly fungi, invertebrates and cryptogams which have not been rigorously surveyed. See Implementation issues at the end of this section.
9.2 The Department will:	Implemented and ongoing.
 9.2.1 continue to monitor the effect of disturbance from timber harvesting on fauna and flora in the Kingston study area (on plan commencement & ongoing); 9.2.2 implement the species, community and process monitoring program, FORESTCHECK (on plan commencement & ongoing); 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 (in year 2 & ongoing); 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 (in year 1 & ongoing). 	The Department continues to monitor the effect of disturbance from timber harvesting on fauna and flora in the Kingston study area. Spotlight surveys are undertaken annually to determine trends in the populations of possums and other medium-sized mammals. Woylie populations in the area have been monitored intensively as part of an investigation of possible causes of a widespread decline. The FORESTCHECK monitoring program has been operating since the commencement of the plan. Forty eight monitoring grids have been established in Donnelly, Wellington, Perth Hills and Blackwood Districts. All sites have been assessed for a second time. The FORESTCHECK operating plan was revised and made available on the internet in 2006. Data from five years of FORESTCHECK monitoring have been analysed and a series of papers are being prepared to report on the major findings from the project. The effectiveness of an indicator species approach is being compared with the current FORESTCHECK sampling methodology as part of the 5 year review of the project.
	research addressing aspects of sustainable forest management including forest health, fire, silviculture and hydrology. Individual research project summaries are provided in the Annual Research Activity Report published by the Science Division, available on the Department's website (www.dec.wa.gov.au). This document also lists scientific publications prepared by staff of the Science Division. Notable developments include release of the final report from Project Vesta which was a major study of fuel dynamics and fire behaviour in the jarrah forest, publication of a paper on the response of karri forest fungi to fire, preparation of a comprehensive progress report on the hydrological response to timber harvesting in the intermediate rainfall zone of the northern jarrah forest and projects initiated in 2005 to monitor stream invertebrate biodiversity (KPI 20), and to identify appropriate seed collection zones for plant species used in rehabilitation operations. The Department's Science Division was represented on the Conservation Commission's Research Advisory
	on the Conservation Commission's Research Advisory Committee during the period of time that this committee was convened (refer to the Implementation issues section below for further information on the Conservation Commission's Research Advisory Committee).

There are no findings from compliance monitoring relevant to this objective.

⁶ FORESTCHECK is a long term monitoring program and is a strategy for increasing knowledge on the maintenance of biodiversity and management effectiveness in Western Australia's forests.

Implementation issues

The biological survey group within the Biogeography program of the Science Division are currently committed to a number of surveys throughout the State including the Pilbara, Kimberley islands and banded ironstone ranges of the Yilgarn block. These surveys have a high priority for the State because they relate to areas of high mineral prospectivity and are subject to development applications for major resource projects. Commitments to field work, data analysis and report preparation will occupy the survey team until the end of 2010 or beyond, therefore impacting on the level of effort that the Science Division can direct towards biological survey in the FMP area. For this reason, the Department has been investigating the possibility of extending the FORESTCHECK project into parts of the FMP area that have not been well sampled in the past. Analysis of data from the first five years of sampling from the FORESTCHECK project have confirmed the important contribution that the project has made to biogeographical knowledge, particularly for invertebrates and fungi.

In February 2004 the Conservation Commission established a Research Advisory Committee, the purpose of which was to identify and provide advice to the Conservation Commission on scientific and social research priorities that would make the most strategic improvement in biodiversity conservation outcomes for Western Australia. It was also intended that the Research Advisory Committee would aid the State's biodiversity research effort through encouraging better integration across government, and including the tertiary education sector, CSIRO and beyond. The Research Advisory Committee was composed of five members that met biannually from 2004 to 2006. It was envisaged that the Research Advisory Committee would play a key role in fire research. In July 2005 the then Minister for the Environment endorsed the recommendations of an Environmental Protection Authority's review of the Department of Conservation and Land Management fire policies and management practices. One of those recommendations was for the Research Advisory Committee to be tasked to advise on the Department's fire research activities. In 2007, due to difficulties in appointing a Chair of appropriate standing who could dedicate the time and effort required for such a position, the Conservation Commission decided to consider alternative approaches to facilitate input of external advice on research planning and priorities.

Key Performance Indicators

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 ten 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.

KPI 1 - Representation of forest ecosystems in formal reserves

As of March 2008, the overall reservation level for native forest ecosystems was 23.4 percent of pre-1750 extent within formal conservation reserves compared to the target reservation level of 26.7 percent when the FMP is fully implemented. Most forest ecosystems are well progressed towards target levels of reservation except for jarrah north east, and to a lesser extent western wandoo forest and western wandoo woodland (for details refer to Appendix A).

Area of formal conservation reserve by land category that have been established since 2004 in the area of the FMP are shown in Figure 1.



Figure 1. Area (ha) of formal conservation reserves by land category that have been established since 2004 in the area of the FMP to 31 March in each reporting period.

As of March 2008, 141 of the 305⁷ land category changes have been implemented (Figure 2), with consultation for a further 85 at an advanced stage. National parks proposed under the *Protecting our old-growth forests* policy have been created, with the proposed national park in the Perup area north east of Manjimup becoming a nature reserve following a Conservation Commission recommendation to that effect. Most land category changes achieved to date took place between 2004 and 2006.

⁷ The FMP lists 318 identifier numbers for land category changes. Eight identifiers did not require action (remained as the current land category type) and five are no longer to be pursued.



Number of individual land category changes required to fully implement all proposed changes.
 Number of individual land category changes completed at 30 March in each reporting period.

Figure 2. Number of proposed land category changes that have been fully implemented to 31 March in each reporting period. Land category changes include, but are not limited to, those that result in addition to the formal conservation reserve system.

KPI 2 – The status of (critically endangered, endangered, vulnerable, conservation dependent) forest-dwelling species and ecological communities as determined by listing

Performance measure	List of species and ecological communities and their status that tracks movements of species between protection categories.
Performance target(s)	No species or ecological community will move to a higher category of threat as a result of management activities.
Reporting	Annually with the review of the lists.
Response to target shortfall	The Department to investigate the cause of a change to a more threatened category and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices, in the context of its assessment and auditing function, in consultation with the Department.

New species are added to lists as information becomes available and a nomination is endorsed by the Threatened Species Scientific Committee and agreed by the Minister. Listing of a species can occur for a number of reasons including; that sufficient information has been compiled to support a nomination (does not necessarily mean that the conservation status of the species has declined), there has been a change to the taxonomic classification of the species or that there is sufficient evidence that the species has suffered a decline in population numbers. Species elevated to a higher category of threat since the commencement of the FMP in 2004 are listed in Table 1 together with the Department's explanation for the change in status over this period.

Flora

Eight species of flora within the FMP area have moved to a higher category of threat since 2004. Six were previously listed as priority species and two species were new additions to the list. It is the view of the Department that there is no evidence to suggest that these species have been elevated to a higher category of threat as a consequence of management activities, but rather the additional level of survey and information available for these species has supported their listing as declared rare flora which will enable a higher level of protection and management attention in the future (refer Table 1 for detailed explanations for individual species). In the Department's view these listings do not represent a shortfall in relation to the performance target for this KPI. Effective implementation of actions identified in the FMP relating to management of fire, weeds, pests, diseases and recreational activities will be important for conservation of these species.

Fauna

Four species of vertebrate fauna have moved to a higher category of threat since 2004 (refer Table 1 for detailed explanations for individual species). The elevation in category of threat of the noisy scrub bird is not related to management activities and therefore is not a shortfall in relation to the performance target for this KPI. This species was increased to endangered as a precautionary approach recognising that areas of core habitat in and adjoining the Two Peoples Bay Nature Reserve (outside the FMP area) may be subject to increased fire frequency as a result of climate change.

For the red-tailed black cockatoo it is uncertain if the move to a higher category of threat is related to management activities. The Department will report to the Conservation Commission and the Minister for the Environment in 2009, after which the Conservation Commission will respond as provided for in the FMP.

For the brush-tailed phascogale, the Department is uncertain if the move to a higher category of threat is related to management activities. The Department reported to the Conservation Commission and the Minister for the Environment in March 2008. Under the FMP requirements the Conservation Commission has been evaluating the need for a revision of management practices, in the context of its assessment and auditing function, in consultation with the Department. A working group comprised of officers from the Department and the Conservation Commission was formed with the purpose of assessing precautionary measures, beyond a pure research approach, for the management of the brush-tailed phascogale. An evaluation was presented at the Conservation Commission's meeting of 10 November 2008 with the resolution that the report findings be further investigated with the aim of identifying options for immediate action.

The conservation status of the woylie changed from conservation dependent to endangered in 2008. The woylie was the first species to be removed from the threatened species list in 1996 due to management actions. Ongoing monitoring of this species has detected a substantial decline in population numbers such that it again met the criteria for listing as threatened. Population declines have been observed throughout the range of the woylie, affecting both extant natural populations and re-introduced populations. The Department has initiated a major research project and a comprehensive project report has been prepared, and findings from a range of investigations were presented to a workshop in February 2008. Details of this research are available at (<u>www.dec.wa.gov.au/programs/saving-our-species/woylie-conservation-research-project.html</u>). Results to date indicate that the decline in woylie populations is unlikely to be driven by habitat loss or fragmentation, fire or other direct human intervention. The Department is of the view that the elevation in category of threat of the woylie is not related to management activities and therefore is not a shortfall in relation to the performance target for this KPI. Further information about the decline in woylie populations and possible factors contributing to the decline are provided in the report on KPI 3.

Threatened ecological communities

The only change to the conservation status of threatened ecological communities occurred between 2005 and 2006 when the availability of higher resolution mapping resulted in one community that was listed as Vulnerable being identified as outside the boundary of the FMP area.

Species	Category	New	Reasons why elevated	Due to
		category		management
Flora				activities
2004				
No species elevated	I to higher cated	orv in 2004		
2005	<u> </u>	,,		
No species elevated	I to higher cated	ory in 2005		
2006				
Andersonia	New	CR	Sufficient information compiled to support a	No
annelsii	addition		nomination for listing based on the occurrence	
			from a single known population. Potential	
			threats identified in the nomination include fire,	
			drought and Phytophthora cinnamomi.	
Laxmannia	P2	VU	Sufficient information compiled to support a	NO
grandifiora			nomination for listing based on occurrence from	
			searching	
Reedia spathacea	P4	FN	Sufficient information compiled to support a	No
noodia opainaooa		2.1	nomination for listing based on inability to	110
			locate additional populations despite extensive	
			survey, and the decline of two populations	
			known to exist a decade earlier. This species is	
			dependent on groundwater seepage and may	
			be adversely affected by recent trends to lower	
			rainfall. Drier conditions may also lead to peat	
			swamps, where this species occurs, becoming	
			hore vulnerable to fire. Some populations are	
Stylidium	New	CR	Sufficient information compiled to support a	No
semaphorum	addition	OIX	nomination for listing based on the occurrence	110
00110p1101011	Gaalleri		from a single known population. Potential	
			threats identified in the nomination include	
			successive fires and weeds.	
2007				
No species elevated to higher category in 2007				
2008				
Cryptandra	Р	VU	Sufficient information compiled to support a	No
congesta			from a single known population at Mt Lindepov	
			within a national park proposed in the EMP	
			Key threatening processes include	
			Phytophthora cinnamomi, inappropriate fire	
			regimes and drying habitat conditions. Feral pig	
			activity and incidental recreational activities	
			such as motorbike riding and bushwalking also	
			have the potential to contribute to population	
			l decline.	

Table 1. List of species elevated to a higher category of threat (2004-2007).

Species	Category	New	Reasons why elevated	Due to
		category		Department management activities
Eremophila glabra	Р	CR	This species is known from two populations.	No
subsp. chorella.	-		one being in the Mogumber Nature Reserve	
			which is within the area covered by the FMP.	
			The second population is within the	
			metropolitan area and is subject to	
			development pressure.	
Goodenia	Р	EN	This species is known from six populations, the	No
arthrotricha			largest of which is located on private property.	
			Populations have declined at one site due to	
			railway maintenance activities, and due to	
			grazing and mining activities at a second site.	
Grevillea	Р	VU	Sufficient information compiled to support a	No
fuscolutea			nomination for listing based on the occurrence	
			from a single known population in the Mt	
			Lindesay area within a national park proposed	
			in the FMP. Survey data indicate that this	
			population has declined in size and condition	
			compared with earlier surveys a decade or	
			more ago. Key threatening processes having	
			the potential to reduce the extent of the	
			incontraction fire regimes and druing behitet	
			conditions Feral nig activity and incidental	
			recreational activities from motorbikes and	
			walkers also have the potential to contribute to	
			population decline.	
Fauna				
2004				
No species elevated	I to higher categ	gory in 2004		
2005				
Calyptorhynchus	P3	VU	Status of this species was increased to	Uncertain
banksii naso			vulnerable because of concerns about the	
(red-tailed black			limited availability of nesting sites, and the loss	
cockatoo)			of known nesting sites monitored by the WA	
			Museum. Nesting sites have been lost due to	
			for agriculture, competition from foral baca and	
			tor agriculture, competition from terai bees and	
			resulting from hushfires and associated fire	
			suppression operations.	
2006	1			
Atrichornis	VU	EN	Status of this species was elevated to	No
clamosus			Endangered on a precautionary approach	
(noisy scrub bird)			recognising that areas of core habitat in and	
			adjoining the Two Peoples Bay Nature Reserve	
			may be subject to increased fire frequency as a	
			result of climate change. These reserves are	
			not within the area covered by the FMP.	
			Recommendation included a requirement to	
			review the status after five years to determine	
			whether in fact the species had continued to	
Dhaaaaaala	D2	\/L1	This appaire is now recognized as a Western	Lincortoin
tanoatafa subsp	гэ	vu	Australian sub spacies. Population sizes have	Uncertain
M/MMM22			declined across the range of the species and	
(brush-tailed			appear to be amongst the lowest on record	
phascogale)			Populations are known to fluctuate widely, and	
phaooogalo			the species is difficult to survey except when	
			abundant.	
2007				
No species elevated to higher category in 2007				
2008				· • •
Bettongia	Conservatio	EN	Re-listed as Endangered following declines in	No
peniciliata	[] dependent		population size (>50 per cent) across the range	
(woyne)	dependent		conservation reserve.	

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.

KPI 3 – The status of selected threatened or conservation dependent species that are the subject of management actions to protect them

Data relevant to KPI 3 are provided by the Western Shield program. Monitoring sites have been established to provide information about population trends of fauna in the critical weight range (35–5,500 g) in response to fox control by 1080 baiting. Some information is also obtained about reptiles and birds. Survey methodology is intended to measure population changes at a landscape level. Data presented here relate to the woylie (*Bettongia penicillata*) and the chuditch (*Dasyurus geoffroii*) as both species have target capture rates defined in recovery plans.

Woylie

The Woylie Recovery Plan (Start *et al.* 1995) established a capture rate of 7.5% at monitoring sites as one of the criteria for successful recovery. Woylies were reintroduced to Batalling in 1982 with fox baiting commenced but not maintained. Capture rates at Batalling consistently exceeded 7.5% within four years of the introduction of quarterly fox baiting in February 1991 (Figure 3). Capture rates began to decline in 2003 and since 2006 have been below the 7.5% criterion for successful recovery. Woylies were also re-introduced at Julimar and Centaur and, while these populations have persisted, capture rates have remained below 7.5%. Both Julimar and Centaur have a moderately high abundance of chuditch which is a known predator of the woylie, and it is possible that predation by chuditch may have contributed to the lack of recovery success.

Population declines have been observed throughout the range of the woylie, affecting both extant natural populations and re-introduced populations. The Department has initiated a major research project involving a number of partner agencies to investigate potential causes of the decline. A comprehensive project report has been prepared and findings from a range of investigations were presented to a workshop in February 2008. Details of this research are available at (<u>www.dec.wa.gov.au/programs/saving-our-species/woylie-conservation-research-project.html</u>.) Results to date indicate that the decline in woylie populations is unlikely to be driven by habitat loss or fragmentation, fire or other direct human intervention. The hypothesis proposed to explain the decline is that woylie populations are being affected by a disease that renders them vulnerable to predation, with cats and foxes the most important predators. The pathogen associated with the disease has not been confirmed.

For the woylie, the trap success rate is below the target specified in the recovery plan and therefore the performance target of this KPI is not achieved. The Department will investigate the cause and report to the Conservation Commission and the Minister for the Environment. Thereafter the Conservation Commission will respond as provided for in the FMP.


Figure 3. Capture rates for woylie at selected monitoring sites within the area of the FMP.

Chuditch

The Chuditch Recovery Plan (Orell and Morris 1994) established a capture rate of 1 per cent at monitoring sites as one of the criteria for successful recovery. Capture rates from the monitoring sites at Batalling, Julimar, Centaur and Noggerup have been sustained at or above 1 per cent within three years of quarterly baiting being implemented (Figure 4). Capture rates exceeding 8 per cent indicate very high densities of chuditch. Capture rates at Batalling dropped after woylie capture rates reached 20 per cent possibly due to competition for traps, with woylies being more likely to enter a trap to the exclusion of chuditch. Chuditch have not been recorded at Batalling since 2006. The reason for this has yet to be established.



Figure 4. Capture rates for chuditch at selected monitoring site within the area of the FMP.

Issues to be addressed from 2009

On the basis of the above, the mid-term audit process identified the following issues to be addressed from 2009:

Whilst there was good early progress in implementing the reserve proposals in the FMP there has been little progress in recent years and there are a range of impediments outside the control of the Department that need to be addressed if progress towards achieving all of the reserve proposals is to remain on target. The Department and the Conservation Commission will advise the Minister for the Environment on approaches to resolving the impediments to progress.

A number of guidelines required by the FMP are yet to be completed. Those close to completion should be finalised by 31 July 2009 (Guidelines to Protect the Values of Informal Reserves and Fauna Habitat Zones, Fauna Distribution Information System, Guidelines for the Selection of Fauna Habitat Zones) and the remaining one by 31 December 2009 (Goals for Understorey Structural Diversity).

The Conservation Commission will finalise the Interim Guidelines for the Preparation of Terrestrial Conservation Reserve Management Plans by 31 July 2009.

The requirement of Action 9.1 for the Department to undertake further biological survey of priority areas within the FMP area determined in consultation with the Conservation Commission will be addressed by the establishment of additional FORESTCHECK monitoring sites.

The Department will report to the Conservation Commission and to the Minister for the Environment with respect to the move of the red-tailed black cockatoo to a higher category of threat (KPI 2). The Conservation Commission will evaluate the need for revision of management practices, in the context of its assessment and auditing function, in consultation with the Department.

The Department will report to the Conservation Commission and to the Minister for Environment with respect to the decline in trap capture success rate of the woylie (KPI 3). The Conservation Commission will evaluate the need for revision of management practices, in the context of its assessment and auditing function, in consultation with the Department.

Conservation Commission advice

With respect to the above issues identified for Biological diversity, the Conservation Commission provides the following advice:

With respect to Objective 2, the Conservation Commission accepts that at present the Department will keep forest conservation areas as a lower priority while resources are needed to progress formal reserves. It is acknowledged that these areas are currently managed and will continue to be managed as conservation reserves and afforded appropriate protection.

With respect to Objective 3, the Conservation Commission accepts the reported level of disturbance to informal reserve boundaries and will continue to monitor compliance through the Department's Works Improvement Notice and Management Letter compliance notification system.

The Conservation Commission finds the interim arrangements of extra planning content for old-growth by the Forest Products Commission, and the Department's efforts in relation to protection of areas of old-growth that are not identified in the

Department's databases, to be acceptable. However, the Conservation Commission expects that the old-growth demarcation procedure is finalised by 31 July 2009.

With respect to Objective 3 and, in particular harvesting and management activities within plantations, the Conservation Commission advises that there is a need to clearly define the planning and approvals system for access to plantations.

With respect to Objective 8 – in particular, the revision of planning checklists – the Conservation Commission expects the Department to finalise the revised planning checklists by 31 July 2009.

With respect to Objective 9 – in particular, the input of external advice on research and planning priorities – the Conservation Commission will now seek to resurrect the Research Advisory Committee.

It is the considered view of the Conservation Commission that there are two issues of particular concern with relation to Biological diversity.

With respect to the establishment of the formal reserve system (Objective 1), a wholeof-government approach and a greater level of collaboration between different Government agencies will be required if land category changes are to be progressed in a timely manner. The FMP was provided with endorsement at a whole-ofgovernment level and this should mean that all agencies facilitate its implementation. The Conservation Commission will review the causes of delays to the implementation of the proposed formal conservation reserves and publicly report to the Minister for Environment by 31 December 2009 with recommended actions to address this issue.

With respect to fauna and Objective 7, the Conservation Commission notes that the Guidelines for the Selection of Fauna Habitat Zones would resolve a number of issues relating to the finalisation of fauna habitat zones.

With respect to the difference of interpretation by the Department and the Conservation Commission of key provisions in Appendix 4 of the FMP, the Conservation Commission, in providing its advice on the Guidelines for Selection of Fauna Habitat Zones, will clarify its expectations and criteria for fauna habitat zone selection.

The Conservation Commission acknowledges that timeliness of the finalisation of individual fauna habitat zones and the completion of harvest planning to enable the Forest Products Commission to access areas of forest has been an issue. The Conservation Commission will seek to address this matter in the Guidelines for Selection of Fauna Habitat Zones. However, it is essential that activities that foreclose options for the finalisation of fauna habitat zones should not occur prematurely. The Conservation Commission, the Department and the Forest Products Commission will work together to improve planning timeframes to ensure that this problem does not recur.

With respect to Objective 8, the Conservation Commission will consider the final report on the Fauna Distribution Information System by 31 March 2009 and will then work with the Forest Products Commission and the Department during 2009 to address concerns about whether FDIS has the capacity to generate an effective management response.

With respect to the KPI 2, the Conservation Commission is currently seeking a report for those species that have been raised to a higher category of threat, including a report for those species where the Department has indicated that the shortfall is unrelated to management activities. The Conservation Commission expects that the conclusion that the shortfall is unrelated to management activities will be substantiated. The Conservation Commission expects that the responses for shortfalls relating to fauna give serious consideration to going beyond a call for further research and monitoring and that, where practicable, Department should provide a proposed management response. That is, a precautionary response is sought by the Conservation Commission from the Department. The Conservation Commission's subsequent response will likewise be precautionary.

The Conservation Commission, in consultation with the Department, will continue to develop a response to the report findings for the brush-tailed phascogale, and likewise for the red-tailed black cockatoo once the Department's report has been received.

The Conservation Commission accepts the explanation provided by the Department in relation to the elevation of the category of threat of the noisy scrub bird and endorses the Department's action in increasing the status of the species to endangered as a precautionary measure.

The Conservation Commission understands that the Department will be providing a report on the woylie under the response to target shortfall requirement for KPI 3. In addition, the Conservation Commission seeks a response regarding the chuditch for the Batalling population that has not met recovery plan performance targets.

In each of these cases and others that may arise, the Conservation Commission will review the information provided by the Department on species that have been moved to a higher category of threat. The Conservation Commission will evaluate the need for revision of management practices, in the context of its assessment and auditing function, in consultation with the Department, and report accordingly.

4. Productive capacity

Overall aim

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

Objective 10. Maintaining the forest area

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

Action	Status of implementation
10.1 The Conservation Commission and the Department	Implemented and ongoing.
 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 leasting and the permanent 	The Conservation Commission and the Department continue to make submissions on planning, land use and development referrals within the FMP area which seek to minimise the loss of forest areas. Recent examples range in scale from individual property developments to major expansion of industrial infrastructure such as the proposal to expand bauxite and sand mining operations within State forest.
10.1.4 reducing the impact of mining and petroleum operations on forested areas with a high productive capacity for timber production (as required).	The Department continues to seek offsets that replace values foregone where the loss of forest cannot be avoided, although offsets have not been achieved in some instances. The co-location of infrastructure remains a primary consideration in the Environmental Impact Assessment process.
	The Conservation Commission and the Department continue to discourage development in highly productive timber areas on State forest.
10.2 The Department will, where reasonable and	Implemented and ongoing.
practicable, construct roads in a manner and at a location that will service multiple needs (on plan commencement & ongoing).	New roads are constructed according to the provisions of area management plans. The Department liaises with the Forest Products Commission with respect to the upgrade or establishment of roads for timber harvesting operations.
	Since 2004 an inventory of roads on Department managed land has been conducted as part of a review of strategic roading requirements and maintenance needs. This inventory database is used on a routine basis to inform priorities for road maintenance and construction.
10.3 The Department will seek to progressively	Implemented and ongoing.
renabilitate redundant roads (by year 5 & ongoing).	The Department's strategic roads inventory has identified relative priorities for rehabilitation of redundant roads within each Region. The identification and rehabilitation of redundant roads is undertaken according to available resources. Following the completion of timber harvesting operations and some wildfires a limited number of roads have been rehabilitated. In the Swan Region, forest access plans (which identify roads for rehabilitation or retention) are routinely developed with the mining companies following bauxite mining of an area.
	Issues relating to rehabilitation of legacy roads are identified below in the Implementation issues section.

10.4 (Plantations): The Forest Products	Implemented and ongoing.
Commission will maintain the minimum area of plantation	
estate required to meet State Agreement Act supply	The Forest Products Commission has replanted
requirements by:	approximately 1,500 hectares of plantation annually
10.4.1 replanting pines in all suitable areas of State	since 2004. Seasonal and operational constraints have
forest and freehold (fee simple) land held in the name of	generated a backlog of approximately 2,500 hectares
the Executive Director that have previously been planted	which is to be addressed through an expanded planting
with pines and have been clearfelled, except at	program in forward years.
Gnangara, Peel, Hamel and other areas determined	
consistently with the agreement ratified under the Wood	Since 2004 an area of approximately 160 hectares in
Processing (Wesfi) Agreement Act 2000 (on plan	Gleneagle plantation has remained fallow as it was
commencement & ongoing); and	considered by the Forest Products Commission to be
10.4.2 establish new plantations on appropriate	unsuitable for replanting to pine.
cleared land to replace any plantation areas that are	
clearfelled but not replanted with plantation species (as	In 2005 an area within Hamel plantation was replanted to
required).	pine with the agreement of the Department.

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

The Department's Strategic Roading Initiative has provided a sound framework and dataset for the prioritisation of road maintenance and rehabilitation. However, the rate of rehabilitation of redundant roads within State forest remains constrained by available resources. Most of the roads considered redundant are associated with historical access for timber harvesting operations prior to the formation of the Forest Products Commission.

Construction of roads within coupes made available for timber harvesting is undertaken by the Forest Products Commission. In some instances the Department has considered the location of such roads to be unsatisfactory. An increased consideration by the Forest Products Commission of the strategic long-term potential use (rather than the immediate purpose of harvest access) during the design stage would increase the net benefit to the community, and improve the future management of access in areas that are protectable from *Phytophthora cinnamomi* infestations.

The process for nomination of roads to become redundant and the standard of rehabilitation being applied has differed between Regions, and requires further development in the working arrangements between the Department and the Forest Products Commission. Similarly, improved integration of strategic roading requirements and management of local traffic issues would be facilitated by the Forest Products Commission accessing the Department's Strategic Roading Initiative outputs and providing the Department with forward roading plans for both native forest and plantation operations.

Since 2004 there have been a number of changes to land use or priority activities following the final felling of sections of plantation areas in Hamel, Peel and Gnangara. Replacement areas are being sought to contribute to the future resource available to service supply agreements. Further land use changes for sections of Murray Valley and Ludlow plantations are under discussion.

Objective 11. Sustained yield

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:

Action Status of implementation 11.1 The average annual yield of logs, calculated over Implemented and ongoing. the 10 year life of the plan, shall not exceed the During its ten year life, the FMP provides for an average maximum volumes stipulated in Tables 3 and 4, and given above for wandoo, blackbutt and sheoak (in Year 1 annual yield of first and second grade sawlogs of 131,000 m³ for jarrah and 54,000 m³ for karri. The & end of Year 10). maximum allowable cut in any one year should not exceed a further 10% (i.e. 144,000 $\ensuremath{m^3}$ for jarrah and 59,000 m^3 for karri). The annual sawlog removals during the period 2004 to 2007 averaged 125,000 m³ for jarrah and 55,300 m³ for karri. These production levels comply with the FMP limits. For karri bole logs other than first and second grade sawlogs, the FMP provides for an average volume of 117,000 m³ to be produced annually. The actual volume produced has averaged approximately 152,400 m³ each year. This production level exceeds the limit specified in Table 4 of the FMP. The FMP provides for a program of expanded first thinning in karri and jarrah forest that would not affect the sustained sawlog yields, but makes available additional bole volume. The Forest Products Commission has expanded the karri first thinning program resulting in the additional yield of other bole volume. For jarrah bole logs other than first and second grade, the FMP provides for an average volume of 534,000 m³ to be produced annually. The actual volume produced has averaged approximately 161,400 $\rm m^3$ during the period 2004 to 2007 which is less than one third of the volume available under the FMP. For other commercial timber species (wandoo, blackbutt,

	and sheoak) the respective allowable annual volumes are 1,300 m ³ , 1,600 m ³ and 1,900 m ³ . The actual annual volume produced has averaged approximately 290 m ³ , 520 m ³ and 290 m ³ , all markedly less than allowable.
	The annual average volume of marri all log volume removed totalled approximately 15,100 m ³ , much lower than the annual allowable limit of 196,000 m ³ .
	Refer to the section on Implementation issues below and the report on KPI 5 later in this chapter for further details.
11.2 In addition to the yield referred to in 11.1, the	Implemented and ongoing.
Forest Products Commission may contract for the	A small quantity of fuart sawlogs and hole logs were sold
jarrah, karri, marri, blackbutt, wandoo and sheoak that	during 2004 to 2007 arising from sand mining operations
become available in small quantities from operations	in a section of the tuart forest near Ludlow.
designed to produce the yield referred to in 11.1 or as a	
result of other operations such as mining (as required &	
11.3 The Forest Products Commission will prepare	Implemented and ongoing
annual timber harvesting plans that are to be (on plan	impionionioù ana ongoingi
commencement & ongoing):	Annual Indicative Timber Harvest Plans were prepared
11.3.1 developed in consultation with, and to the	in consultation with the Department for each forest
requirements of, the Department;	region for each year 2004 to 2008.
referred to in Action 11 1: and	The total projected volumes made available under these
11.3.3 made publicly available.	plans were consistent with the allowable timber yields.

The Forest Products Commission and the Department	Each plan was made publicly available on the Forest Products Commission's website, with advertising and direct mail-out to key stakeholders. Local consultation on a range of topics and for individual areas was undertaken with interested parties. Implemented and ongoing.
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 (in Year 1 & ongoing): first and second grade sawlogs; lower grades of sawlogs; and	The Forest Products Commission has recorded the volume of timber removed (by product category) from each forest coupe in the Logging Operations Information System (LOIS). This system provides the source data for compiling KPI 5.
residue logs; and 11.4.2 periodically audit the grading and removal of sawlogs (in Year 1 & ongoing).	Log grading standards were reviewed by a Forest Products Commission working group in 2006. Joint arrangements with the Department were initiated to advance the assembly and reporting of aggregated log removal data on a coupe basis. During the period 2004 to 2007, 126 forest inventory plots were harvested in consultation with the Department to enable the monitoring of plot removals reported in KPI 11.
11.5 The Department will prepare rolling three-year	Implemented and ongoing.
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	Three-year Indicative Harvest Plans were produced for each forest region for the periods 2006–2008 and 2008– 2010. As at October 2008 preparation of an indicative 2010–2012 plan for each Region was well advanced.
11.5.3 made publicly available.	Each plan was developed to be consistent with the allowable timber yields and was made publicly available with a consultation process to receive feedback.
11.6 The Forest Products Commission will conduct	Implemented and ongoing.
its silvicultural operations: 11.6.1 in accordance with the Department's Silviculture Guidelines (on plan commencement & ongoing); 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	The Forest Products Commission recognises the requirement to conduct silvicultural operations in accordance with the Department's Silviculture Guidelines. Field monitoring and the relevant KPI data (KPIs 6, 9 and 11) indicate some variation in silvicultural outcomes associated with application of the guidelines.
amendments (on plan commencement & ongoing).	See section on Implementation Issues below and the section on Issues to be addressed from 2009 for further details.
11.7 Any amendment to the Silviculture Guidelines	Implemented and ongoing.
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. (as required).	Appendix 5 was prepared as a summary of the key proposed changes to silvicultural practice, with a range of other changes being intended but not explicitly stated. However, legal advice obtained in 2004 suggested that the amendments would need to be strictly confined to the key proposed changes identified in Appendix 5 to the FMP. The more substantially updated guidelines that were intended will need to 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. The key proposed changes identified in Appendix 5 were incorporated into the jarrah (CALM 2004a), karri (CALM 2005) and wandoo (CALM 2004b) Silviculture Guidelines. As at December 2008 no subsequent amendments have been made.
11.8 The Department and the Forest Products	Implemented and ongoing.
which each different silvicultural treatment is achieved in each year (on plan commencement & ongoing).	Areas of each silviculture treatment have been recorded in the Silvicultural Records System (SILREC) and published each year in the Forest Products Commission's Annual Report.
	details.
11.9 The Forest Products Commission will, where practicable and economically feasible, enter into	Implemented and ongoing.
contracts that are not confined to the supply of first and	The Forest Products Commission has continued to seek

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 (on plan commencement & ongoing).	markets for supply of logs other than first and second grade sawlogs, and has entered into contracts for the delivery of jarrah bole logs and jarrah and karri third grade logs. The calculated equivalent volume of first and second grade logs in these bole logs is included in the annual removal figures reported against under Action 11.1.
11.10 The Department may use forest produce that becomes available for use from the carrying out of	Implemented and ongoing.
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 (as required).	Each forest Region continues to use forest produce that becomes available for improvements such as small scale capital works projects and maintenance of facilities. Since 2004 these have included the construction of the Wharncliffe Mill Interpretation Centre, redevelopment work on the Yeagarup recreation facilities, wheelchair access boardwalk for the Cape to Cape trail, and the construction of picnic tables.
11.11 The Department will continue to refine the data and methodology used for the sustained yield	Implemented and ongoing.
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) (on plan commencement & ongoing).	The Department continues to update the area, silviculture and treatment data used in the calculation of sustained yields. During the period 2004 to 2007, work commenced on the update of computer applications for woodflow scheduling and silvicultural modelling, timber inventory and utilisation measurements were collected, and the use of remote sensing technologies to improve the stratification of the forest were investigated.

During the period 2004 to June 2008, the Department issued 22 Work Improvement Notices and three Management Letters relating to silvicultural standards. The majority of these were in relation to incidents where insufficient tops disposal had been undertaken around retained trees, while excessive crop tree damage was recorded in three instances. Three Management Letters and one Works Improvement Notice were issued for incidents associated with retention or protection of habitat elements within harvesting coupes. Over two-thirds of the Work Improvement Notices have yet to be resolved to the satisfaction of the Department. In a few instances, notices for tops disposal were not resolved because regeneration burns were conducted in coupes without the requested remedial work being completed.

Field monitoring by the Forest Products Commission has resulted in EMS incidents relating to habitat retention, gap size, karri regrowth standard, compliance with standards for treemarking and crop tree protection. As a result of these incidents the Forest Products Commission has developed and implemented a checklist to provide daily monitoring of treemarking standards including retention of habitat elements. Greater emphasis is also being placed on training and supervision of treemarkers. The Forest Products Commission is also increasing attention on contractor performance, including the reinforcement of standards and monitoring of tops disposal activities.

Confirmation of compliance with the limits on karri clearfell and jarrah gap (regeneration release) patch sizes specified in the Silviculture Guidelines has been undertaken each year. The maximum size of 40 ha for karri two-tiered forest, 20 ha for karri regrowth forest, and 10 ha for jarrah have been consistently met, with the average clearfell and regeneration release patch sizes being substantially less (e.g. approximately 8 ha in karri two-tiered forest).

Implementation issues

Log monitoring and utilisation

The recovery and segregation of logs into the various product grades is undertaken by the Forest Products Commission. The sustained sawlog yields assume almost all

sawlogs projected to be made available in harvest operations are recovered and that logs are graded appropriately. Field observations indicate there has been some localised variation in standards of log recovery and grading in the initial years of the plan. The inventory monitoring plots (see KPI 11) indicate a net slippage of up to 2% of higher grades into lower grades was recorded in some sample plots. The Forest Products Commission has appointed a full-time log adjudication officer and is assisting the Department to monitor the delivered log grades to customers.

The development of the FMP reflected a number of changes in Government policy which saw a significant reduction in the size of the native forest sawmilling sector as a consequence of changes to the quantity and type of log resource available. At the same time there was an expectation that the employment and commercial success of the value-adding sawmill sector would be driven by buoyant local timber processors, manufacturing furniture, flooring and joinery. Under the current economic and market settings the industry vision has been difficult to reach and sustain. In order to maintain a viable native forest timber industry in Western Australia the Government is examining a number of structural changes including changing log segregation (current FMP first and second grade sawlogs are likely to be reallocated into new log grades) to better reflect the commercial value of those logs to the sawmills and their markets. For example, higher quality logs would be supplied in smaller quantities to valueadding sawmills. The Forest Products Commission and the Department will need to ensure that the new grades fully capture the equivalent volume of first and second grade sawlogs that are supplied under any new grading system, and that an appropriate monitoring of actual performance of the grades is undertaken. The Department is aware that any variance to the number and characteristics of the sawlog grades would add complexity to the monitoring process, and the Department is currently acquiring further data to assist the reconciliation with sustained yields.

The Forest Products Commission enters into contracts of sale with customers based on the minimum sawlog size and quality specifications used in the calculation of sustained yields. Where any subsequent changes to the acceptable log size or quality specifications are negotiated with customers, timely notification to the Department of such changes is essential to enable the Department to determine the equivalence to the first and second grade sawlog specifications used in the calculation of sustained yield, and hence adjustments to the monitoring of annual removals.

The annual and cumulative volumes of jarrah and marri other bole volume removed to the end of 2007 are substantially less than the upper limits specified in Table 4 of the FMP (see KPI 5). The absence of sufficient markets for the lower grades of log material produced during integrated harvesting or first thinning operations have constrained the area accessed to remove sawlogs, the level of silvicultural treatments completed, and the overall level of sawlog recovered. In a number of instances, substantial volumes of surplus other bole volume logs that have been generated during the removal of sawlogs have been stockpiled within the coupe or burnt during regeneration operations.

The low level of production of wandoo, blackbutt, and sheoak sawlogs relative to the allowable cut for these species reflects a combination of both a lower demand and the variable quantities that become available each year from the mix of forest types within those coupes that comprise the annual harvest plans.

The implications of the oversupply of karri other bole volume relative to the upper limit specified in Table 4 of the Plan (see KPI 5) is discussed at the end of this chapter.

Harvest planning

A number of the settings introduced in the FMP have added complexity to the selection and preparation of coupes in harvest plans. Extended timelines associated with the finalisation of fauna habitat zones, confirmation of old-growth status, and the management of harvesting operations under moist soil conditions have at times challenged the capacity of the Forest Products Commission and its contractors to maintain log delivery schedules. The higher proportion of lower-yielding areas to be included in the harvest plans compared to the historical range of forest available has also contributed to this issue. The Forest Products Commission and the Department have reviewed the planning systems to extend the forward planning for coupes, but the capacity to accommodate further complexity arising from changes to settings during the period of the plan remains limited.

The geographic distribution and representation of coupes within the annual and threeyear harvest plans has followed the strategic settings of the FMP. Nevertheless, adjustments within these plans due to operational and market factors (for example, delays in coupe access, variations in customer requirements and achieving a balance in harvest contractor schedules) have generated variations in the relative proportion of the total jarrah sawlog sustained yield delivered from each forest Region. During 2004 to 2008 a higher proportion of resource has been sourced from the Warren Region, and should this continue to 2013 then subsequent forest management plans would need to address the future balance of supply between Regions. For karri two-tiered forest, there has been a marked reduction in the average coupe size and this has progressively increased the complexity of planning and management.

An increasing number of jarrah coupes are experiencing a protracted period between the commencement of timber felling operations and the final completion of regeneration. Consequently, the Department considers that a higher than desirable number of coupes are remaining active for several years. An individual coupe can remain active for various reasons, including; extended coupe planning periods to undertake additional flora, *Phytophthora* dieback or old-growth surveys; the deferral between seasons of appropriate areas within the coupe to access under moist soil conditions; the timing of harvest operations may be determined by other parties where the coupe is associated with mining or infrastructure activities; a staged harvesting over successive periods to maximize the recovery of different products; and/or the need to 'smooth' log deliveries to multiple customers which differ in the rate at which supply is required. However, the extended periods have consequent impacts on the prescribed burning programs, harvest planning process, Phytophthora hygiene management, and management of public access within these areas. Guidance on achieving a balance between the number of new coupes and the completion of active coupes should be included in the forthcoming Native Forest Timber Harvest Planning Guidelines (see action 34.1.1).

Silviculture

Implementation issues relating to silviculture include the degree of consistency with the Silviculture Guidelines in the choice of silvicultural objectives being applied in some areas; variations in the treemarking for some silvicultural objectives; the comprehensiveness of follow-up silvicultural treatments; and the currency and accuracy of some of the silvicultural outcome records.

The structure and composition of the jarrah forest is highly variable at the scale of application of the Silviculture Guidelines. This variability can make the choice of an appropriate silvicultural objective difficult, particularly in those forest areas where previous harvesting has produced stands with a complex mix of varied tree size, condition, and presence of advance growth, or where a significant proportion of the

stand is already standing at or below the target residual densities. Effective implementation of treemarking operations depends on the availability of trained and experienced field staff. The Forest Products Commission has had some difficulty in maintaining a team of experienced personnel for this type of work. Differences between Departmental and Forest Products Commission officers have arisen in the selection of the most appropriate silvicultural objective to be sought in some coupes, and in the scale (e.g. minimum patch size) at which the objectives were applied.

Field monitoring and data contributing to KPI 11 suggests that in some areas a conservative approach has been adopted in treemarking for some objectives by retaining a higher proportion of crop or habitat trees than the relevant guideline requires.

Silvicultural treatments designed to release regeneration or crop trees from competition are implemented during or following harvesting. Field observations suggest the area being effectively treated has been constrained.

Records of the extent and completion of silvicultural treatments for each area are managed within the SILREC system. Because some treatments (e.g. regeneration burns) can occur a considerable period after harvest and other treatments, verifying the currency and accuracy of all records has proved challenging. Increased attention within both the Forest Products Commission and the Department to reviewing the currency of records would benefit the field monitoring, auditing, reporting and review responsibilities of both agencies.

Actions taken to address the issues identified above include the Forest Products Commission and the Department jointly providing additional training courses in silviculture, and the Department has increased the focus on silvicultural standards in the overall coupe monitoring framework. The Department has developed treemarking assessment procedures and is working with the Forest Products Commission to address circumstances where treemarking is viewed as below the Department's silvicultural standards. Independent expert assistance will be sought to assist the Forest Products Commission and the Department to jointly review the status of silvicultural outcomes and to identify any further training and system requirements to improve performance.

Objective 12. Exotic species on State forest and timber reserves

The plan proposes the following Actions 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:

Progress with implementation of actions proposed

Action	Status of implementation
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 (on plan commencement & ongoing).	Implemented and ongoing. The total volume of softwood delivered each year has varied between approximately 714,600 m ³ in 2004 to 981,300 m ³ in 2007, including logs sourced from land held in the name of the Department's Chief Executive Officer. The total volume of exotic species delivered annually was below the allowable limit of 1.2 million m ³ .

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

There are no significant issues affecting implementation of these actions.

Objective 13. Other forest produce

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 the demand for that produce:

Action	Status of implementation
13.1 The Department will:	Implemented in part and ongoing.
 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 (on plan commencement & ongoing); 13.1.2 maintain and, where appropriate, prepare guidelines for the management of other forest produce (by year 5 & ongoing) 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 (by year 5 & ongoing); 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. (as required). 	The supply of other forest produce has been administered through the existing licence systems. Amendments to the <i>Forest Management Regulations</i> 1993 relating to the administration and management of apiary sites provide for the trading of apiary sites and increased rental fees for apiary sites. In 2004 the Department and the Forest Products Commission commenced work to prepare guidance documents on the supply of some components of other forest produce. Work was subsequently suspended to address other priorities for plan implementation. Supply patterns have been monitored at a District level on an ongoing basis. The salvage of forest produce (see also response at Action 11.10) has occurred following storm and wildfire events within the Regions. In 2006 a substantial volume of jarrah products was salvaged from wind- thrown and damaged trees within an area in Nundedine forest block. Forest produce was also salvaged from trees pushed down during wildfire suppression operations in 2005 and 2007 in the Perth Hills District. In that instance the timber was used primarily for the rehabilitation of fire-damaged recreation sites and other infrastructure.
The Department and the Forest Products Commission will work together to review the regulation of access to craftwood, which: 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)	Implemented in part and ongoing. The Forest Products Commission has periodically provided access to craftwood and feature grade logs through auctions at Harvey. Access to craftwood has also been available through the issue of minor production contracts.
13.3 The Department will conduct research and	Implemented and ongoing.
undertake public consultation with a view to determining the environmental management requirements for the production of domestic firewood (in year 2 & ongoing).	A pilot study on domestic firewood collection patterns has been conducted and management strategies have been developed which focused on both consumer education and awareness of environmental sensitivities associated with collection, and improved planning to locate public firewood areas based on minimising environmental risk. In addition to routine monitoring of firewood activities, weekend patrols have been conducted during targeted periods to promote public education and awareness, and where necessary, enforcement of regulations. The use of enforcement has generally only been applied for repeat offenders. Enhanced map and information products have been developed for distribution to the public in each Region.

The Department has progressed numerous prosecutions relating to the illegal taking of firewood and other log products, mostly in the Swan Region. A number of cases involving the illegal taking of forest produce are under investigation.

Implementation issues

The capacity of State forest areas to maintain domestic firewood demand varies across the Regions. In the Swan Region forward planning has identified a potential shortfall in the resource available from public firewood areas within the next couple of years. In the South West Region, there is a significant shortfall of accessible firewood in close proximity to the larger regional centres. The Warren Region cannot service the demand for domestic firewood in the Denmark and Albany area due to lack of supply from State forest and timber reserves and these communities are encouraged to seek alternative heating sources. Other parts of the Warren Region continue to service demand. Increased emphasis has been placed on locating public firewood areas in previously harvested areas that pose the least risk of environmental damage or disease spread, but the level of uncontrolled access and extraction in areas close to population centres remains problematic. Where there is a shortage of accessible firewood in close proximity to population centres, this may increase the risk of illegal taking of firewood from conservation reserves.

When issuing minor production contracts for craftwood the Forest Products Commission needs to be cognisant of the need for the Department to approve access and to consider the interactions with other activities (such as recreation events) scheduled to occur in the area. The consultation process initiated in the Warren Region should be extended to the other forest regions.

Objective 14. Weeds, pests and diseases

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

Action	Status of implementation
14.1 In addition to the measures referred to in Action	Implemented and ongoing.
18.4, the Department will:	
14.1.1 establish a process for the identification and	The Department maintains records at a District level of
investigation of weed, pest and disease outbreaks that	declared and major environmental weeds, including
threaten productivity (in year 2 & end of year 2); and	any new or significant weed incursions identified on
Silviculture Guidelines to limit the impact of weeds pests	eradications are managed within the available
and diseases on productivity (as required).	Divisional operational resources. In 2006 significant
	additional funds provided through the Saving Our
	Species initiative were targeted to weed and pest
	eradication.
	The forest health surveillance and monitoring system
	disease outbreaks that threaten productivity (refer to
	proposed action 18.4).
	, , , , , , , , , , , , , , , , , , , ,
	Silviculture Guidelines incorporate measures to limit or
	reduce the impact of pests and diseases, such as
	setting targets for the retained density of overstorey in
	Phytophthora dieback infested sites or the reduction of
14.2 (Plantations): The Earost Products	Armiliaria innoculum in karri regrowth.
Commission will:	implemented and ongoing.
14.2.1 maintain an early warning system for Sirex in	The Forest Products Commission maintained trap
pine plantations (on plan commencement & ongoing);	trees as an early warning system for Sirex up to and
and	during 2005/2006, when they were discontinued in

14.2.2 monitor weeds, pests and diseases affecting productivity and, where reasonable and practicable, take measures to control them (on plan commencement & ongoing).	favour of more effective 'static' traps (described in KPI 8). A system of static traps was evaluated in 2006/2007 and the Forest Products Commission is looking to expand this program in the future.
	In 2004 a specific monitoring and eradication program was commenced to control the European house borer.
	The monitoring of weeds, pests and diseases in plantations which have the potential to affect productivity is ongoing and part of routine operations.
	Refer to KPI 8 later in this chapter for further details.

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

Some weed species in plantations do not attract a high priority for control as they do not impact on site productivity, but they do constitute a threat to biodiversity values on adjacent lands.

Objective 15. Regeneration and rehabilitation of disturbed forest

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:

Action	Status of implementation
15.1 The Forest Products Commission will conduct	Implemented and ongoing.
regeneration operations in a manner that: 15.1.1 is in accordance with the Department's Silviculture Guidelines (on plan commencement & ongoing); and 15.1.2 prior to the formal incorporation of the amendments identified in Appendix 5 into those Guidelines, is consistent with those amendments (on plan commencement & ongoing).	The Forest Products Commission recognises the requirement to undertake regeneration operations in accordance with the Silviculture Guidelines. While karri regeneration standards have been consistently met, there have been delays in completing regeneration treatments in some jarrah / wandoo areas due to operational, seasonal or market factors.
	Refer to KPIs 9 and 10 later in this chapter and in Appendix A for further details.
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 (on plan commencement & ongoing).	Implemented and ongoing. Since commencement of the plan the Forest Products Commission has investigated a number of markets for lower grade sawlogs and residue products, including solid and reconstituted wood products. In 2008 the Forest Products Commission engaged in a Request for Tender process to seek customers for a range of native forest material that is currently under-utilised.
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 (as required).	Implemented and ongoing. Formal rehabilitation requirements are consistently applied in areas subject to mining and petroleum activities, including the extraction of gravel. The Department continues to liaise with mining and industry groups to progressively carry out rehabilitation operations.
	The location and condition of gravel pits are routinely recorded into SILREC. During 2006 and 2007 the rehabilitation of old gravel pits was progressed in each Region and will be ongoing subject to funding and resources.

	See also Objective 29 Basic Raw Materials in the Socio-economic benefits chapter.
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 (on plan commencement & ongoing); 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 (as required & as required); and where regeneration or rehabilitation to a standard specified in the relevant guidelines, investigate the cause and if necessary, repeat the regeneration or	See also Objective 29 Basic Raw Materials in the Socio-economic benefits chapter. Implemented in part and ongoing. During 2004 to 2007 the plantation area clearfelled each year varied between approximately 1,700 and 2,600 hectares (including on land held in the name of the Chief Executive Officer of the Department). The area replanted annually varied between approximately 1,050 and 1,500 hectares. All areas were re- established in accordance with the Forest Products Commission's Plantation Management Guidelines. The Guidelines for the Rehabilitation of Plantation Areas are yet to be developed.
(on plan commencement & ongoing).	

Field monitoring has resulted in EMS incidents related to regeneration burning being recorded. One minor incident concerning tree planting techniques during a regeneration operation in karri forest has been reported.

Five Works Improvement Notices were issued in 2008 and one in 2006 for failure to rehabilitate landings and/or gravel pits to the required standard.

Implementation issues

Extended delays have been experienced in completing jarrah regeneration treatments in some coupes (refer to KPI 9). The Forest Products Commission has indicated it will address the shortfall by reviewing its performance against those aspects which it has an element of control over. The Forest Products Commission has requested the cooperation of the Department in a review of its performance to conduct regeneration burns in a timely manner and under suitable conditions. Further information is provided in KPI 9 and Appendix A.

The absence of markets for lower grade jarrah and marri logs has adversely impacted on the extent and effectiveness of silvicultural treatments designed to remove cull trees to achieve the release or establishment of regeneration. In the longer term this has the potential to impact on the sustained yield of sawlogs through reduced regeneration establishment and growth rates.

A large number of gravel pits in coupes harvested and regenerated prior to the formation of the Forest Products Commission have not been rehabilitated, particularly in the South West and Warren Regions. The current rate of rehabilitation is dependent on opportunistic funding, and substantial resources will be required to bring these areas back to a productive condition.

The growing backlog of ex-plantation areas requiring rehabilitation to native vegetation at Gnangara is anticipated to become much larger through to 2014. Additional resources will be required to achieve rehabilitation of these areas. An interagency working group is developing strategies to address this and related land use issues at Gnangara for consideration by Government.

In addition to Gnangara, there are significant areas of plantation that have been clearfelled during the life of the FMP, as well as earlier, where it is not proposed to re-

establish plantation and that have not been rehabilitated. In relation to Action 15.4.2, where the Forest Products Commission has made the decision to not replant areas of plantation, it is the responsibility of the Forest Products Commission to rehabilitate the area to native vegetation.

Objective 16. Management of regrowth stands

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

Progress with implementation of actions proposed

Action	Status of implementation
16.1 The Forest Products Commission and the	Implemented and ongoing.
Department will:	
16.1.1 maintain records of the history of silvicultural	The spatial extent and silvicultural objective of
treatments applied to stands of trees (on plan	treatments applied during the period of the FMP has
commencement & ongoing);	been recorded in the Department's SILREC system,
16.1.2 develop schedules of future silvicultural	from which annual summary statistics have been
treatments for stands of trees to promote growth of	compiled and published in Annual Reports of the
timber that can be used to produce sawlogs (on plan	Department. Refer to comments in relation to Action
commencement & ongoing);	11.8.
16.1.3 assess stand development when silvicultural	The French Devidente Operation in the second second date
treatments are scheduled, with a view to determining	The Forest Products Commission has supplemented the
whether those treatments are then required (on plan	field evoluation of the statue of stands to develop
16.1.4 undertake or reschedule these proposed	silvicultural treatment schedules for forest areas
silvicultural treatments according to the assessment	requiring attention according to the FMP quidelines
referred to in Action 16.1.3 (on plan commencement &	requiring alternion according to the rivin guidelines.
ongoing): and	Although some areas have had the timing of thinning or
16.1.5 report to the Conservation Commission every	other treatments rescheduled for silvicultural reasons.
two years after the commencement of the plan on the	the scheduled first thinning of regrowth jarrah stands
extent to which these scheduled silvicultural treatments	have not proceeded to date due to the absence of
have been undertaken (in year 2 & ongoing).	markets for small logs and forest residue.
	Refer to KPI 12 later in this c hapter for further details.

Compliance monitoring

Intensive monitoring of residual density in the regrowth karri thinning areas indicates that a very high standard of compliance to the target residual density is being achieved by the Forest Products Commission in these operations.

Implementation issues

The absence of markets for small jarrah and marri logs has seriously constrained the commercial thinning opportunities in regrowth jarrah stands.

An expanded program of first thinning in regrowth karri has led to the production of karri other bole volume being greater than the volume limit specified in the FMP (refer to KPI 5).

Improved stratification of the site quality, species composition and stand structure would assist the scheduling of thinning and facilitate the re-evaluation of timing for those stands deferred following field inspection.

Key Performance Indicators

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 target shortfall	The Forest Products Commission to advise the Conservation Commission how it will manage removals to be under the end of plan target. The Conservation Commission to evaluate the need for a revision of harvesting levels in the context of its assessment and auditing functions, in consultation with the Department.

KPI 5: Annual removal of wood products compared to the sustained yield determined by the plan

First and second grade sawlogs – Except in 2006 for karri, the annual removal of first and second grade sawlogs was within the prescribed target of no more than 10 per cent more than the average annual yield in each year (Tables 2 and 3). In 2006 the upper limit for karri was exceeded by less than 2 per cent, although this was relative to a significant undercut in previous years. For both species, the three-year periodic outturn has been within the performance target.

Table 2. Jarrah first and second grade sawlog removals during 2004 to 2007 relative to the 131,000 m³ annual sustained yield.

Jarrah first and second grade sawlog volume (cubic metres)							
	Annual volumes				Cumulativ	e volumes	
Year	KPI upper limit	Annual removals	Variation	Period	KPI upper limit	Periodic removals	Variation
2004	144,100	120,251	- 23,849				
2005	144,100	135,677	- 8,423				
2006	144,100	120,507	- 23,593				
2007	144,100	122,598	- 21,502				
				2004 to 2006	412,650	376,435	- 36,215
				2005 to 2007	412,650	378,782	- 33,868

Table 3. Karri first and second grade sawlog removals during 2004 to 2007 relative to the 54,000 m³ annual sustained yield.

Karri first	Karri first and second grade sawlog volume (cubic metres)						
	Annual volumes			Cumulative volumes			
Year	KPI upper limit	Annual removals	Variation	Period	KPI upper limit	Periodic removals	Variation
2004	59,400	51,986	- 7,414				
2005	59,400	53,691	- 5,709				
2006	59,400	60,325	+ 925				
2007	59,400	55,151 ⁸	- 4,249				
				2004 to 2006	170,100	166,002	- 4,098
				2005 to 2007	170,100	169,167	- 933

Annual removal of other jarrah log products – The annual and cumulative removals of jarrah other bole volume removed to the end of 2007 are significantly below the upper limits specified in the FMP with annual removals being between 132,432 m^3 and 201,804 m^3 relative to the upper limit of 534,000 m^3 (for details refer to Appendix A).

Annual removal of marri bole logs – The annual and cumulative removals of marri bole logs to the end of 2007 are significantly less than the upper limits specified in the FMP with annual removals being between 7,326 m³ and 25,989 m³ relative to the upper limit of 196,000 m³ (for details refer to Appendix A). This primarily reflects the absence of a market for the non-sawlog, lower quality logs.

Annual removal of other karri log products – The annual and cumulative removal of karri other bole volume removed each year has exceeded the upper limit specified in the FMP (Table 4).

⁸ Figure incorporates an adjustment to the raw delivery data to reflect a change in the minimum sawlog size that was accepted by customers in 2007.

Table 4. Karri other bole volume removals during 2004 to 2007 relative to the FMP specified limit. The annual and cumulative removals figures include a proportion of crownwood that can be additional to the FMP upper limit.

Karri other volume (cubic metres)							
	Annual	Cumulative	FMP	FMP	Variation		
Year	removals	removals	upper limit	cumulative limit	(cumulative removals – FMP cumulative limit)		
2004	143,504	143,504	117,000	117,000	+ 26,504		
2005	147,252	290,756	117,000	234,000	+ 56,756		
2006	170,249	461,005	117,000	351,000	+ 110,005		
2007	148,727 ⁹	609,732	117,000	468,000	+ 141,732		

In response to the elevated level of production, the Forest Products Commission has advised the Conservation Commission that it does not believe the additional production of karri other bole volume relative to the upper limit represents a significant departure from the intent of the FMP, and has recommended that the upper limit be varied.

The Forest Products Commission has previously advised the Conservation Commission that the level of production of karri other bole volume is consistent with achieving Objective 16, and in doing so provide volumes greater than the quantities specified in Table 4 of the FMP. The Forest Products Commission considers that it is producing other bole volume from thinning of young karri in a manner as indicated in the FMP (page 33):

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 karri forest.

The additional volumes that have been generated from the expanded program of thinning young karri forest (see KPI 12) have been sourced from operations that are consistent with the Department's Silviculture Guidelines, and have not resulted in an excessive yield of sawlogs (see Table 3 above). The quantities specified in Table 4 should be varied as proposed by the FMP where this volume is sourced in this manner.

In addition, elsewhere in this report (Ecosystem health and vitality chapter) the following statement is made:

Karri thinning operations that would allow for relatively safer and less costly prescribed burning of regrowth have been limited to an area of about 5,000 ha distributed over numerous, widely scattered coupes that cannot be readily aggregated into consolidated areas that could be burnt as buffer zones. An expanded program of thinning could be beneficial to fire protection but the scale of the program is constrained by the FMP."

It is the Forest Products Commission's view that the expanded program of karri thinning, and the volume provided, is consistent with the intent of the FMP and, if necessary, Table 4 of the FMP should be varied to reflect the yield derived from this program.

⁹ Figure incorporates an adjustment to the raw delivery data to reflect a change in the minimum sawlog size (and hence proportion sold as other bole volume) that was accepted by customers in 2007.

Annual removal of other species sawlogs – After four years, or 40 per cent through the 10 years of the FMP, the cumulative sawlog removals for each of wandoo, blackbutt and sheoak are substantially less than 40 per cent of the total permissible removals over the 10 year period. As at December 2007, the cumulative sawlog removals of wandoo were 9 per cent of the 13,000 m³ permissible total, blackbutt sawlog removals were 13 per cent of the 16,000 m³ permissible total, and sheoak sawlog removals were 6 per cent of the total allowable volume of 19,000 m³ over the period of the plan.

Annual volume of jarrah and karri sawlogs other than first and second grade sold for value added products – The use to which lower grade logs are put once sold to customers is not recorded in existing information systems. Consequently, it is not possible to report on the proportion that was put to value-added end uses.

Performance measureAnnual 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.ReportingAnnual publication of areas cut over.Response to reportingThe 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.

KPI 6: Area of forest cut over annually

During the period 2004 to 2007, the total area of native forest cut over each year averaged 9,582 ha, or 1.1 per cent of the total area of 848,380 ha of native forest available for timber production under the FMP. Most of this area was jarrah (average of 7,972 ha per year or 1.1 per cent of available 751,910 ha), followed by karri (average of 1,510 ha per year or 2.5 per cent of available 60,000 ha), with small areas of wandoo (average of 100 ha per year or 0.3 per cent of available 36,470 ha). Note that the annual area cutover relative to the total area available for timber production does not infer a rotation length for the species, due to the inclusion of thinning and partial cutting objectives in the area cutover.

While the total area of jarrah and karri cut over has been relatively consistent each year, the proportion cut to each silvicultural objective has fluctuated across the reporting period (Table 5).

Forest type	Forest type Silvicultural objective			Area cuto	ver ^{#, ^} (ha)	
			2004	2005	2006	2007
Jarrah	Promote growth on retained trees (thinning)		470	410	1,020	360
	Release regeneration (gap)		480	230	680	410
	Establish regeneration-eastern jarrah (shelter	wood)	770	720	1,090	500
	Establish regeneration-western jarrah (shelter	wood)	3,040	2,160	1,710	2,540
	Single tree selection (retention in Phythopthor	a dieback areas)	1,420	1,810	2,230	2,200
	Selective*		1,460	520	1,070	1,190
	Other (mining and clearing for utilities)		910	920	650	920
		Jarrah total	8,550	6,770	8,450	8,120
Karri	Establish jarrah/karri regeneration		80	30	60	20
	Establish regeneration (clearfall karri)		170	480	350	440
	Establish regeneration (partial karri clearfall)		120	10	0	100
	Promote growth on retained trees (thinning)		930	1,090	1,160	1,000
		Karri total	1,300	1,610	1,570	1,560
Wandoo	Establish regeneration		0	0	90	20
	Promote growth on retained trees (thinning)		0	30	220	40
		Wandoo total	0	30	310	60

Table 5. Annual area	(hectares	of native forest cut over to each silvicultural object	ctive.
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These statistics will vary slightly from figures published in previous DEC and FPC Annual Reports due to the

subsequent updating of some objectives following later silvicultural treatments, and data overlay processes.

^ The areas reported are the net area cut over, which is equal to the entire coupe area LESS the area of informal reserves and other uncut patches within the coupe.

* Stands that have been cutover and retain a high proportion of cull (unmerchantable trees), and in which limited silvicultural treatments have been applied.

Over half of the area of jarrah forest cut over each year was cut to shelterwood or single tree selection (*Phytophthora* dieback) objectives. Cutting to release regeneration (gap) or thinning to promote growth on retained trees were the smallest proportion of the area cut over each year. In contrast, the thinning objective was sought in over two-thirds of the total area of karri cut over each year. This is principally the first thinning in regrowth karri stands aged less than 30 years.

The figures in Table 5 are the aggregated area recorded as cut to the particular objective. They do not directly indicate whether a particular silvicultural objective as applied in the field was the most appropriate choice for the stand structure and composition. Field monitoring suggests that during the period 2004 to 2006 there was considerable variation in the scale (i.e. minimum patch size) at which the jarrah silvicultural objectives were defined in the field, and in the consistency of treemarking. Moreover, some of the jarrah objectives may not be achieved unless appropriate treatments are applied following harvesting to attain the necessary stand density. While the extent of the silvicultural treatments is recorded by the Forest Products Commission, supplementary data on the outcome achieved is not recorded post-treatment. The Department will progress improved reporting of silvicultural outcomes with the Forest Products Commission.

KPI 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.

Trap trees to detect the presence of *Sirex* were established and monitored by the Forest Products Commission during the 2005/2006 financial year. No evidence of the *Sirex* wasp was recorded in pine plantations sampled across the area of the FMP.

The Forest Products Commission is a member of the National Sirex Coordination Committee. Concerns about the reliability of the trap tree method (refer to Appendix A) have led to a discontinuation of the trap trees and the trialling of a new system using 'static traps' (designed to attract and retain the wasp for positive identification). This technique was trialled in four plantations during 2007 (Gnangara, Myalup, Wilcock and Napier – none of which recorded infested trees) and the Forest Products Commission is seeking to expand the use of static traps from 2008 onwards.

	1				
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.				

KPI 9: Time to regenerate harvested areas

The performance target for jarrah was not met in the sample of coupes harvested during the first three years of the plan for which data is available (Table 6).

Table 6. Per cent of sampled jarrah harvest coupes in various categories of time between harvest and completion of regeneration treatments. The sample covers coupes; in which harvesting was completed during the period 2004-2006, in which regeneration was not based on planting of seedlings and hence where the performance target is 100 per cent of areas treated to be completed within 18 months. Numbers in parentheses refer to the number of coupes contributing data for that year.

Year harvest completed	Less than 18 months	18 to 30 Months	Greater than 30 months	Regeneration not recorded at 30/6/08	Total
2004	13% (1)	38% (3)	38% (3)	13% (1)	100% (8)
2005	29% (2)	57% (4)	0% (0)	14% (1)	100% (7)
2006	50% (8)	6% (1)	6% (1)	38% (6)	100% (16)
Total	35% (11)	26% (8)	13 (4)	26% (8)	100% (31)
Target	100%				

In response to this shortfall, the Forest Products Commission has advised the Department that the lengthy periods can be attributed to a number of factors, most of which relate to the capacity to conduct the regeneration burns in a timely manner or under suitable conditions:

- a large backlog of areas were awaiting regeneration burns at the commencement of the FMP;
- a lack of markets for forest residue logs has generated delays in the removal of logs from landing stockpiles in preparation for regeneration burns;
- the need to time the burning to be coincident with the maturation of seed crops;
- restricted opportunities to undertake burning due to seasonal conditions;
- delays in completing silvicultural treatments;
- operational preferences to maintain coupes available for access during moist soil conditions;
- competition for equipment and staff resources to conduct regeneration burning when wildfire suppression or prescribed burning programs are underway; and
- the opportunity to undertake some burns has been restricted to comply with smoke management requirements.

The Forest Products Commission has indicated it will address the shortfall by reviewing its performance against those aspects which it has an element of control over. The Forest Products Commission has requested the cooperation of the Department in a review of its performance to conduct regeneration burns in a timely manner and under suitable conditions.

The Department will determine the need for a revision of management practices, in consultation with the Conservation Commission.

The performance target was partially met in the available sample of karri coupes (Table 7).

Table 7. Per cent of sampled karri harvest coupes in various categories of time between harvest and completion of regeneration treatments. The sample covers coupes; in which harvesting was completed during the period 2004 to 2006, in which regeneration was based on planting of seedlings and hence where the performance target is 75 percent of areas treated to be completed within 18 months and 100 percent of areas treated to be completed within 30 months. Numbers in parentheses refer to the number of coupes contributing data for that year.

Year harvest complete	Less than 18 months	18 to 30 months	Greater than 30 months	Regeneration not recorded at 30/6/08	Total
2004	50% (2)	50% (2)	0% (0)	0% (0)	100% (4)
2005	70% (7)	30% (3)	0% (0)	0% (0)	100% (10)
2006	100% (7)	0% (0)	0% (0)	0% (0)	100% (7)
Total	76% (16)	24% (5)	0% (0)	0% (0)	100% (21)
Target	75%	100 %			

The target of 75 percent was not met in the first two years of the FMP. In response to this shortfall the Forest Products Commission has advised the Department that delays were due to a reduced capacity to conduct regeneration burns in a timely manner due to restrictions to comply with smoke management requirements. More areas are now being prepared to facilitate late autumn burning.

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.				

KPI 10: Effectiveness of regeneration of native forest and plantation

The proportion of the area of forest regenerated each year to karri, jarrah and pine plantation that required remedial treatment is summarised in Tables 8, 9 and 10 respectively. The target for regeneration success in native forest areas has been consistently achieved, although there remains a significant backlog of survey work in jarrah to be completed.

Table 8. Annual area of karri forest regenerated that was surveyed and required remediation to achieve stocking density standards specified in the Silviculture Guidelines.

Year	Area (ha) regenerated in previous year	Area (ha) surveyed	Area (ha) understocked	Area requiring remedial treatment (% of area surveved)
2004	1,409.6	1,381.5	8.4	0.6
2005	1,323.0	1,314.6	5.9	0.4
2006	737.5	731.6	1.0	0.1
2007	674.5	673.5	4.0	0.6

Table 9. Annual area of jarrah forest regenerated that was surveyed and required remediation to achieve stocking density standards specified in the Silviculture Guidelines.

Year	Area (ha) regenerated in previous year	Area (ha) surveyed	Area (ha) understocked	Area requiring remedial treatment (% of area surveyed)
2004	1,614.7	952.1	0	0
2005	962.6	512.2	0	0
2006	287.7	222.4	0	0
2007	302.9	173.8	0	0

Table 10. Annual area of plantation (pine) forest regenerated that was surveyed and required remediation to achieve stocking density standards specified in the Silviculture Guidelines.

Year	Area (ha) regenerated in previous year	Area (ha) surveyed	Area (ha) understocked	Area requiring remedial treatment (% of area surveyed)
2004	1,418.1	1,418.1	105.0	7.4
2005	1,455.8	1,455.8	143.0	9.8
2006	1,432.7	1,432.7	45.0	3.1
2007	1,511.5	1,511.5	52.0	3.4

The target for regeneration success in plantation areas was not achieved in the first two years. The Forest Products Commission has advised the Department that

- the shortfall in 2004 and 2005 in plantation establishment stocking targets has received remedial treatment, and
- the performance in 2006 and 2007 indicates there is no systematic deficiency in achieving the required performance target.

The Department has consulted with the Conservation Commission and determined that management practices are adequate.

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.

KPI 11: Forecast strategic timber yield versus actual timber yield

A total of 126 inventory plots were re-established prior to timber harvesting commencing in coupes to compare predictions of the sawlog yield with the volume removed during harvest. Analysis of the 96 plots available from jarrah operations was the priority for this report because the 30 plots in karri operations are in varying stages of completion and data entry. The majority of the karri plots are located in thinning operations which contribute a smaller proportion of sawlog supply. The data presented below therefore refer only to jarrah sawlogs.

The analyses compared the volume harvested in individual plots to the forecast yield for the geographic and silvicultural strata used in the sustained yield calculation (Table 11).

Table 11. Per cent of the volume of jarrah sawlog removed in sample plots relative to the volume forecast for combinations of silvicultural objective and Region. Figures in parentheses are the number of plots contributing to the calculation.

Silvicultural objective of harvest operation		Percent of sawlog removed relative to forecast				
	Swar	n Region	South-	West	Warre	n
		-	Regior	า	Regio	n
Promote growth on retained trees (thinning)	81	(5)	114	(5)		
Release regeneration (gap)	81	(1)	55	(1)	11	(3)
Establish regeneration – eastern (shelterwood)	100	(1)	79	(10)		
Establish regeneration – western (shelterwood)	27	(6)	107	(24)	361	(3)
Single tree selection (Phytophthora dieback area	53	(6)	155	(14)	355	(2)
Selective*	48	(6)	42	(5)		
Jarrah sourced from mixed karri stands			0	(1)	148	(3)

* Stands that have been cutover and retain a high proportion of cull (unmerchantable trees), and in which limited silvicultural treatments have been applied.

The number and geographic representation of the plots monitored is strongly influenced by the sequence and location of coupes on the annual harvest plans, and hence a balanced plot representation in all silvicultural and regional strata is difficult to achieve in a short period.

The small sample size for many combinations of silvicultural objective and Region indicates that the absolute figures should be interpreted with caution. While further data will accrue, there is a clear trend of the volume of sawlog removed in the Swan Region being less than the forecast yields. Averaged across all plots in all regions the volume removed was 15 per cent less than forecast. The persistence of such a trend to 2013 would influence the settings adopted for the next plan when calculating the sustained yields.

These trends were detected by year three of the FMP and detailed analysis for each plot was undertaken in collaboration with the Forest Products Commission. This analysis considered individual tree attributes, product specifications, silvicultural treemarking, and measurement precision. A range of factors were identified as contributing to the differences, with the individual factors and their magnitude varying between Regions and silvicultural objectives:

- Variation between modelled and actual treemarking. The yield forecasts assume stands are treemarked to the precise thresholds in the Silviculture Guidelines. While field variation is expected, in some instances, more sawlog was retained in the forest because more trees than required by the guidelines were retained as crop or habitat trees within the stands. These crop trees remain available to potentially contribute to future yield;
- Trees forecast to be available for harvest were not taken. In areas containing a significant proportion of sawlogs of minimum size or marginal quality, whole trees included in the yield forecast were not removed. These trees also remain available to contribute to future yield;
- Variation between modelled and applied sawlog specifications. Within a harvested tree bole, variations arose between the proportion of a log that was actually cut as sawlog in the field relative to the proportion of the log forecast (modelled) as a sawlog. Examples include where a higher sawlog standard was applied in the field and hence not all sawlogs that met the minimum specification as modelled were removed; and
- The silvicultural objective that was implemented was not always consistent with the silvicultural objective assumed in the modelling. An overall reduction in the area cut to release regeneration (refer KPI 6) and higher than forecast area cut to establish regeneration (shelterwood) meant that more areas were marked to objectives that retain more trees per hectare than forecast.

In 2006 the Forest Products Commission undertook actions to enhance silvicultural training and improve log grading consistency. The issue of sawlogs of minimum size and quality being retained is ongoing and reflects, in part, the economic constraints on sawmilling and the absence of markets for other residue components of such logs (refer to KPI 5). The Department will seek to enhance the present monitoring system with improved quantification of log grading standards beyond the stump/plot basis. However, resource commitments have an impact on the level of monitoring that is achievable. The Department and the Forest Products Commission will put further emphasis on training in the implementation of the Silviculture Guidelines.

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.

KPI 12: The achievement of early thinning schedules that underpin future yield

The regrowth jarrah and karri forests constitute an increasing proportion of the total sawlog sustained yield in future decades. Attainment of these future yields depends upon the appropriate timing and application of crop-tree release (thinning) operations, particularly the first thinning in young regrowth stands.

The Silviculture Guidelines provide for varied timing and intensity of thinning in regrowth stands according to the size and condition of trees and the productive capacity of the site. Detailed stratification of the forest estate into these categories assists the scheduling of thinning operations, but such stratification is only progressed as resources permit, and is still being refined for jarrah stands. Such stratification work would be an important refinement to the calculation of sustained yields for the next plan, but the extent of such work will need to be weighed against other priorities. The future woodflow projections therefore adopted broad strata and indicative five-year periods for thinning planning.

The total area of karri regrowth thinned to December 2007 indicates that the thinning program for this species is progressing ahead of schedule (Table 12). This reflects a strong commercial market for the product and the availability to date of appropriate stratification, planning and operations support systems to achieve the program.

Table 12. Area (hectares) of regrowth karri provisionally scheduled and actually thinned during the period 2004 to 2007. The figure for the area scheduled includes provision for an expanded first thinning program as provided for in the FMP.

Operation period	Area provisionally scheduled for first thinning (ha)	Area thinned (ha)	Variation (ha)
2004 – 2005	1,452	2,020	+ 568
2006 - 2007	2,103	2,160	+ 57

The faster rate of thinning will not impact future sawlog sustained yields (refer to KPI 11 for further information), and is considered by the Department to facilitate the reintroduction of strategic prescribed burning into these younger stands.

First thinning operations in regrowth jarrah were nominally scheduled to commence in 2006 in stands in the Warren Region that had been regenerated in the early 1980s. A program of approximately 450 hectares per annum was provisionally scheduled, depending on site quality.

To October 2008, thinning in these stands has not commenced. Preliminary field inspection of some of the scheduled stands has indicated that refinement of the site stratification will be necessary to reschedule many areas, as they are not yet ready for thinning due to variable stocking and slower growth rates. The current absence of a market for the small residue jarrah and marri logs has delayed these operations, as non-commercial thinning will require significant funds and potentially complicate fire protection in these stands. The Forest Products Commission has been investigating markets and suitable harvesting equipment for these operations.

While a delay of several years in conducting thinning operations in these stands is not significant, lengthy delays will generate large backlogs and require alternate yield regimes to be adopted into the next FMP.

The causes of the delay in commencing first thinning operations in the regrowth jarrah stands and the consequences for sustained yield will be reported to the Conservation Commission by the Department and the Forest Products Commission. The Conservation Commission will then evaluate the need for revision of management

practices in the context of its assessment and auditing function, in consultation with the Department.

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.	

KPI 14: Access for apiculture

Trend information is not available for apiary site data for 2004-2008. It is anticipated that trends will be reported for the next five year period of the plan. As at March 2008, a total of 1,243 registered apiary sites were located on lands managed by the Department within the FMP area. The proportion of sites varies between tenures, ranging from 68 per cent of sites located in State forest to four per cent within nature reserves (Table 13).

Table 13. Number of registered apiary sites (as at March 2008) by land tenure and purpose category within the Forest Management Plan area.

Land category / purpose	Number of apiary sites	
State forest	803	
National park	295	
Conservation park	45	
Nature reserve	47	
Timber reserves	46	
Unvested reserves	7	

The Department continues to provide access for apiculture within the FMP area.

KPI 15: Wildflowers and seed	picking
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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.

Data for 2006 and 2007 has not been supplied for this review, limiting the reporting of trends to the comparison of 2004 and 2005 activity levels. The number of wildflower

and seed picking endorsements and the relative quantity of stems harvested reduced by approximately 10 per cent between 2004 and 2005 (Table 14).

Table 14. Registration and location statistics for wildflower and seed pickers for 2004 and 2005.

Wildflower harvesting	2004	2005
Number of grid reference* for which wildflower harvesting licenses were issued	19	19
Number of grid reference in which wildflowers were harvested	16	16
Number of registered [#] wildflower pickers	454	412
Number of registered wildflower pickers who submitted a value return [^]	92	77
Total number of wildflowers harvested (number of stems)	9,935,886	9,108,337

Seed collection	2004	2005
Number of grid reference for which seed collecting licenses were issued	19	19
Number of grid reference in which seed was harvested	15	13
Number of registered [#] seed pickers	454	412
Number of registered wildflower pickers who submitted a value return^	58	47
Total amount of seed collected (kg)	40,360.78 ¹	8004.8 ²

- Data is not available for "forest blocks" so data was analysed on the basis of the state-wide "grid reference" squares. The following grid reference squares were used to encompass the south west forests of WA (1811, 1812, 1813, 1814, 1911, 1912, 1913, 1914, 2004, 2011, 2012, 2013, 2014, 2102, 2111, 2112, 2113, 2114, 2123)
- # This is the total number of Commercial Purposes Licensee's for the calendar year. i.e. any Commercial Producer's Licensee is able to take seed / wildflowers if they obtain the correct permissions / endorsements. Applicants specify these details on an application form, but this data is not reflected on their licence.
- A return on which a value was given for stem / seed picked for that year. Therefore this number does not include those licensees who harvested but did not submit their return, or those licensees who submitted a "Nil" return.
- 1 Data concerns due to reported collection of 30,000 kg of *Banksia grandis* seed which is suspected to be cones for the woodturning market, 4,047 kg of *Macrozamia riedlei* seed and 4500 kg of *Paraserianthes lophantha* seed.
- 2 Data concerns due to reported collection of 5000 kg of *Xanthorrhoea preissii* seed.

The strategies in place to manage, monitor and assess the conservation of commercially harvested native plant taxa in Western Australia have recently been published by the Department in Management of Commercial Harvesting of Protected Flora in Western Australia 1 July 2008 – 30 June 2013.

Issues to be addressed from 2009

On the basis of the above, the mid-term audit process identified the following issues to be addressed from 2009:

Log monitoring and utilisation

Insufficient markets for the quantity of lower grade jarrah and marri logs generated during integrated harvesting continues to be an issue.

In the absence of suitable markets for small jarrah and marri logs, the completion of some follow-up silvicultural treatments and the management of vegetation density for water production or other purposes requires substantial financial investments. The Forest Products Commission will continue to develop markets for this component of the 'other bole volume' made available under the FMP.

Harvest planning

Changes in the location of native forest sawmills or processing facilities may arise to improve the overall economic viability of the sector. While any adjustments to contracts must remain consistent with the overall sustained yields, changes in the location of sawmills relative to the sawlog resource may necessitate variation to the relative proportion of sawlogs sourced from different Regions, and require some revision of published three-year harvest plans.

The Department and the Forest Products Commission will need to progress the site quality and forest structure stratification of native forests to ensure appropriate information is available to assist harvest planning and (where necessary) to reschedule thinning treatments (KPI 12).

Silviculture

The highly variable structure and composition of the jarrah forest, and the recognised complexity of the Jarrah Silviculture Guideline has made the field interpretation of the guideline challenging. Independent expert assistance will be sought to assist the Department to develop guidance to simplify such issues as the variable scale of application and selection of silvicultural objectives (including acceptable ranges for retained density). In consultation with the Forest Products Commission, the Department will extend training programs on jarrah silviculture.

Accurate records of the extent and outcome achieved in the silvicultural treatments applied to the forest are essential for managing the productive capacity for all forest values. Renewed emphasis will be placed by the Forest Products Commission and the Department on the timely collation and verification of this information.

Sustained yield

The calculation of future woodflows in the revision of the sustained yields for the next FMP will need to accommodate any alterations to the area of forest available for timber production, evolving climate and forest hydrology knowledge, and variations to the structure and location of the wood products industry.

The following actions will need to be progressed by the Department during the period 2009 to 2013 to facilitate the next revision of the sustained yields:

- enhance the monitoring of silvicultural outcomes and sawlog utilisation in coupes;
- expand the approach to monitoring log grading standards;
- expedite the update of inventory and stratification projects recommended in the Ferguson report and the FMP; and
- refine knowledge and adaptive strategies for climate-induced changes to long-term site productive capacity.

The following actions will need to be progressed by the Forest Products Commission during the period 2009 to 2013 to facilitate the next revision of the sustained yields:

- confirm the magnitude of any changes arising from restructuring within the sawmilling sector of the timber industry that may affect the nature, quantity, or location of future available resource;
- secure sufficient markets for forest residue products to initiate thinning programs and undertake all scheduled silvicultural treatments;
- develop programs to address the backlog of regeneration treatments; and
- ensure consistency in silvicultural and log grading activities with the sustained yield settings.

Rehabilitation of clearfell plantation areas

Ex-plantation areas outside of the Gnangara area that have been clearfelled where the intention is not to re-establish plantation and that have not been rehabilitated should be rehabilitated to native vegetation as a matter of priority.

An inventory of those areas that are the Forest Products Commission's responsibility should be completed by 31 March 2009 and agreed to by the Department. A program of rehabilitation to be achieved by the relevant agency should be agreed between the Forest Products Commission and the Department, such that at least 50 percent of these areas should have rehabilitation works complete in 2010 and the other 50 percent in 2011. In the absence of the Guidelines for Rehabilitation of Plantation Areas, the Department should document the standards of rehabilitation that are to apply in the interim.

Conservation Commission advice

With respect to the above issues identified for Productive capacity, the Conservation Commission provides the following advice:

The issue of determining responsibility and of allocating resources for rehabilitation of redundant roads and gravel pits has persisted since the formation of the Forest Products Commission. It is the view of the Conservation Commission that the Government needs to provide additional funding to address the problem of legacy roads and gravel pits leading to a resolution of this issue.

The Conservation Commission considers the establishment of markets to facilitate the full utilisation of wood products from areas harvested should be a priority for the Forest Products Commission.

With respect to roading issues identified under Objective 10, the Conservation Commission expects to see an increased consideration by the Forest Products Commission for the long term potential use of roads and broadscale strategic planning for roads.

With respect to Objective 14 - Weeds, pests and diseases, the Conservation Commission expects that weed species in plantation areas that impact on biodiversity values attract a high priority for control.

The Conservation Commission will discuss with the Department the issues relating to domestic firewood demand and what actions can be taken to reduce the level of uncontrolled access and the illegal taking of firewood from conservation reserves.

The Conservation Commission notes that dates for reporting against actions identified by the Department and the Forest Products Commission for KPI 6, KPI 9 and KPI 12 have not been provided. The Conservation Commission requests that dates for completion of these actions be provided.

With respect to KPI 15, the Conservation Commission notes that data for 2006 and 2007 have not been supplied for this report. The Conservation Commission will ask the Department to review the protocol for this KPI if data availability is likely to continue to be a problem.

It is the considered view of the Conservation Commission that there are a number of issues of particular concern in relation to Productive capacity.

The Conservation Commission understands that the industry has proposed a new grading system for sawlogs to address some of the economic issues facing some parts of the timber industry. If the proposed system is adopted, the Conservation Commission is aware that the Department and the Forest Products Commission will need to ensure that the process of grading will be adequately monitored and that a new grading system may require the FMP's sustained yields to be recalculated to reflect the new grades. The Conservation Commission will provide its advice to the Minister for Environment as these proposals are progressed.

In relation to the additional volumes of karri other bole logs that have been generated, the Conservation Commission advises that a detailed analysis of the causes for the greater volumes being produced needs to be undertaken by 31 March 2009. The Conservation Commission will work with the Department and the Forest Products Commission to achieve this outcome. On the basis of the detailed analysis, the Conservation Commission will then report to the Environmental Protection Authority on its recommendations by 31 July 2009.

When the FMP was being prepared the Conservation Commission was concerned that there appeared to be a trend emerging where a shortfall of actual versus predicted sawlog volume was becoming common. At the time the Conservation Commission responded to its concern by including a KPI (KPI 11) to monitor this trend and revisit the issue mid-term. The Conservation Commission is now of the view that if variance in sawlog volumes continues there will be an impact on sustained yields. The Conservation Commission accepts that further analysis of the data is required to determine the extent to which the yields may need to be adjusted but is of the view that adjustment cannot be continuously deferred.

The Conservation Commission advises that a detailed analysis of the causes for the actual versus predicted sawlog shortfall needs to be undertaken by 31 March 2009. The Conservation Commission will work with the Department and the Forest Products Commission to achieve this outcome. On the basis of the detailed analysis, the Conservation Commission will then report to the Environmental Protection Authority on its recommendations by 31 July 2009.

With respect to Objective 15 - Regeneration and rehabilitation of disturbed forest, the Conservation Commission supports the Forest Products Commission in reviewing its performance and in requesting the Department to review its performance in conducting timely regeneration burns. The Conservation Commission will monitor progress with this issue.

The Conservation Commission was concerned with past performance in the areas of regeneration and rehabilitation of disturbed forest and compliance with thinning schedules when preparing the FMP. The Conservation Commission remains concerned with performance and will consider undertaking future specific performance assessments during the remainder of the plan's duration.

5. Ecosystem health and vitality

Overall aim

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

Objective 17. Fire

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.

Action	Status of implementation
17.1 The Department will:	Implemented and ongoing.
17.1.1 maintain a competent fire management,	
suppression and response capability (on plan	The Department continues to maintain a workforce and a
commencement & ongoing);	store of equipment sufficient to meet the fire management
17.1.2 prepare and maintain a fire management plan and	needs of the lands for which it has fire management
smoke management guidelines (in year 1 & ongoing);	responsibility. The Department is developing a risk to
17.1.3 undertake an annual prescribed burning program	resources model that will provide an indication of resourcing
In a manner that:	needs relative to its risk exposure and work load associated
is in accordance with the management plan,	with life suppression and prescribed burning program. This
	concerning the business systems used by the Department
has regard to the Goals for Understorey Structural	in managing its fire program. Training is delivered to
Diversity referred to in Action 4.1: and	personnel in accordance with recognised national best
considers any special vulnerability of fauna and flora	practice standards.
known to exist in a particular area to burning in that area	P
(on plan commencement & ongoing); and	The Department has a fire management framework
17.1.4 consult with stakeholders and interested	including Policy Statement No. 19 - Fire Management, a
community members in a manner that seeks to develop	Code of Practice for Fire Management, a series of Fire
community understanding of and support for, and enable	Management Principles, Fire Management Guidelines (one
constructive discussions and deliberations on, the	specific to smoke management) and Fire Operational
planning and implementation of prescribed burning and	Guidelines (FOG) that provide guidance for its fire
other fire management programs (on plan	management programs and operations. The Fire
commencement & ongoing).	Management Guidelines are being progressively referred to
	and conservation commission for comment and endorsement. Once endorsed these Fire Management
	Guidelines will be applied through management plans and
	the Master Burn Planning Process. The Department is in the
	process of developing Fire Management Plans for each
	Region that provide a framework guiding the annual Master
	Burn Planning process for developing the prescribed
	burning program.
	The Department undertakes a Master Burn Plan review
	process twice each year that develops a rolling prescribed
	burning program. This process draws on the guidance of
	Regional Fire Management Plans to target the outcomes of
	ins program to the blouwershy conservation, strategic
	protection and land management objectives set out in these plans. Development of the prescribed burning program and
	the Prescribed Fire Plans for each prescribed burn draws on
	information contained in Fire Management Guidelines
	many of which address the fire requirements of species and
	ecosystems that have particular fire regime requirements.
	In 2006 the Conservation Commission conducted a
	performance assessment on the Master Burn Plan process
	and prescribed burning. Details of key findings are
	presented below in the Conservation Commission

	performance assessment section (the full reports can be found on the Conservation Commission's website - <u>www.conservation.wa.gov.au</u>). Further information on the outcomes of the prescribed burning program can also be found in the report on KPI 16 later in this chapter and in Appendix A. Consultation and engagement of local community stakeholders is a standard component of the bi-annual Master Burn Planning process. The Department has developed a Fire Guideline for Prescribed Fire and
	Community Engagement Process (FOG 84) that outlines the process to be undertaken in community consultation in relation to the prescribed burning program.
17.2 The Forest Products Commission will: 17.2.1 undertake an analysis of the risk from fire to its native timber production resources (in year 2 & end of year 2); 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 (on plan commencement & ongoing).	Commenced. The Forest Products Commission and Department commenced a joint analysis of the risk from fire to the karri regrowth resource in 2004, but no substantial progress has been achieved as other work has been given priority. A similar analysis is required for the jarrah forest. The greater tolerance of jarrah to fire and the lesser impact of fire on long term sustained yield of jarrah mean that completing the analysis for the karri regrowth resource should remain the higher priority.
	From 2006/2007 the Government changed the funding arrangements such that the Department receives a Consolidated Revenue Funding allocation for fire management that had previously been directly funded by the Forest Products Commission.
	Draft working arrangements for fire management in plantations and native forest are being progressed by the Department and Forest Products Commission.
17.3 The Department and the Conservation Commission	Implemented.
will: 17.3.1 participate in the proposed public review of fire management by the Environmental Protection Authority (on plan commencement & end of year 1); 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 (in year 2 & end of year 2).	 In 2005 the Minister for the Environment responded to the review by the Environmental Protection Authority of the Department's fire management. The review recognised that the fuel reduction program implemented by the Department is a key strategy to reduce the extent and damage to biodiversity and other assets which might otherwise be caused by wildfires and recommended that: biodiversity be given first consideration in planning the annual burning program; objectives for burning be clearly stated and measurable so that the level of outcome can be assessed; the Conservation Commission audit the burning program implemented by the Department; the Department continue to engage the community in relation to the burning program; and realistic funding be provided to maintain operational and research capabilities required to address fire management into the future.
	Policy (Policy 19) incorporating comments received in public submissions and the Environmental Protection Authority's recommendations into the policy. Policy 19 was posted on the Department's website (www.dec.wa.gov.au) in 2005.
17.4 (Plantations): The Forest Products Commission will	Commenced.
 17.4.1 undertake an analysis of the risk from fire to its plantation timber production resources (in year 2 & end of year 2); 17.4.2 undertake an analysis of the risk from fire 	A risk assessment of the Forest Products Commission plantation assets has been commenced but is not yet completed.
emanating from its plantations moving into surrounding land (in year 2 & end of year 2); and 17.4.3 co-operate with the Department and other organisations in seeking to control the risks to acceptable levels, so far as is reasonable and practicable (on plan commencement & ongoing).	Draft working arrangements for fire management in plantation and native forest are being progressed by the Department and the Forest Products Commission.
Conservation Commission performance assessment

In 2006 the Conservation Commission undertook performance assessments of prescribed burning within the FMP area, and the Master Burn Planning process used by the Department. The assessment of prescribed burning made findings; in relation to the use of Landscape Conservation Units as a planning tool, the level of information provided in burn prescriptions, rehabilitation standards for fire lines, interpretation of satellite imagery to show variation in fire severity and performance indicators for prescribed burning. Findings from the assessment of the Master Burn Planning process related to post-burn monitoring and review, development of a standard template for the process and formal documentation to show how biodiversity outcomes are incorporated in the burn planning process. Consistency in the Master Burn Planning process across Districts and post-burn monitoring were identified as issues. It was concluded that the majority of the findings would be adequately addressed with the publication of guidelines to give clear and consistent guidance to those involved in the prescribed burning planning process, however, further improvements to the planning, monitoring and review systems were likely to improve aspects of the Master Burn Planning process.

In the 12 month period after the performance assessments were undertaken, a number of issues were addressed through presentations to the Conservation Commission. At the end of the 12 month period the Conservation Commission sent a request for a 12 month review to the Department to determine what actions had been undertaken since the publication of the assessment reports. Overall the response received from the Department was acceptable, however, further clarification in relation to monitoring and the reporting of outcomes is required.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

The Department has identified a risk posed by its inability to achieve an adequate level of prescribed burning and fire preparedness within the karri and jarrah forests in the Warren Region. More than 35 years of timber harvesting and associated regeneration activity have resulted in a complex spatial mosaic of regrowth and mature forest in which fire management is becoming increasingly difficult. The twotiered or mature forest is generally available for prescribed burning on a regular cycle. However, throughout the landscape this forest is now interspersed with large areas of regrowth forest, which has not been prescribed burnt since regeneration and therefore constitute 'pockets' of highly flammable vegetation where wildfire suppression will very difficult under dry summer conditions. The original strategy, established in the 1970s, was to concentrate timber harvesting outside of a network of broadscale burning buffers; areas of mature forest that would remain available for prescribed burning until a staged re-introduction of prescribed fire could occur within regrowth forests. However, a series of subsequent changes to forest policy over the last two decades affected the area of forest available for timber production (and hence the location and individual patch size of areas regenerated) and the level of sustained yield (which affected the rate of areas being cutover and regenerated). With a complex spatial mosaic to manage the opportunities for prescribed burning are now also limited by the window of suitable weather. In recent years the situation has been exacerbated by concerns from the wine industry about smoke dispersal over vineyards. Karri thinning operations that would allow for relatively safer and less costly prescribed burning of regrowth have been limited to an area of about 5,000 ha distributed over numerous, widely scattered coupes that cannot be readily aggregated into consolidated areas that could be burnt as buffer zones. An expanded program of thinning could be

beneficial to fire protection but the scale of the program is constrained by the sustained yield of karri bole logs set in the FMP.

Funding for maintenance of access roads and bridges needed for fire protection in regrowth forests has not been available and responsibility for funding this work has been disputed. As a result, important strategic roads are overgrown and bridges built by the timber industry have reached the end of their service life. The Forest Products Commission is yet to complete an analysis of the risk from fire to its native timber production and plantation resources, as required by Actions 17.2 and 17.4, and these analyses are required to determine the source and level of funding for these works. These issues formed the subject of a Cabinet Submission prepared in 2007, which resulted in an increase in the Department's recurrent fire management budget from July 2008. Additional personnel will be employed for fire management and associated conservation works in the three Regions covered by the FMP area, providing an enhanced capability to partially address the backlog of fire protection works.

Areas in the Swan and South West Regions that have been rehabilitated following bauxite mining also present difficulties for implementing prescribed burning programs due to the variation in species composition and vegetation structure, particularly those mined areas rehabilitated before 1988. There is now a considerable backlog of rehabilitated forest that has not been burnt for 20 years or more.

Objective 18. Weeds, pests and diseases

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.

Action	Status of implementation
18.1 The Conservation Commission will develop a whole of government policy framework for the management of	Implemented in part and ongoing.
Phytophthora dieback.	The Conservation Commission continues to contribute to
	the development of a whole-of-government policy for the management of <i>Phytophthora</i> dieback through the Government's Dieback Response Group, established in March 2004 and the Dieback Consultative Council, the peak body advising the Minister on policy development and frameworks for action.
	In 2009 the Conservation Commission will undertake a performance assessment of <i>Phytophthora</i> dieback management.
18.2 The Department and the Forest Products	Implemented in part and ongoing.
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 <i>Phytophthora cinnamomi</i> and Disease Caused by It Guidelines (on plan commencement & ongoing), 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 (as required).	In 2006 the Conservation Commission accepted the Department's (CALM) Policy No.3 <i>Phytophthora cinnamomi</i> with the qualification that it be an interim policy which would be reviewed and finalised in 12 months. The Department continues to comply with the intent of the interim policy and guidelines but is yet to finalise the review. The Department is yet to initiate the review of Volume 1 of the <i>Phytophthora cinnamomi</i> and Disease Caused by It Guidelines.
18.3 The Department will:	Commenced.
18.3.1 prepare an inventory of sites where the impact of	
P. cinnamomi on the vegetation is known to have been	Work has commenced on selecting a representation of
high, with a view to setting priorities for the regeneration	sites to sample for historical disease spread. However,
or renadilitation of those areas (in year 2 & end of year	the rationale and objectives for rehabilitation across the

	and the second sec
5); and 18.3.2 further develop <i>Phytophthora</i> dieback spread and impact models, including models relating to the effects of new infections (in year 5 & end of year 10).	range of impacted sites require further development. Research into the survival and growth of clones of <i>Phytophthora</i> dieback resistant jarrah has been completed and published (Stukely <i>et al.</i> 2007)
	Preliminary work has commenced on enhancing computer algorithms for predicting spread of <i>Phytophthora</i> dieback in newly infected sites.
18.4 The Department will:	Implemented and ongoing.
 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 (on plan commencement & ongoing); 18.4.2 develop and implement weed, pest and disease control programs (on plan commencement & ongoing); 18.4.3 eradicate, wherever reasonable and practicable, localised infestations of weeds, pests or diseases before they are securely established (on plan commencement & ongoing); 18.4.4 encourage the coordinated involvement of industry, the community and other land managers in addressing weeds, pests and diseases (on plan commencement & ongoing); 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 (as required). 	The Department continues to implement appropriate weed, pest and disease management practices and control programs, including, as part of the Western Shield program, aerial fox baiting on over 2.13 million ha, the control of feral pigs, rabbits, arum lily, bridal creeper, blackberry and other declared and priority environmental weeds. The Department spends a total of more than \$10.4 million on invasive plants and animals on all lands under its management, with a significant proportion of this spent within the FMP area of the Swan, South West and Warren Regions. The Department continues to maintain records of declared and major environmental weeds at the District level.
	The Department maintains a coordinated approach to addressing the management of weeds, pests and diseases across land tenures. The Department, in conjunction with the Department of Agriculture and Food, contributed to the National Land and Water Resources Audit on the distribution and abundance of the ten most significant invasive vertebrate pests in Australia. The Western Shield predator baiting program is supported by ALCOA and Worsley Alumina.
	The Department released a Good Neighbour Policy in 2007. This policy aims to guide the management of common cross-boundary issues that affect the Department and its neighbours including weeds and feral animals.
	The Department currently has an informal forest health monitoring system in place and forest health research is being undertaken (Robinson 2008). Surveillance and mapping of <i>Phytophthora</i> dieback disease has been one of the longest running forest health projects undertaken by the Department. The Department is collaborating in research to investigate and monitor the cause of decline in tuart and wandoo forests and woodlands.
18.5 The Forest Products Commission will, so far	Implemented and ongoing.
as is reasonable and practicable, maintain their nurseries free from weeds, pests and pathogens that could be transported into the forest with planting stock (on plan commencement & ongoing).	The Forest Products Commission conducts its nursery operations having regard to the requirements of this action. This includes the maintenance of strict hygiene procedures such as restricting access (people and vehicles), controlling external drainage, using raised benches and providing an anti-splash ground surface, chlorination of water supplies and pasteurisation of the growing media to minimise the introduction of pathogens. Where necessary weeds are removed from planting stock prior to leaving the nursery.
 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 (on plan commencement & ongoing); 18.6.2 develop and implement weed, pest and disease control programs for identified weeds, pests and diseases (on plan commencement & ongoing): 	Implemented and ongoing. The Forest Products Commission monitors and, where necessary, implements control programs for significant weeds, pests and diseases. Management programs are undertaken with advice from the Department, Water Corporation, and the Department of Agriculture and Food regarding the presence of declared weeds, pests and diseases.
18.6.3 where there is an identified risk that plantation operations may result in transport of <i>Phytophthora cinnamomi</i> , conduct its operations having regard to the policy and in accordance with the Guidelines referred to in Action 18.2 (on plan commencement & ongoing); and 18.6.4 take reasonable and practicable measures to	An infestation of European house borer (<i>Hylotrupes bajulus</i>) was located in Parkerville in January 2004 and is a major threat to seasoned pine timber including untreated structural pine in buildings. Subsequent delimiting surveys have confirmed infestations in numerous areas close to the metropolitan area. This

control the spread of plantation species into adjacent native vegetation (on plan commencement & ongoing).	includes plantations in Mundaring, Peel and Gnangara. An initial response group including Forest Products Commission and Department of Agriculture and Food staff, funded predominantly by the State Government has now been replaced by an independent response group reporting to the Department of Agriculture and Food. The current response group is being funded as a national initiative with contributions from the Commonwealth and all state Governments. Industry contributions have also been sought. The national co-ordinating body has agreed to shift the control emphasis to phase 3, which is	
	eradication of the pest and the agreed process is planned for completion in 2021.	
	Risks associated with the spread of <i>Phytophthora</i> dieback during plantation operations are identified and managed using Pre Harvest Checklists and associated hygiene management plans.	

Compliance monitoring

There were 32 incidents between 2004 and 2008 relating to breaches of hygiene management that resulted in the Department issuing a Works Improvement Notice or Management Letter. The most common types of incidents related to; non-compliance with conditions of a hygiene management plan, failure to clean down machinery on entry to forest mapped as being protectable from *Phytophthora* dieback and inappropriate use of gravel of unknown hygiene status or known to be infested with *Phytophthora cinnamomi*. Preventative actions taken by the Forest Products Commission to minimise the number of dieback hygiene incidents include improved boundary demarcation of protectable and unprotectable forest and re-training and reinforcement of standards with relevant personnel. The Forest Products Commission is of the view that the number of incidents reported in the EMS relating to hygiene management is small when considered in the context of the area harvested. Most incidents were assessed to be of low impact according to the risk rating applied in the Forest Products Commission's EMS.

Implementation issues

There has been some dispute between the Department and the Forest Products Commission regarding roles and responsibilities for management of weeds in plantations on lands managed by the Department within the FMP area. Development of working arrangement for plantations would clarify these responsibilities.

The rationale and objectives for rehabilitation of *Phytophthora* dieback-affected forest requires further development and needs to be considered in the context of the values that the forest is being managed for in different areas of the forest estate. Rehabilitation works are likely to be costly and therefore need to be clearly prioritised.

Dieback hygiene requirements should be implemented consistently for access by industry and the public, taking account of the relative risk of disease spread under a range of circumstances. There is concern that recognition of the threat posed by this pathogen has declined. The review of Volume 1 of the *Phytophthora cinnamomi* and Disease Caused by It Guidelines provides an opportunity to address these issues. Issues raised under Objective 20 on soil in the Soil and water chapter should also be considered.

Objective 19. Developing self-sustaining ecosystems

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:

Progress with implementation of actions proposed

Action	Status of implementation		
19.1 The Department and the Forest Products	s Implemented and ongoing.		
Commission will undertake their regeneration or rehabilitation operations by (on plan commencement & ongoing): 19.1.1 using natural regeneration where reasonable and practicable: or	Natural regeneration is employed for gap and shelterwood treatments in jarrah forest. Marri is regenerated using natural regeneration.		
19.1.2 where natural regeneration is not reasonable and practicable, using seed collected locally or plants propagated from seed collected locally.	Clearfelled areas are regenerated by planting nursery raised seedlings of karri and jarrah appropriate to the pre- harvest composition of the stand, following the Silviculture Guideline for karri forest. Seed is collected locally and propagated at the Forest Products Commission's nursery.		
	Recently the Department's Science Division provided recommendations on appropriate local seed mixes for rehabilitation works. In addition, the Forest Products Commission in consultation with the Department has developed a procedure to manage for the use of local seed. The procedure requires the Department to provide ongoing advice on the location of species and provenance and for the Forest Products Commission to put processes in place to ensure the seed is collected and available for use and is applied in the correct location.		
19.2 The Department and the Forest Products Commission will report to the Conservation Commission	Implemented and ongoing.		
annually as to the circumstances where local seed sources have not been used in their regeneration or rehabilitation operations (in year 1 & ongoing).	The Department approved requests from the Forest Products Commission to use non-local seed on three occasions in 2004 and 2005 and these were reported to the Conservation Commission. These instances related		
	to non-availability of karri seed, replacing correctly planted seedlings killed by frost and use of non-local understorey seed for landing rehabilitation to utilise existing supplies of seed.		

Compliance monitoring

The Department issued one Management Letter in 2008 relating to the failure to use local seed for rehabilitation. The program of seeding for the non-compliant seed mix covered a number of sites over a large geographic range. The issue was investigated and steps have been taken by both agencies to improve systems and processes for the use of local seed for rehabilitation.

Implementation issues

The Forest Products Commission has found that in some instances availability of local seed for regeneration and rehabilitation is limited. This may be influenced by circumstances where the Department may not issue permits to collect seed in some forest blocks where other collectors are currently operating and by the complexity of seed collection programs and storage requirements.

Key Performance Indicators

The reporting protocol for KPI 16 (reported on below) was provided to the Conservation Commission in 2006. At that time the Conservation Commission decided that further work was needed before the protocol could be published. The revised protocol has not been received by the Conservation Commission and key issues identified with the KPI 16 protocol remain unresolved.

KPI 16 – The risk to biodiversity conservation in forest ecosystems posed by inappropriate fire regimes

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.

The frequency distribution of fuel age gives an indication of the diversity of fuel age and as a result understorey structural diversity and therefore habitat diversity. The frequency distribution of fuel age is examined below at a whole-of-forest scale as well as for four of the larger representative Landscape Conservation Units within the FMP area. The Department's target distribution is a negative exponential function that is based on inputs relating to the life history attributes and requirements of the vegetation occurring in forest areas.

The degree to which the fuel age distribution conforms to the theoretical negative exponential curve gives an indication of how well the Department's fire management program is achieving the fire management objectives of the FMP.

In interpreting the results it is important to recognise that:

- due to the nature of the data, the amount of older fuel ages is significantly under represented because records depict the total area to which prescribed fire was applied within the boundaries of each prescribed burn unit and do not recognise unburnt patches within the burn area. In most cases it is neither the objective or the outcome that all of this area is burnt; and
- the desired match with a negative exponential curve is approximate and not exact.

Additional information is provided in Appendix A.

Whole-of-forest scale

Figure 5 shows a strong correlation with the desired negative exponential curve indicating that vegetation structural diversity is highly probable at the whole-of-forest scale.



Figure 5. Frequency distribution of time since fire as a proportion of the entire area of native vegetation on lands managed by the Department within the FMP area.

Individual Landscape Conservation Units

The fuel age distributions for the Landscape Conservation Units in Figures 6–9 below indicate a general conformity with the theoretical negative exponential distribution. In general, variations above the theoretical curve in younger age classes can be explained by the occurrence of recent bushfires or the need to manage fuels to mitigate the risk of bushfire adjacent to private assets. Variation in the distribution of older age classes is generally due to the necessity to protect areas such as fire vulnerable karri regeneration until it is mature enough to be exposed to fire without causing unacceptable tree damage.



Figure 6. Frequency distribution of time since fire for the Central Jarrah Landscape Conservation Unit.

The fuel age distribution generally conforms to the negative exponential distribution (Figure 6). This Landscape Conservation Unit abuts private property to the west along the scarp and a high proportion of asset protection burns are required to protect community values in, and adjacent to, lands managed by the Department.



Figure 7. Frequency distribution of time since fire for the North Western Jarrah Landscape Conservation Unit.

The fuel age distribution of the North Western Jarrah Landscape Conservation Unit is skewed by the large Perth Hills wildfire of 2005 (Figure 7).



Figure 8. Frequency distribution of time since fire for the Blackwood Plateau Landscape Conservation Unit.

The fuel age distribution in the Blackwood Plateau Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure 8).



Figure 9. Frequency distribution of time since fire for the Central Karri Landscape Conservation Unit.

The Central Karri Landscape Conservation Unit (Figure 9) contains large tracts of young karri regrowth that requires fire exclusion for up to 25 years before the karri trees become tolerant to fire and can be burnt without unacceptable bole damage. Implementation of prescribed burning in this Landscape Conservation Unit has also been constrained by the narrow range of weather conditions suitable for burning in karri forest, unavailability of resources at critical periods due to fire suppression commitments elsewhere in the State and issues of smoke dispersion over vineyards.

Issues to be addressed from 2009

On the basis of the above, the mid-term audit process identified the following issues to be addressed from 2009:

The Forest Products Commission needs to complete analyses of the risk from fire to native timber and plantation production resources as required by Actions 17.2 and 17.4.

Working arrangements for fire management between the Department and the Forest Products Commission will be finalised and implemented.

The review of Volume 1 of the *Phytophthora cinnamomi* and Disease Caused by It Guidelines provides an opportunity to address a range of concerns about management of the risks associated with this pathogen.

Conservation Commission advice

With respect to the above issues identified for Ecosystem health and vitality, the Conservation Commission provides the following advice:

With respect to Objective 16 – Fire, the Conservation Commission considers that post-burn monitoring is vital, particularly in an adaptive management environment, as indicated in the Department's 12-month response to the Conservation Commission's performance assessment. The Conservation Commission is also aware that additional

resources may be required to undertake more thorough follow-up monitoring of prescribed burning. With these points in mind the Conservation Commission has scheduled a further assessment of prescribed burning on Conservation Commission vested lands and will maintain its performance assessment of fire management as a priority within its work program. The focus of this assessment will be the mechanisms for and results of post-burn monitoring with a particular focus on nature conservation objectives and outcomes.

It is the considered view of the Conservation Commission that there are a number of issues of particular concern in relation to Ecosystem health and vitality.

With respect to Objective 18 – Weeds, pests and diseases, the Conservation Commission is aware that the issues surrounding *Phytophthora* dieback management and dieback hygiene requirements will not be solved by the efforts of the Department and the Forest Products Commission alone. The issue requires a whole-of-government approach to be applied across all lands. There is a need for a set of consistent measures to be developed that applies to all Government and non-government bodies, industry and the general public. The Conservation Commission is of the view that these need to be made binding through a whole-of-government statutory policy and/or regulations. This may be achieved under the current framework of the *Environmental Protection Act 1986*, however, if not then the appropriate legislation should be amended to enable this action. With respect to this matter the Conservation Commission will be better able to offer further advice to the Environmental Protection Authority and the Minister for Environment after its performance assessment of *Phytophthora* dieback management scheduled for 2009.

It is the understanding of the Conservation Commission that the interim *Phytophthora* dieback management policy endorsed by the Conservation Commission would be reviewed after a trial period of one year. After that time the policy was to be subject to further review. The Conservation Commission is concerned that the 12 months has passed and the review has not yet occurred.

With respect to KPI 16, the Conservation Commission is concerned that the Department is giving inadequate weighting to biodiversity as an objective for fire management. The Conservation Commission has not yet been convinced that a clear and demonstrated link between special biodiversity requirements and the details of individual fire prescriptions has become a routine outcome of fire management planning. The Conservation Commission would also like to see post-burn monitoring and review become part of the routine outcome of prescribed burns. More generally, the Conservation Commission has not accepted the 'negative exponential target' as a general principle. Whilst the target may be appropriate at some scales and in some contexts, the Conservation Commission does not consider it appropriate in all circumstances for the conservation of biodiversity. For example, where there is a need for long unburnt habitat a negative exponential target is not appropriate. Whilst the Conservation Commission has generally supported the thrust of the fire management policy and is aware that there is evidence that biodiversity is being addressed in fire planning, the Conservation Commission would like to see further refinement in the implementation of policy.

6. Soil and water

Overall aim

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

Objective 20. Soil

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

Action	Status of implementation
20.1 The Forest Products Commission and the	Implemented in part and ongoing.
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 (on plan commencement & end of year 2); 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	The Department and the Forest Products Commission have conducted their operations in accordance with Appendix 6 and subsequent reviews. The Interim Manual of Procedures for the Management of Soils Associated with Timber Harvesting in Native Forests was developed in 2004 and revised on an annual basis to 2007. Soil and Water Conservation Guidelines have been drafted and were released for public comment in
advice and approved by the Minister for the Environment by 31 December 2005, when they will take effect and supercede Appendix 6 (in year 2 & end of year 2).	March 2008. Refer to the report on KPI 21 later in this chapter and
20.2 The Department and the Concernation Commission	Completed
20.2 The Department and the Conservation Commission will review the operation of the implementation of	Completed.
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 (in year 2 & end of year 2).	The Department and the Forest Products Commission have formed a Soils committee that meets regularly to review operation of the implementation of Appendix 6. The Interim Manual of Procedures for the Management of Soils Associated with Timber Harvesting in Native Forests was developed taking into account Appendix 6. The Manual has been revised a number of times since the commencement of the plan, within an adaptive management framework, to facilitate access during the wetter part of the year while managing the risk of soil damage. The revisions were developed in consultation with the Conservation Commission.
20.3 The Department will investigate the development of	Implemented and ongoing.
a soil hazard assessment system to help planning to protect soil from damage (by year 5 & end of year 6).	A combination of research outcomes, field survey and monitoring and refinement of operational activities have been incorporated into the soil hazard assessment system. A consultancy report on soil trafficability issues was completed and published in 2005 (Rab <i>et al.</i> 2005). A contract to map soils in timber harvesting areas has also been completed (Smolinski and Kuswardiyanto 2007). Research has been undertaken into the effectiveness of soil protection treatments, including cording, matting and brushing (Whitford <i>et al.</i> submitted). The system is now at a stage where only minor refinement is required on an annual basis.
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 (on plan commencement & ongoing).	Implemented and ongoing. The Forest Products Commission undertakes rehabilitation of soil damaged during operations. Rehabilitation of jarrah landings fell behind schedule during 2007, and will be addressed during summer 2008/2009.

	The Department has initiated a process to investigate, map and report instances where soil disturbance limits are exceeded. The Department has undertaken rehabilitation works on disturbed sites in areas harvested before 2000, and in areas affected by soil erosion resulting from the upgrading of burn boundaries.	
20.5 (Plantations): The Forest Products	Implemented and ongoing.	
Commission will:		
20.5.1 conduct its plantation operations in a manner	The Code Of Practice for Timber Plantations in WA	
that is in accordance with guidelines for soil protection in	was revised in 2006 in consultation with the	
the Code of Practice for Timber Plantations and the	Department. Plantation operations are conducted in	
relevant plantation manual, which will be revised in	accordance with the Code of Practice for Timber	
consultation with the Department by 31 December 2005	Plantations.	
(on plan commencement & ongoing); and		
20.5.2 rehabilitate damaged soil resulting from	The Code of Practice for Timber Plantations in WA	
plantations operations to the standards specified in the	does not specify rehabilitation standards for soils	
Code of Practice for Timber Plantations and the relevant	domogod during timber baryosting Soils domogod	
plantation manual (on plan commencement & oppoind)	during plantation horizonting are rehabilitated during	
plantation manual (on plan commencement & ongoing).	site proportion energians prior to replanting of the	

Compliance monitoring

Native forests

Monitoring and audit for the protection of soils has been a major focus in implementing the FMP. Both the Department and the Forest Products Commission have invested significant time planning for and implementing the soil protection requirements of the FMP. The Department has issued between five and ten Works Improvement Notices and Management Letters relating to soil management each year. In 2005 and 2007 a relatively higher number of notices were issued, the majority of which were related to systems and processes rather than physical soil disturbance.

The majority of compliance notices issued by the Department were for three types of breach:

- operating without approval or outside approvals. This relates to commencement of a harvest operation before the Pre-operations Checklist is signed by the relevant Regional Manager, or failure to comply with conditions of approval, such as the requirement for monitoring and reporting;
- ineffective erosion control resulting from failure to install erosion control structures where they were required, or installation of structures that did not meet the required specifications; and
- exceeding soil disturbance limits where transect surveys by the Department recorded soil disturbance greater than the allowable limits (refer to KPI 21 report at the end of the Soil and water chapter and Appendix A for more detail).

In addition, several minor hydrocarbon spills were reported through the Forest Products Commission EMS.

Approximately half of the Works Improvement Notices and Management Letters issued by the Department relating to soil management have been subsequently closed. Refer to Objective 32 in the Plan implementation chapter for further discussion of monitoring and audit. Actions taken to minimise the number of incidents relating to soil management include planning disturbance activities for periods when soil conditions are appropriate to the type of operation, greater emphasis on selection of extraction tracks prior to commencement of harvesting operations, and suspension of operations during periods when the risk of soil damage is high. Greater emphasis has also been placed on training personnel and making them aware of relevant procedures and standards.

Plantations

Two incidents relating to soil management in plantations were reported relating to a machine becoming bogged and erosion following planting preparation.

Implementation issues

The focus on management and protection of soil values during timber harvesting operations under the current FMP has resulted in a significant improvement in protection of soil compared to the situation before the FMP was implemented. Both the extent and severity of soil disturbance associated with timber harvesting has significantly reduced. This can be attributed to a tighter definition set regarding severity of damage, introduction of rutting, erosion, deposition and landing management limits, the introduction of a precautionary planning approach and a more determined effort to halt operations prior to exceeding allowable limits.

Substantial resources have been committed to field based monitoring of soil disturbance, to the development of the Interim Manual of Procedures for the Management of Soils Associated with Timber Harvesting in Native Forests and to the development of advisory notes related to the protection of soil values (Rehabilitation of Landings and Extraction Tracks that have been Corded or Matted, 2005; Blade-up Access on State Forest and Timber Reserves, 2006). Log supply and delivery commitments proved difficult to achieve within the original soil management settings of Appendix 6. Between 2004 and 2006 significant annual review of the manual and the implementation of Appendix 6 of the FMP was required. The reviews were developed by the Department and Forest Products Commission in consultation with the Conservation Commission. The reviews were mostly concerned with the definition of risk periods and allowable activities, in order to allow increased access during moist soil conditions while minimising the risk of damage to susceptible soil types. The increased access was conditional on an increased requirement to conduct monitoring and surveillance. This work delayed the development of the Soil and Water Conservation Guidelines that are required by Action 20.1.2. The Department believes that the approach taken is sound and will lead to robust and enduring Soil and Water Conservation Guidelines. The guidelines were released for public consultation in 2008 but are yet to be finalised.

Access during moist soil conditions is dependent on soil type and, with the exception of karri thinning operations, is now almost entirely focused on upland gravels and sands. An unintended consequence of the additional soil protection measures is that operations in jarrah forest during winter and spring are concentrated in areas of forest that are protectable from *Phytophthora cinnamomi*. Departmental field and management staff have indicated that the levels of winter access into areas of protectable forest, combined with high profile roading and operational considerations relating to clean on entry requirements and traffic management, are proving challenging.

The Department has put a process in place to improve the planning and approval of the soil/hygiene management issue. This process will be reviewed over the next two years.

The current soil disturbance limits were derived from experience and examples of best practice determined prior to the widespread use of machine harvesting. Timber harvesting systems have subsequently changed from predominantly manual falling with machine extraction to predominantly machine harvesting and extraction. The additional layer of machine movement has led to the allowable limits of soil disturbance being exceeded for some types of operation.

The planning and approvals process associated with management of timber harvesting operations under moist soil conditions is one of a number of layers within the overall approval process for timber harvesting. A unified approach early in the coupe planning process that simultaneously considers all relevant risks to environmental values is desirable.

The Code of Practice for Timber Plantations does not currently define damaged soil or specify rehabilitation standards for soils that have been damaged.

Objective 21. Water

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:

Action	Status of implementation		
21.1 The Department and the Forest Products	Implemented in part and ongoing.		
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 (on plan commencement & end of year 1); 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 (in year 2 & ongoing).	The Department and Forest Products Commission conduct operations in a manner that has regard to the provisions for stream zones in Appendix 3. With regard to Action 21.1.2 the Department developed Advisory Notes for: - Blade-up Access on State Forest and Timber Reserves; - Management of Access in Informal Reserves and Other Protected Areas Within State Forest and Timber Reserves; - Salvage of Logs in Association with Informal Reserves.		
	Guidelines to Protect the Values of Informal Reserves and Fauna Habitat Zones were released for public comment in March 2008 and will be in 2009.		
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 (by year 5 & end of year 10).	Implemented in part and ongoing. The Department finalised a statewide Strategic Roading Initiative in 2007. Outcomes of the initiative are being examined in terms of addressing the risk to road users, development of the Road Management policy (Policy 40), and development of a roading manual incorporating engineering standards and inspection procedures.		
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 (as required).	Implemented in part and ongoing. The Water Corporation is the proponent of an adaptive management trial in the 12,845 ha Wungong catchment which aims to increase water yield by managing vegetation density. The Department and the Conservation Commission evaluated the draft Wungong Catchment Environment and Water Management Proposal and considered that the proposal as presented was consistent with the objectives and actions within the FMP. To date the Wungong Catchment Trial has treated about 1,400 ha of State forest.		
	The Department, Forest Products Commission and the Conservation Commission contribute to the Wungong Technical Reference group which provides input into project development and the review and development of research and monitoring proposals. The Conservation Commission commenced a performance assessment of the Wungong Catchment Trial in August 2008 as part of the four-yearly review		

	process recommended by the Environmental Protection Authority's informal assessment recommendations. The findings from the audit will be published by 31 July 2009.
21.4 The Department:	Implemented in part and ongoing.
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 (as required); 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 (as required); 21.4.3 will take and use water sustainably from land to which the plan applies (on plan commencement & ongoing); 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 (as required);	Since commencement of the plan there has been one instance where the Department has provided advice and assistance to bodies seeking to access water located on land to which the plan applies. During 2006, the Department contributed to the assessment of the likely environmental impact of the Water Corporation's proposal to extract 45GL of water from the South West Yarragadee aquifer in State forest and national park. An amendment to the CALM Regulations (81) improving the Department's ability to undertake Action 21.4.2 was signed by the Minister and gazetted in January 2008. The amendment relates to infrastructure and facilities for the removal and storage of water.
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 (as required).	Abstraction of water from proclaimed areas on land to which the FMP applies is presently provided for under the <i>Rights in Water and Irrigation Act 1914</i> and managed by the Department of Water. The Department of Water manages statutory approvals and licenses in these areas. For areas of land to which the plan applies that are not in proclaimed areas, the <i>Conservation and Land Management Act 1984</i> , s20(6), s101(1a) and s101(1e) provide for the Department to take water and issue permits for taking water. To date, the Department has not issued any permits for the sustainable taking of water from land to which the plan applies.
	The Department and the Conservation Commission have not yet developed 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	Implemented in part and ongoing.
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 (on plan commencement & ongoing); 21.5.2 consult with the Water and Rivers Commission prior to undertaking plantation operations in a public water catchment area (on plan commencement & ongoing); 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 (as required & as required).	The Code Of Practice for Timber Plantations in WA was revised in 2006 in consultation with the Department. Plantation operations have been conducted in accordance with the Code.
	Consultation with the relevant authorities occurs when required prior to the commencement of each operation via the use of a planning checklist (Pre Harvesting Checklist). The Water Corporation is advised of both harvesting and establishment operations upon development of the harvest plan.
	The Forest Products Commission is working with the Water Corporation and the Department with regard to management of plantations within the Wungong catchment to enhance streamflow through appropriate silvicultural intervention.
	The Gnangara Sustainability Strategy is being developed to guide sustainable management of the groundwater in the Gnangara Mound as a partnership involving the Forest Products Commission, the Department, Water Corporation and the Department of Water. Work undertaken by a number of agencies over many years has demonstrated that dense pine plantations eliminate recharge. Thinning is an effective mechanism to reduce water use by plantations and thus to increase recharge under plantations. The Forest Products Commission has developed a plan for thinning the Gnangara plantation over a 25 year period through the commercial harvest of the plantations to supply raw material for manufacture of laminated veneer lumber and medium density fibre board. The

Strategy is investigating the impacts of removal of plantations and of possible subsequent land uses which range from replanting some areas with lower
density plantation to facilitate recharge, through to the replacement of the plantations with grasslands. The Strategy is due to be delivered to Government in June 2009.

Compliance Monitoring

Incidents relating to stream zones have been reported under Action 3.1 in the Biological diversity chapter.

Implementation issues

Water yield from forested catchments has received increasing attention during the life of the current FMP and this trend may continue as we move towards development of the next FMP. However, there have been significant changes in rainfall and streamflow patterns, as well as changes in the silviculture in the jarrah forest catchments near Perth, in recent decades. These changes mean that despite the significant amount of research in previous decades there is now considerable uncertainty regarding the streamflow benefits from a program of active catchment management aimed to increase streamflow.

Since 2004 situations have arisen where potential conflict exists between actions specified in the FMP and the requirements of water source protection plans, particularly in relation to fire and recreational use.

The large bushfire which burnt much of the catchment surrounding the Mundaring Weir in January 2005 highlighted the potential adverse consequences for water quality from high intensity wildfires, and clearly demonstrated that prescribed burning is a key risk management strategy.

Implementation issues have also been identified in relation to harvesting and future management of areas of plantations close to streams and adjoining water reservoirs.

Key performance indicator

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.

KPI 21 – the level of soil damage resulting from timber harvesting

A number of changes to the soil management and monitoring system occurred during the reporting period and a consistent methodology providing comparable results that would readily identify trends is not available. The main elements contributing to this are:

- definition of risk periods changed significantly and progressively in order to allow increased access during moist soil conditions;
- timing of surveys shifted from active operations to completed operations; and
- definition of soil disturbance categories and assessment techniques were modified.

Additionally, the data is not a random or unbiased sample of operations. Surveillance and monitoring undertaken by the Department is carried out in a risk management framework and is often focused on sites that are at the highest risk of exceeding disturbance limits.

Data from surveys undertaken by the Forest Products Commission have not been included in Table 3, primarily because monitoring is conducted prior to completion of operations and does not represent the final level of disturbance for a feller's block.

Summarised results from visible soil disturbance surveys are shown in Table 15. Additional information is provided in Appendix A.

Table 15. Number of transect surveys of visible soil disturbance where the allowable limits of soil disturbance were exceeded.

				Very severe
	Number	Moderate soil	Severe soil	soil
Harvest type	of	disturbance	disturbance	disturbance
	surveys	N	umber of surveys	6
		excee	eding allowable li	mits
		2005		
Jarrah	21	9	6	0
Karri thinning	11	0	0	0
Karri clearfall	5	0	0	0
Total surveys	37	9	6	0
		2006		
Jarrah	23	6	3	0
Karri thinning	3	0	0	0
Karri clearfall	0	0	0	0
Total surveys	26	6	3	0
		2007		
Jarrah	17	3	6	0
Karri thinning	3	0	0	0
Karri clearfall	0	0	0	0
Total surveys	20	3	6	0
2008 (January to June)				
Jarrah	9	1	4	0
Karri thinning	7	1	0	0
Karri clearfall	5	0	1	0
Total surveys	21	2	5	0

The Department has investigated the cause of operations exceeding allowable limits of soil disturbance. The following section and the full report on KPI 21 in Appendix A represent the Department's report on the target shortfall.

The risk period in which operations were conducted had limited influence on whether or not allowable limits were exceeded. Operations where limits were exceeded were almost entirely in jarrah forest and were generally related to management of extraction tracks. All instances where limits were exceeded were for machine harvested operations.

Preventable instances occurred where there were multiple secondary extraction tracks following corridors made by machine harvesters and where more than two primary

extraction tracks were used. Less preventable instances where limits were exceeded were related to:

- small or narrow cells with high volume of timber;
- *Phytophthora* dieback coupes of irregular shape, where multiple primary extraction tracks are required to access localised patches of *Phytophthora* dieback affected forest; and
- machine harvested areas on steep slopes where cross-slope machine movement is unsafe resulting in closely spaced tracks at right angles to the contour.

A number of instances were identified where specified landing size limits were exceeded. Incidents related to:

- small harvest cells (1–3 ha) where the prescribed limits are not practically achievable; and
- small to medium sized harvest cells (6-10 ha) where high log volumes had been extracted.

In general, management practices did not contribute to landing size limits being exceeded. Safety is an important consideration for log landings as these are generally the most dangerous areas on which to operate. Landings must be of adequate size to provide for safe work practices.

Issues to be addressed from 2009

On the basis of the above, the mid-term audit process identified the following issues to be addressed from 2009:

Procedures introduced during the current FMP to protect soils during timber harvesting in moist soil conditions have had the consequence of focusing harvesting operations on upland sites with gravel soils. Harvesting activity during moist soil conditions and associated vehicle movement has the potential to increase the risk of spreading *Phytophthora* dieback. Planning and operational procedures need to be reviewed to ensure that dieback hygiene during timber harvesting in moist soil conditions is properly considered (see also the Issues to be addressed from 2009 section in the Ecosystem health and vitality chapter).

Since the FMP was implemented mechanised harvesting operations using excavator base machines with felling heads has become routine practice. In some situations large vehicles may not be capable of conducting operations within allowable limits of soil disturbance (refer KPI 21) and alternative approaches to accessing these resources may need to be developed.

With the increasing focus of water agencies on active management of catchments to enhance water yield there will be a need for greater cooperation and consultation between the Conservation Commission, the Department, the Forest Products Commission, the Department of Water and the Water Corporation (see also the Global carbon cycles chapter). Consistency in policy development in relation to fire management and recreation would also be desirable.

The Soil and Water Conservation Guidelines should be finalised by 31 July 2009.

The Department should define damaged soil and specify rehabilitation standards for soils that have been damaged in plantation areas.

The Department will report to the Minister for the Environment on the cause of soil damage exceeding maximum prescribed levels. The Conservation Commission is to evaluate the need for revision of management practices in the context of its assessment and auditing function, in consultation with the Department.

Conservation Commission advice

With respect to the above issues identified for Soil and water, the Conservation Commission provides the following advice:

The potential conflict between actions specified in the FMP and the requirements of water source protection plans, particularly in relation to fire and recreational use, should be addressed through a greater level of cooperation and consultation between the Conservation Commission, the Department, the Forest Products Commission, the Department of Water and the Water Corporation.

It is the considered view of the Conservation Commission that there are a number of issues of particular concern in relation to Soil and water.

With respect to Objective 20 – Soil, the Conservation Commission is of the view that there is enough flexibility in the current moist soils approval system for the Department and the Forest Products Commission to work through the soil and hygiene management issue. The Conservation Commission should be kept informed of their progress.

With respect to KPI 21 and operations exceeding allowable limits of soil disturbance, the Conservation Commission will consider the Department's report on the shortfall for KPI 21 and respond by 31 July 2009.

The Conservation Commission is concerned that the trend to increased use of machinery for timber harvesting will lead to further shortfalls in the area of soil disturbance. The Forest Products Commission is requested to provide the Conservation Commission with its proposed response to this issue by 31 March 2009 for consideration leading to the Conservation Commission's response to the target shortfall to be completed by 31 July 2009.

With respect to Objective 21 – Water, it is the view of the Conservation Commission that the FMP's Objective 21 for water may be overly ambitious with regard to the desire to protect the ecological integrity and quality of streams, wetlands and their associated vegetation, and increase the flow of water in the context of a drying climate. The Conservation Commission notes the now considerable uncertainty regarding the streamflow benefits from a program of active catchment management aimed to increase streamflow. The Conservation Commission recommends that the Government as a whole should address the question of whether it is reasonable to expect that forests can, or should, be managed to maintain or enhance water supply in the current drying climate. This recommendation should be read in the context of the Conservation Commission's advice in the Global carbon cycles chapter.

The Conservation Commission notes that the performance assessment of the Wungong Catchment trial, which is expected to be completed by 31 July 2009, will provide an analysis of management of catchments to increase water run-off.

7. Global carbon cycles

Overall aim

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

Objective 22. Forests as a carbon sink

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:

Progress with implementation of actions proposed

Action	Status of implementation
22.1 In addition to the Actions proposed in previous chapters, which will assist in maintaining net carbon	Implemented in part and ongoing.
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. (on plan commencement	In 2004, the Department began preparing a draft climate-biodiversity strategy, the first element of which involved incorporating carbon sequestration considerations into all Departmental land management activities. The strategy is also intended to take into account the function of forests as a carbon sink.
& ongoing).	Western Australia's Greenhouse Strategy takes account of the potential for Western Australia's forest ecosystems to sequester carbon. The capacity for the forest ecosystems to sequester carbon will be significantly affected by future climate regimes.
	Departmental staff have attended national courses and training to maintain an understanding of current processes and rules associated with carbon accounting.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

Since the FMP was developed the methods for measuring and modelling the carbon balance of forests have undergone very significant development and are now at a stage where modelling is beginning to be applied at a regional level in some jurisdictions in Australia.

Objective 23. Enhanced greenhouse effect

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:

Action	Status of implementation
The Department will:	Implemented in part and ongoing.
23.1.1 investigate the likely impacts of climate change on	
the forest, including the role of forest ecosystems in the	See text below
carbon cycle (in year 2 & ongoing);	
23.1.2 maintain contact and, where appropriate,	

collaborate with external groups undertaking research and modeling relating to climate change (on plan	
commencement & ongoing); 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 (on plan	
commencement & ongoing).	

Action 23.1

Within the established national and State climate change policy framework, the Conservation Commission, the Department and the Forest Products Commission are working towards developing a greater understanding of the effects of climate change on forest ecosystems and the role of forest ecosystems in the carbon cycle.

Work on climate change is being undertaken at the national, State and Departmental levels and includes an analysis and development of policy frameworks, researching the effects of climate change and involvement in reporting processes.

One of the key initiatives that the Forest Products Commission and the Department are involved in at the national level include the National Climate Change Action Plan for Forestry which is being developed under the National Climate Change Adaptation Framework endorsed by the Council of Australian Governments. The objective of the Climate Change Action Plan for Forestry is to identify the key impacts, vulnerabilities and research priorities for production forests, develop strategies in collaboration with industry and support research to address major knowledge gaps. The Action Plan will assist industry to remain sustainable and identify threats and opportunities associated with market responses to climate change. Major issues for the forest industry and climate change continue to revolve around how the forest industry can contribute to mitigation (sequestration, bioenergy) and its treatment in relevant national and State policies and, adaptation of forests and forest industries to climate change (for example, yield, water, fire and markets). The Forest Products Commission chairs the Forests and Climate Change Committee which is progressing the Action Plan.

The Department is a member of the Natural Resource Management Standing Committee group, Climate in Agriculture and Natural Resource Management. This group is developing a series of climate change priorities for biodiversity, marine and primary industries, including forests.

The Department is a full member of the Indian Ocean Climate Initiative (IOCI) and a member of the IOCI Panel Executive. As a member of the IOCI Panel, the Department is working to generate better climate change information and scenarios for forest and other ecosystems, and land management planning.

In the mid-1990s the former Department of Conservation and Land Management recognised that carbon investment had the potential to underpin the expansion of farm forestry in WA and also meet regional development and land conservation goals. These concepts were included in a range of policies and plans including the Action Plan for Tree Farming (2002), WA Greenhouse Strategy (2004), Farm and Plantation Forestry Strategy (2007) and the Premier's Climate Change Action Statement (2007).

Potential impacts of the projected changes to climate on Western Australia's forest ecosystems will be investigated as part of the Department of Environment and Conservation – South African National Biodiversity Institute collaborative bioclimatic research project. The results of this research will be incorporated into forest management planning and monitoring will be undertaken to determine in situ changes to forest ecosystems.

The Department's Science Division has committed to a number of short, medium and long term programs which will assist with the understanding of the impacts of climate change and the development of management response options. This work includes developing an understanding of climate change impacts on potentially 'at risk' species, communities and ecosystems as a basis for developing management response options including adequacy of conservation reserve design. Research will focus on information generated by surveys and Forestcheck. The Science Division program also includes developing an understanding of the influence of climate change on fire regimes and ecosystem response in south west ecosystems as a basis for developing management response.

The Department commissioned a consultants report on Best Practice in Incorporating Climate Change into Forest Management Planning which addressed:

- the extent to which mitigation and adaptation to climate change is being incorporated into strategic and operational forest management planning in Australia and internationally;
- approaches used to incorporate mitigation and adaptation responses into forest management planning;
- strengths and weaknesses of the different approaches; and
- best practice in the Australian context.

The report from the consultant concluded that:

In terms of best practice, at present, adaptation responses are focusing on short to medium term timeframes, aimed at strengthening the resilience of forests and maximising diversity. Increased focus on fire suppression and pest resistance is common. In light of the uncertainties of future climate, maintaining flexibility in the forest is key. Considering that no one person or organisation can be expected to have 'the answer', maintaining management diversity (as well as ecological diversity) will help to spread risk, and give a greater chance of finding successful solutions. A key theme has been looking at ways to enhance the resilience of forests to adapt to climate change. Carbon modelling is becoming common as forest managers begin to better understand their baseline carbon state.

A number of systems and models currently used for land management incorporate climate change predictions into the management planning processes. Some systems have an inbuilt capacity to review ecological information as it becomes available, feed the information back into the planning process and adapt to changes; for example sustained yield modelling and prescribed burning planning. For sustained yield, the models and yield predictions have a standard review period of ten years which allows new information and settings relevant to current environmental conditions to be incorporated into sustained yield figures for successive forest management plans. This means that sustained yield figures will be revised for the next 2014 – 2023 forest management plan.

In regards to the production of a sustained timber yield, a number of adaptive settings were incorporated into the current FMP. The overall approach has involved:

- incorporation of provisions for reduced tree growth in the calculation of the sustained yield for the FMP;
- continuation of a periodic inventory system to monitor growth, forest health and vigour; and
- establishment of further research to improve predictive modelling of stand development and change.

Calculations for the period of the current FMP have assumed no future sawlog growth above the 1990 inventory for the mixed/mature components of the jarrah and karri forests. Projected sustained yields assumed a future reduction in the quantity of

regeneration in the drier eastern forests and hence reduced future timber yields. As climate change continues these drier forests, and other less resilient parts of the forests, may well struggle to adapt to reduced rainfall and increased temperatures.

In the karri forest, sawlog availability in future decades is projected to increase substantially to more than double the current sustained yield as large areas of regrowth forest mature. These projections are based on tree and plot measurements that include the recent drier period. Should the program of forest monitoring detect major departure from assumptions, then adjustments for future yield changes can be incorporated into the next revision of the sustained yield.

Re-measurement of forest inventory plots is continuing to monitor the change in timber volume and the growth of trees. Initial analysis of the data collected to date, although based on a limited number of plots, has not detected any short-term anomalies in growth rates. This work is ongoing.

The Department is also undertaking work to better quantify the rate of spread and potential impacts of dieback, the influence of fire frequency on tree growth rate and work to improve predictive modelling of growth responses. In all these areas, measurement of any specific impacts that climate change may be having on the native forests is a challenge because of the relatively slow background growth rates and the interaction between factors that contribute to forest growth. The uncertainty regarding how forests respond to climate change emphasises the need to adhere to the precautionary principle when addressing current and future management strategies.

Key performance indicators

No key performance indicators have been selected for this criterion.

Issues to be addressed from 2009

On the basis of the above, the mid-term audit process identified the following issues to be addressed from 2009:

The considerable activity that the Department and the Forest Products Commission are undertaking in relation to the possible impacts of climate change needs to continue, with a focus during the period from 2009 to 2014 on acquiring information to address key knowledge gaps about identification of vulnerabilities associated with climate change, and mitigation and adaptation options. This will be done with a view to the next FMP being in a position to more comprehensively address the key issues associated with climate change and the south west forest region. This work needs to be cognisant of improved capacity to model carbon balance of forests at a regional level, and the improved predictions of likely future climate change.

In April 2008 the Sustainable Forest Management Division prepared a draft discussion paper regarding the impacts of climate change in the forests of south west Western Australia entitled Incorporating the Effects of Climate Change into Forest Management Planning in the Swan, South West and Warren Regions of DEC. In August 2008 the Department's Sustainable Forest Management Division hosted a climate change workshop to discuss and collate ideas from Departmental staff and other stakeholders. The information collected will be used to update and complete the April 2008 discussion paper prior to publication during 2009.

Conservation Commission advice

With respect to the above issues identified for Global carbon cycles, the Conservation Commission provides the following advice, all of which are of particular concern:

Action 23.1.3 identifies the need to incorporate climate change predictions into management planning. This action is identified as ongoing through the life of the present FMP leading to the preparation of the next plan commencing around 2011-2012.

In preparing this mid-term audit of performance of the FMP the Conservation Commission has considered the consequences for forest management of climate change at length. The Conservation Commission acknowledges that the present FMP has already incorporated climate change in two broad ways:

- the Department's calculation of sustained yield for the present plan took climate change into account by assuming no further growth on standing crop trees, and by incorporating the effects of declining rainfall up to the then present time when determining future growth. These measures were accepted by the Conservation Commission at the time; and
- other measures in the FMP, while not explicitly included as responses to climate change, are nevertheless consistent with accepted adaptation strategies; for example seeking to ensure connectivity of habitat (the network of formal and informal reserves and fauna habitat zones). However, other adaptation strategies such as ensuring sufficient diversity and flexibility in management, and enhancing the attention paid to mitigating other threats to ecosystem health and vitality, were less clearly captured through the actions proposed in the FMP.

In considering the adequacy of these measures the Conservation Commission has been mindful of the significant changes that have occurred in climate change science and policy since 2004. These changes include both changes to the predictions of future climate patterns in terms of higher temperatures, declining rainfall and changes to the severity and seasonality of weather events as well as changes to community understanding and expectations of how we need to respond to the challenges ahead.

The Conservation Commission recognises that, while its conclusions with respect to these matters should be based on reliable data and sufficient evidence, other considerations also apply. In particular, climate change responses by their very nature need to address predicted effects as much as, or more than, past events and should be based upon the principles of ecologically sustainable forest management, especially the precautionary principle.

The Conservation Commission's thinking about these matters has addressed two aspects of the climate change challenge: what work needs to be commenced now to better inform decisions leading into the next FMP and what changes to management practices are required between now and 2014 when the next plan commences.

The Conservation Commission is concerned to ensure that adequate resources are devoted to this work, and that it is undertaken in a timely manner, so that the next FMP can be prepared on the basis of a firm footing in terms of climate change and forest management.

With respect to Objective 22, the Conservation Commission is aware of significant work being undertaken across the country in terms of carbon balances in native forests and encourages the Department to develop similar work programs to inform the preparation of the next plan.

With respect to Objective 23, the Conservation Commission supports the work being undertaken by the Department and the Forest Products Commission as described

above, but has concluded that a more strategic review of forest management under a changing climate is required. This review should be at a whole-of-government level and provide for wide public consultation.

To this end the Conservation Commission will seek support from Government, relevant agencies and stakeholders for a wide-ranging and public discussion of forest management under a changing climate. The Conservation Commission recommends that the first step should be the preparation, by the Conservation Commission, of a paper to identify and scope the issues that need to be canvassed. An indication of the Conservation Commission's current thinking is that the following matters need to be included:

- the adequacy of the conservation reserve system and its management under a changing climate;
- the adequacy of the formal and informal reserve and fauna habitat zone system in establishing a sufficiently connected landscape scale network. This work will need to acknowledge the matrix of forest within which the network is located, while also identifying any emerging issues; for example, whether sufficient protection is afforded to aquatic values under a drying climate by the present FMP and associated measures and whether the system of fauna habitat zones should be adjusted, in terms of an increase in their minimum size and improved location, in response to climate change impacts on fauna populations;
- the range of values and uses that the forest can support under a changed climate; for example, whether timber harvesting can continue under the present Silviculture Guidelines across the entire State forest estate outside of the informal reserves and fauna habitat zones, or whether some areas of forest will no longer be able to support timber harvesting either generally or in terms of some silvicultural treatments (for example, it may be that only thinning operations will be sustainable in some situations). One particular focus here should be on the eastern jarrah forest where the Conservation Commission has previously been concerned as to the adequacy of regeneration of future crop trees and where ecosystem restoration post-harvesting may become increasingly difficult. This analysis should be informed by an understanding of the recent past and future shifts in critical isohyets;
- the quantity and quality of water for human and ecosystem use that can be provided by forest environments under a drying climate (see also the Soil and water chapter). Competition for water between the terrestrial and aquatic components of the ecosystem, compounded by demands for human use, requires a whole-of-government resolution. Access for recreation has become an issue of public concern in recent times, and could be considered in this process;
- the need to review the management of weeds, pests and disease so as to reduce the threats that the forest is subject to, as an adaptation strategy to build ecosystem resilience; and
- the need to review the impact of fire, both planned and unplanned, on forest and community values, and to consider whether current practice will remain appropriate as the climate dries and temperatures increase.

These matters reflect the Conservation Commission's concern that the health and vitality of our forest ecosystems may be at considerable risk from the cumulative threats of weed and pest incursions, the continuing and inevitable spread of dieback, disturbances caused by prescribed fire, wildfire and timber harvesting combined with the impacts of climate change.

The Conservation Commission acknowledges that this approach will involve a significant amount of work and require commensurate resources to be provided. The

FMP provides for an independent expert review of silvicultural practices and their impacts on biodiversity during the second half of the life of the plan, and therefore there is already a commitment to undertake some of the work proposed.

The Conservation Commission recommends that this independent expert review be enlarged into an independent task force charged with the responsibility of undertaking the work proposed here.

It is through an approach such as this that the key policy settings for the next FMP can be identified in advance, and through an explicit and public process, thereby guiding the development of the next plan. To not follow a process along the lines of the one outlined here risks a situation in which the next FMP will, by default, be based upon an incomplete understanding of how the public would like to see their forests managed and protected over the following decade.

To achieve this end the following timeline is proposed:

- the Conservation Commission to publish its discussion paper by 31 July 2009;
- any action required to be undertaken prior to the adoption of the next FMP to be identified by the 31 December 2009 and considered by Government for immediate implementation (see below);
- the final report to be completed by 31 December 2010 to inform the development of the next FMP from 2011.

The Conservation Commission has also considered the need to change forest management practices in advance of the adoption of the next FMP. The Conservation Commission is aware that some sections of the community are of the view that action should be taken immediately rather than in five years time. The Conservation Commission has considerable sympathy with this view and believes that, should the long-term strategy recommended here identify issues requiring an immediate response to avoid future opportunities being lost, then these measures should be implemented from the end of 2009, through amendment to the FMP, its associated guidelines, or in other ways.

The Conservation Commission also advises that, in light of the precautionary principle, it has requested that the Department give greater weight to climate change whenever it makes management decisions from the beginning of 2009. For example, the choice of fauna habitat zone selection should immediately take into account climate change. Likewise, climate change considerations should influence the priority setting for the implementation of recovery plans for threatened species. Future timber harvesting operations should be preferentially scheduled in the more resilient portions of State forest as far as is practicable. This last option would lead to the most significant immediate result. The identification of the more resilient portions of State forest is an expert judgement but is likely to exclude regions where different forest ecosystems are at the limit of their range; for example, the eastern edge of the jarrah forest and the interzone between jarrah and karri forest. Areas of critical importance for the maintenance of wetlands should also be considered for exclusion.

This request is consistent with Action 23.1.3 of the FMP.

8. Natural and cultural heritage

Overall aim

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

Objective 24. Aboriginal heritage

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:

Progress with implementation of actions proposed

Action	Status of implementation
24.1 The Department will:	Implemented in part and ongoing
 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 (in year 1 & end of year 1); 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 (in year 1 & end of year 2); and 24.1.3 facilitate cross-cultural awareness and interpretive activities to inform and educate the wider community regarding Aboriginal culture (on plan commencement & ongoing). 	A formal Nyoongar consultative working group has not been established. However the Department has been liaising directly with local Indigenous representatives on issues relating to Aboriginal cultural heritage in the plan area. The Department has a formal Memorandum of Understanding with the South West Aboriginal Land and Sea Council (SWALSC), the native title representative body for the plan area. This memorandum was signed and endorsed in 2002 for the purpose of seeking to work with Aboriginal people to identify, interpret, protect and manage significant cultural sites. Through SWALSC and the various native title claimant working parties, the Department has been able to identify traditional owners and custodians with authority and knowledge relating to Aboriginal cultural heritage.
	The Department has established an Aboriginal Heritage Unit to provide a central point for advice and guidance for staff in relation to Aboriginal involvement in the management of Department-managed land. The unit focuses particularly on education, training and liaison. During the period of the plan the unit has provided quality educational products to schools, TAFE and universities and the broader community. The unit also provides professional development for the Department through a cultural learning program aimed at ensuring better working relationships with Aboriginal communities. Refer to the report on KPI 24 later in this chapter and
	to Appendix A for further details.

Compliance monitoring

Aboriginal cultural heritage is considered in the planning phase of harvest operations through the pre-harvest checklists. There have been no reported incidents relating to disturbance of cultural heritage sites. Refer to KPI 23 later in this chapter and to Appendix A.

Implementation issues

The approach to consultation with Nyoongar representatives has developed in a slightly different way to that envisaged at the time when the FMP was prepared. However, the approach adopted is considered to address the objective and the intent of the action.

Objective 25. Natural and other cultural heritage

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:

Action	Status of implementation
25.1 The Department will:	Implemented and ongoing.
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. (on plan commencement & ongoing).	Non-Indigenous cultural heritage sites, including moveable heritage items, are recorded in the Department's Recreation and Tourism Information System and are accessible to Departmental staff. As at 31 December 2007, there were approximately 880 non-Indigenous cultural heritage sites from the Swan, South West and Warren Regions recorded in the database.
	The Department continues to cooperate with the Heritage Council and other external agencies with responsibilities relating to cultural heritage.
	and to Appendix A for further details.
25.2 The Department and the Forest Products	Implemented in part and ongoing.
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 (on plan commencement & ongoing).	Guidelines for the Management of Cultural Heritage on Lands and Waters Managed by the Department were drafted and submitted to the Conservation Commission in August 2003. These guidelines are intended to apply to all of the Department-managed land including the area covered by the FMP. The Conservation Commission raised a number of matters with regard to the guidelines including requesting the Department to consider broadening them to include management of Indigenous cultural heritage.
	Further development of the guidelines has not progressed due to the focussing of resources into other areas. In 2003 the Department released a consultation paper Indigenous Ownership and Joint Management of Conservation Lands in Western Australia, outlining the changes that would be needed to the CALM Act enabling joint management of reserves with Traditional Owners. Implementing joint management will require amendments to the CALM Act. The Department has developed a draft policy with the objective of acknowledging Traditional Owners and conducting <i>Welcome to Country</i> ceremonies at appropriate events and meetings.
	Activities Environmental Assessment that requires Departmental staff, or project proponents working on land managed by the Department, to undertake a desktop check and to consult relevant databases before undertaking any disturbance activity. Field surveys may also be undertaken.
	Where items of potential cultural significance are identified in the field, the proponent of the works is

	required to advise the relevant Departmental District of
	the location of the item and to provide other
	information that may assist in determining whether the
	item has or should be listed and subsequently
	protected from disturbance activity.
25.3 (Plantations): The Forest Products	Implemented and ongoing.
Commission will:	
25.3.1 undertake its operations in a manner that is in	The Forest Products Commission Pre Harvesting
accordance with guidelines in the Code of Practice for	Checklist for plantations takes cultural values into
Timber Plantations and the relevant plantation manual	account. The checklist and actions within it must be
for the identification of significant heritage sites, which	completed prior to commencement of each harvesting
are to be revised in consultation with the Department (on	operation. The Forest Products Commission currently
plan commencement & ongoing); and	uses the same cultural heritage databases as the
25.3.2 share information relating to identified heritage	Department for checking the presence of cultural
sites with the Department (on plan commencement &	heritage, with additional checks conducted using
ongoing).	recognised Indigenous and non-Indigenous heritage
- 3- 3/	experts

Compliance monitoring

No incidents relating to heritage sites were recorded in the Plantations EMS from 2004 to 2007.

Implementation issues

Indigenous Heritage Management Guidelines and Non-Indigenous Heritage Management Guidelines have yet to be finalised by the Department.

Key performance indicators

KPI 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.

The number of heritage sites identified during planning for native forest timber harvesting operations in the Swan, South West and Warren regions is shown in Table 16. This information was collated from Pre-operations and Pre-harvest checklists prepared by the Forest Products Commission for approval by the Department and therefore information presented relates only to disturbance activities conducted by the Forest Products Commission. Nine indigenous sites and three non-indigenous sites were identified during planning for timber harvesting operations during 2007, none of which were disturbed.

Summary statistics for disturbance operations managed by the Department or proponents other than the Forest Products Commission are not currently available, nor are the statistics for road construction and maintenance, fire management, recreation and other forest management activities within the FMP area.

Table 16. Disturbance of heritage sites on Department of Environment andConservation managed lands for 2007.

	Indigenous sites identified in planning for disturbance operations	Non- indigenous cultural heritage sites identified in planning for disturbance operations	Heritage sites that were not disturbed	Heritage sites disturbed with formal approval	Heritage sites disturbed without formal approval
Disturbance operations managed by FPC	9	3	12	0	0

KPI 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.

The Department has not established a formal Nyoongar working group. The Department has investigated the reasons for the proposed Nyoongar working group not being established and the following represents the response to the target shortfall.

The reason for not establishing the Nyoongar working group is that the Department has adopted an alternative approach of liaising directly with local Indigenous representatives on issues relating to Aboriginal cultural heritage in the plan area. This approach is considered to address the objective and the intent of the action.

The Department has a formal Memorandum of Understanding with the South West Aboriginal Land and Sea Council (SWALSC), the native title representative body for the plan area, for the purpose of seeking to work with Aboriginal people to identify, interpret, protect and manage significant cultural sites. The various native title claimant groups have established Working Parties (supported by SWALSC) to negotiate and facilitate interests in the claim area. The Department has an established relationship with the Working Parties. Through the above mechanisms the Department has been able to identify traditional owners and custodians with authority and knowledge relating to Aboriginal cultural heritage.

The Department and the Forest Products Commission notify SWALSC for all disturbance activities that have the potential to impact on Aboriginal values and actions are often formally presented to SWALSC. The notification and protection process often includes; field visits and site inspections with traditional owners and custodians with authority and knowledge relating to Aboriginal cultural heritage, Indigenous representatives on site during earthworks and incorporation of cultural heritage messages and themes in onsite information. In liaising with local Aboriginal groups and custodians the Department ensures that sensitive information is protected from unnecessary disclosure.

In circumstances that necessitate a registered indigenous site to be disturbed, appropriate Ministerial consent is required. The proponent of the disturbance activity must apply to the State Aboriginal Cultural Heritage Materials Committee for approval to undertake the activity in the vicinity of the registered site.

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.

KPI 25 – The protection of heritage places through representation in reserves

Since 2004 the number of heritage places represented in formal and informal reserves has increased from 60% of target to 95% of target in 2008 as a result of implementation of land category changes (Table 17). The large increase in the number of Aboriginal sites in informal reserves between 2006 and 2008 reflects improved information being added to the database, rather than the discovery of new sites.

Reserve	Heritage	FMP	Dec 04	Dec 06	Dec 08
type	list	proposed			
Informal	Heritage Council	n/a	7	10	11
morma	Aboriginal sites	n/a	286	282	338
	Heritage Council	23	13	19	22
Formal	Aboriginal sites	313	189	262	296
	Total	336	202	281	318
	% of Target		60	84	95

Table 17. The representation of heritage places in the conservation reserve system.

Issues to be addressed from 2009

On the basis of the above, the mid-term audit process identified the following issue to be addressed from 2009:

The Department will report to the Minister for the Environment with respect to the alternative arrangements established for consultation and involvement of Aboriginal people in forest management.

Conservation Commission advice

With respect to the above issues identified for Natural and cultural heritage, the Conservation Commission provides the following advice:

With respect to Objective 24 Aboriginal heritage and KPI 24, the Conservation Commission recognises that the approach to consultation with Nyoongar representatives has developed in a slightly different way to that envisaged at the time when the FMP was prepared, accepts that the approach adopted addresses the objective and the intent of the action and supports the continued consultation with Nyoongar representatives.

With respect to KPI 23 - Identification and protection of cultural heritage, the Conservation Commission is of the view that the lack of information provided for this KPI does not allow for an adequate assessment of whether the performance target has been met. The Conservation Commission requests that the Department collate statistics on the number of existing and new heritage sites identified in planning and the number protected for the next KPI report. The Conservation Commission will ask the Department to review the protocol for this KPI if data availability continues to be a concern.

9. Socio-economic benefits

Overall aim

The overall aim of the plan is to seek to sustain and enhance socioeconomic benefits obtained from the forest to meet community needs.

Objective 26. Recreation and tourism

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:

Action	Status of implementation
26.1 The Department will:	Implemented and ongoing.
 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 (in year 2 & end of year 5); 26.1.2 issue and administer licences, leases and permits for commercial tourism uses in accordance with the provisions of the CALM Act (on plan commencement & ongoing); 26.1.3 issue permits and take other action to enable organised non-commercial recreation and educational groups to undertake appropriate activities (on plan commencement & ongoing); 26.1.4 undertake research in relation to the knowledge, attitudes, skills and activities of visitors to land to which the plan applies (by year 5 & ongoing); and 26.1.5 where appropriate, provide designated areas where camping may take place or where dogs and horses may be taken (on plan commencement & ongoing). 	Warren Region has completed a Regional Recreation Framework plan based on Recreation Opportunity Spectrum planning, and has now moved on to preparing detailed precinct plans. These have been completed for about half of the region. Swan Region has developed a structure for the two District Recreation Framework plans and also developed a process that will provide an analysis of data, which is required to best place recreation facilities for future needs. Preparation of a framework plan for South West Region has not yet commenced. On 1 July 2007, the Department appointed a Recreation Activities Coordinator to provide enhanced capacity for dealing with growth in recreation activities such as mountain biking, off-road vehicles and trail bike use. This position provides opportunity for greater planning and coordination of these activities.
	In 2007, development of a State Trail Bike Strategy was jointly sponsored by the Department and the Departments of Sport and Recreation, and Planning and Infrastructure. The strategy has been released for public comment and has resulted in recommendations for coordination across Government. Following assessment of public comment the strategy and associated recommendations will be provided to Government for consideration. Mountain Biking Management Guidelines were developed by the Department in 2006/07 to assist with planning and management of this activity.
	The Department continues to issue and administer leases, licences, and permits for commercial tourism uses. As at 30 June 2007, there were 20 leases for recreation/tourism with four new leases issued that year. There were 145 commercial operations licences in place with 118 issued or renewed during the 2006/2007 financial year.
	The Department continues to issue permits to enable organised non-commercial recreation and educational groups to undertake appropriate activities. Demand for the recreational activities on lands managed by the Department increased steadily from 2004 to 2007. This trend is particularly evident in the Perth Hills District where the number of non-commercial permits increased from 64 to 173 over the reporting period. Popular activities include sporting competitions, school expeditions and weddings.

The Department continues to undertake research in relation to the knowledge, attitudes, skills and activities of visitors. The Department's visitor survey program collects information on visitor satisfaction, use/activities, characteristics and demographics of the visitor, visitor needs and levels and patterns of use. The survey program enhances the rigour of measuring the overall level of visitor satisfaction to recreation areas managed by the Department and provides a benchmark Visitor Satisfaction Index and the collection of other information useful for planning and management. Regions and Districts are responsible for distributing surveys in parks where recreation occurs and survey results are analysed and reported on by the Social Research Unit.
Parks and Visitor Services Division sought nominations from Swan, South West and Warren Regions for areas which will be designated for access for horses and dogs. Regions will also be asked to consider areas of State forest where dogs will not be allowed (e.g. where there are high fauna values) and any national parks where dogs will be allowed. Designation of areas for dog and horse access is needed to allow the CALM Regulations 2002 to be applied for unauthorised dog and horse riding access.
The designation of camping areas is currently considered to be a low priority option as the signposting of Departmental camping areas is sufficient to allow the CALM Act Regulations 2002 to be applied for camping.
Refer to report on KPI 26 later in this chapter and to Appendix A for further details.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

There is a need to address increasing pressures associated with recreational use of lands managed by the Department within the FMP area, particularly in relation to pursuits such as mountain bike riding, car rallies, motorcycling and 4WD use. All Regions have concerns with regard to public safety and the environmental impacts of these activities. There are several working groups developing approaches to address these issues.

Objective 27. Visual landscape

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

Action	Status of implementation
27.1 The Department and the Forest Products	Implemented in part and ongoing.
Commission will:	
27.1.1 maintain a visual landscape classification and	Since 2004 the Department has updated the visual
management system (on plan commencement &	landscape management GIS datasets available for use
ongoing);	by planning and management staff. Timber harvesting
27.1.2 review guidelines for the application of visual	operations are managed on an ongoing basis through
landscape management principles in land-use planning,	the Silviculture Guidelines and the checklist approvals
codes of practice, operational guidelines and other	process undertaken prior to harvesting.
relevant manuals (by year 5 & end of year 5); and	
27.1.3 make submissions in relation to development	Forest Products Commission implements the visual
proposals that may impact on visual landscapes on land	landscape management systems specified in the
to which the plan applies that are forwarded to them for	Departmental guidelines including Sustainable Forest

comment or advice, with a view to seeking to reduce the effect of any proposed development on the visual quality of the landscape (as required).	Management Guideline No.1 Silvicultural Practice in the Jarrah Forest (2004). Visual landscape management is an item for consideration in the Pre Operations checklist and harvesting operations must give relevant consideration.
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 (on plan commencement & ongoing).	Implemented in part and ongoing. The Forest Products Commission has considered the impact of plantation operations on the visual quality of the landscape and where reasonable and practicable, conducted those operations in a manner that seeks to reduce their impact on the visual quality of the landscape. The Department's Recreational and Landscape Unit provided advice to the Forest Products Commission in relation to proposed plantation harvesting operations within the Murray Valley. Factors
	considered in modification of harvesting operations included visual landscape management zones, operational sequencing, management of remnant native vegetation and public communication planning.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

There are no significant issues affecting implementation of these actions.

Objective 28. Minerals and petroleum

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:

Progress with implementation of actions proposed

Action	Status of implementation
28.1 The Department and the Conservation Commission will:	Implemented and ongoing.
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	This action is addressed on a case by case basis according to the Department's policy framework. The Department and the Conservation Commission continue to provide advice to the EPA, the Department of Industry and Resources and industry on all proposals that impact on land to which the FMP applies. Advice is focused on achieving impact avoidance, reduction or mitigation in that order. Refer also to the response to action 10.1.
operations are complete; and 28.1.3 seek to recover the cost of providing that advice and assistance (as required).	The Department and the Conservation Commission continue to provide advice to the EPA, the Department of Industry and Resources and industry on operations that impact land to which the FMP applies with a view to achieving sustainable vegetation systems in accordance with the Department's Policy 10 Rehabilitation of Disturbed Land. The Department continues to seek cost recovery where appropriate, and to ensure that liability to the State is minimised once operations have ceased.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

The Department has taken back from Alcoa management responsibility for some areas in the Wungong catchment that have been rehabilitated following bauxite

mining. This was done at the request of the Water Corporation to allow these areas to be silviculturally treated as part of the Wungong catchment trial. Areas include bauxite pits rehabilitated with exotic overstorey species before 1988 and with native overstorey species after 1988. There are a number of ongoing management issues associated with mainly pre-1988 rehabilitated bauxite pits, including inadequate topsoil and drainage, and threats from potentially invasive exotic species such as *Eucalyptus resinifera*. If such aspects are not adequately addressed by the Water Corporation additional funding will be required to address these risks and effectively integrate rehabilitated bauxite pits back into the forest landscape.

Objective 29. Basic raw materials

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:

Action	Status of implementation
29.1 The Department will extract and use gravel and	Implemented and ongoing.
other BRM required for the management of land to which	
the plan applies (on plan commencement & ongoing).	This action is addressed on an ongoing basis. Also
	refer to response for Action 29.4.
	Refer to report on KPI 27 later in this chapter and to
	Appendix A for further details.
29.2 The Conservation Commission will review its policy	Implemented and ongoing.
on BRM extraction as a matter of priority.	
	The Conservation Commission reviewed and
	published its policy on BRM extraction during 2006.
	The policy is available on the Conservation
	Commission website (www.conservation.wa.gov.au).
29.3 The Department will make submissions in relation	Implemented and ongoing.
to proposals to extract basic raw materials on land to	
which the plan applies that are forwarded to it for	All Mining Act 1978 leases and notice of entry
comment or advice, with a view to seeking (as required):	agreements under the Local Government Act 1995
29.3.1 to have the cost of rehabilitation of areas from	continue to require the proponent to bear rehabilitation
which BRIM are extracted borne by the organisation	costs. The Department continues to seek the
responsible for the extraction of those materials; and	application of performance bonds for exploration,
29.3.2 the lodgement of a renabilitation performance	except where fisks are very low, and mining operations
bonu.	Acte
29.4 The Department and the Forest Products	Implemented and ongoing
Commission will maintain a database of areas from	implemented and ongoing.
which BRM have been extracted and will progressively	The Department continues to record new BRM
develop plans and works programs for the rehabilitation	extraction sites for roading associated with the timber
of these areas (in year 2 & end of year 10).	industry in the SII REC database.
	The Department is developing a process to transfer
	part of the Forest Products Commission roading
	contracts involving the winning of BRM from State
	forest to the Department. This action was required in
	order to allow activities to proceed within the existing
	institutional framework. A review and update of
	procedures for the Management and Rehabilitation of
	Basic Raw Material Pits has been completed.
	Pohabilitation work continued on loggery group hits
	when recourses were evolution. Befor to the response
	to Action 15.3
	The Forest Products Commission has assembled data
	for each Region detailing areas from which basic raw
	materials have been extracted (gravel pits) Details
	have been assembled for all gravel pits established
	since the inception of the Forest Products Commission
	in November 2000. Pits are rehabilitated by a
	combination of ripping, seeding and/or re-planting.
Some pits created recently to service harvesting	

coupes have yet to be captured in the database as	
they do not become available for rehabilitation until	
completion of roading and harvesting in adjacent	
coupes.	

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

There is a significant backlog with the Forest Products Commission's rehabilitation of exhausted gravel pits, with many pits remaining open and not rehabilitated. The Department is of the view that, in some areas, rehabilitation works undertaken by the Forest Products Commission have not been to an acceptable standard.

Access to basic raw materials by the Forest Products Commission has not been facilitated by the current institutional framework. As identified above in Action 29.4, the Department is developing a process to transfer part of the Forest Products Commission roading contracts involving the winning of BRM from State forest to the Department. Also see Issues to be addressed from 2009 at the end of this chapter.

Objective 30. Leases

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

Progress with implementation of actions proposed

Action	Status of implementation
30.1 The Department will issue and administer leases for facilities and uses in accordance with the provisions of	Implemented and ongoing.
the CALM Act (on plan commencement & ongoing).	The Department continues to issue and administer leases for facilities in accordance with provisions of the CALM Act.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

There are no significant issues affecting implementation of this action.

Objective 31. Bioprospecting

The plan proposes the following Actions 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:

Progress with implementation of actions proposed

Action	Status of implementation
31.1 The Department will implement the current contract (on plan commencement & ongoing).	Implemented and ongoing.
	The Department has developed a bioprospecting contract to facilitate negotiations with commercial and other research interests in a manner that enables sustainable access to the State's biological materials for bioprospecting purposes at least management cost to all parties.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

There are no significant issues affecting implementation of this action.

Key performance indicators

KPI 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.

National parks are the main focus for recreation within the FMP area but State forest also offers opportunities and facilities for recreation, particularly overnight camping (Table 18). Day use recreation sites associated with information, interpretation and bushwalking opportunities are the most common type provided. Day use sites are also provided in conservation parks. Associated facilities including information displays and toilets, are currently better provided for in national parks and State forest than in conservation parks.

Table 18. Type and number of recreation and tourism facilities by proposed land category for the areas of the FMP.

	Number of recreation facilities							
Land Category	Accommodation	Camping	Day use	BBQ	Info	Toilets	Bush walk	4WD
National Park	3	37	121	61	38	138	89	41
Nature Reserve	0	0	4	0	1	8	0	0
Conservation Park	1	6	52	7	2	18	35	1
State forest, Timber Reserve	10	39	70	41	26	91	60	17
CALM Act section 5(1)(g)	0	12	10	9	5	42	13	5
Total	14	94	257	118	72	297	197	64

Figure 10 indicates a general increase in visitation over the four-year period for recreation sites in the FMP area, with annual visits to national parks increased by half a million. Visitation levels to State forest decreased over the period 2004-2007. This trend can be attributed to several factors including; the increase in the number of

sampling sites in other land tenures, conversion of areas of State forest to national park and more accurate estimates of visitation from improved technology.

The visitor satisfaction index for selected recreation sites in the FMP area has increased over the reporting period (Figure 11).



Figure 10. Number of visits to selected recreation areas by proposed land category for the area of the FMP from 2004 to 2007.



Figure 11. The level of visitor satisfaction recorded for recreation sites within the FMP area from 2004-2007.

KPI 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.

The extraction of basic raw materials is recorded by the Notice of Entry system. No basic raw materials were extracted from existing or proposed conservation reserves. Since commencement of the FMP approximately 60,000 m³ of material have been extracted from State forest and timber reserves, predominantly comprised of gravel (Table 19). Lesser amounts of sand and small amounts of shale have been extracted in the Warren Region. There are no clear trends in extraction of basic raw materials over the period 2004-2007.

Notices of Entry generally occur in response to roading projects and are only recorded in the year of pit establishment. Once a pit is established and operating, the volume of ongoing removals is not tracked by this process. This is likely to be the reason that no data are available for the Swan Region, where a number of large regional pits already exist. Notices of Entry only reflect a portion of basic raw material extraction and do not include extraction by the Main Roads Department, Forest Products Commission or the Department.

Table 19. Notices of Entry served to the Department within the FMP area between 2004-2007.

Voor	Material	Notices of Intended Entry		Quantity
rear	Material	Warren	South West	(m ³)
2004	Shale	0	0	0
	Sand	1		1,500
	Gravel	1	1	21,500
2005	Shale	1		100
	Sand	1		1,500
	Gravel		2	1,700
2006	Shale	1		180
	Sand	1		1,500
	Gravel	1	3	50
2007	Shale	1		180
	Sand	2		7,899
	Gravel	1	1	24,000

Issues to be addressed from 2009

On the basis of the above, the mid-term audit process identified the following issues to be addressed from 2009.

The Department and Forest Products Commission should develop a process to provide access to basic raw materials for the Forest Products Commission roading requirements associated with timber harvesting in State forest, which is within the current institutional framework. The process should ensure that there is adequate planning for access to the anticipated amount of gravel required over time on a regional basis, conditional approval for access is obtained from the Department prior to operations commencing, and that pit management and rehabilitation is undertaken to standards approved by the Department.

Conservation Commission advice

With respect to the above issues identified for Socio-economic benefits, the Conservation Commission provides the following advice.

With respect to Objective 26 – Recreation and tourism, the Conservation Commission acknowledges the increasing pressures associated with recreational pursuits such as mountain bike riding, car rallies, motorcycling and 4WD use on land within the FMP area. The Conservation Commission is of the view that a policy is required to ensure that adventure activities and events occur in the most appropriate location. The most intensive of these activities for example, that do not need to be held in sensitive conservation areas, may be located in State forest instead.

The Conservation Commission will work with the Department to develop a policy for adventure activities and events on land vested in the Conservation Commission.

With respect to KPI 27 – Basic raw material supply, the Conservation Commission will discuss with the Department the opportunity to develop a system that captures basic raw material extraction by the Main Roads Department, Forest Products Commission and the Department.

10. Plan implementation

Overall aim

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.

Objective 32. Monitoring and audit

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:

Progress with implementation of actions proposed

Action	Status of implementation
32.1 The Department and the Forest Products	Implemented and oppoing
Commission in consultation with the Conservation	implemented and ongoing.
Commission. will:	The Department has an annual audit program that
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 (on plan commencement & ongoing).	includes management of native forest harvesting, environmental protection, plantation protection and management of <i>Phytophthora</i> dieback hygiene. In the early years of implementation of the FMP the audit program was developed in consultation with Forest Products Commission and the Conservation Commission, however this was not considered necessary in later years. The Department has provided copies of audit reports to the Conservation Commission. Findings and recommendations are provided to the relevant sections of the Department and Forest Products Commission to facilitate follow-up
	corrective action and progressive improvement.
	During 2004 the Department and the Forest Products Commission in consultation with the Conservation Commission developed an audit program. The Forest Products Commission agreed to audit the performance of its EMS system and compliance with requirements for contractors in coupe management, including disease hygiene and soil conservation. In 2005 the audit program was again jointly reviewed and agreed between the agencies. In addition, it was agreed that reviews of the audit program did not need to be annual but could move to a longer time interval.
	The Forest Products Commission has undertaken audits in alignment with the programs previously agreed with the Department and the Conservation Commission. Scrutiny for these internal audits is based upon the EMS compliance framework dealing with operational controls such as coupe management, disease hygiene, and soil conservation. Branch EMS have been subject to internal and external audit surveillance in order to maintain certification. Karri forest operations undertaken by the Forest Products Commission have been certified under the Australian Forestry Standard. The results of audits completed have been supplied to the Conservation Commission.
32.2 The Conservation Commission will undertake	Implemented and ongoing.
independent audits to assist it in assessing the extent to which management of the land applies is undertaken in accordance with the plan, and will give priority to auditing: 32.2.2. 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	The Conservation Commission is responsible for conducting audits of activities undertaken by both the Department and the Forest Products Commission. The Conservation Commission Policy for the Performance Assessment of Conservation Reserve and Forest Management Plans and Biodiversity Management in WA was published on the Conservation Commission's website (www.conservation.wa.gov.au) in 2008. A
zones:	rolling annual audit program has been developed and

 32.2.4 marri retention; 32.2.5 <i>Phytophthora</i> dieback hygiene; 32.2.6 protection of significant flora and understorey species; and 32.2.7 soil management. 	is continually updated. Five performance assessments relating to the FMP have been undertaken since its implementation and reports on the findings are available to the public on the website (www.conservation.wa.gov.au). A summary of key findings from the performance assessments and follow-up information from the 12 month reviews is provided in Appendix B. During the period 2004-2007 the following assessments were conducted; fauna habitat zones
20.2. The Opposition Complication will undertake	master burn planning and prescribed burning and Informal reserve protection during timber harvesting operations (Part A and Part B).
s2.3 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. These audits will be provided to the EPA for review by 31 December 2008 and 31 December 2012 respectively.	This report fulfils the Conservation Commissions commitment to undertake a comprehensive mid-term audit.
32.4 The Conservation Commission, the Department	Implemented in part and ongoing.
results of the audits referred to in Actions 32.1, 32.2 and 32.3 (in year 2 & ongoing).	Up until 2006/2007 a summary of the outcomes of audits undertaken through the year was published in the Department's Annual Report. The reporting requirement was revised in 2007/2008 and other forums for publishing audit findings are currently being considered, including publication via the Department's website.(www.dec.wa.gov.au)
	The Forest Products Commission provided copies of audit reports to the Department and the Conservation Commission.
	The Conservation Commission publishes copies of performance assessments on its website (www.conservation.wa.gov.au) (see Action 32.2).
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 (in year 1 & ongoing).	Implemented and ongoing. This action has been addressed by annual FMP compliance reports which have been published for 2004, 2005, 2006 and by this mid term audit report.
 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 (in year 1 & ongoing). 32.6 The Department, in consultation with the Conservation Commission, will develop a protocol for each key performance indicator in the plan (in year 1 & end of year 1), 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. 	Implemented and ongoing. This action has been addressed by annual FMP compliance reports which have been published for 2004, 2005, 2006 and by this mid term audit report. Implemented in part and ongoing. Reporting protocols for 20 key performance indicators were approved in 2006 and published on the Department's website (www.dec.wa.gov.au). The reporting protocol for KPI 16 was provided to the Conservation Commission in 2006, however at that time the Conservation Commission decided that further work needed to be done before the protocol could be approved. The revised protocol has not been received by the Conservation Commission and key issues identified with the KPI 16 protocol remain unresolved A further 8 protocols have been developed in draft form to collect key data required for reporting on in the mid-term audit of performance. The Conservation Commission has not been provided with these draft protocols.
 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 (in year 1 & ongoing). 32.6 The Department, in consultation with the Conservation Commission, will develop a protocol for each key performance indicator in the plan (in year 1 & end of year 1), 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. 	Implemented and ongoing. This action has been addressed by annual FMP compliance reports which have been published for 2004, 2005, 2006 and by this mid term audit report. Implemented in part and ongoing. Reporting protocols for 20 key performance indicators were approved in 2006 and published on the Department's website (www.dec.wa.gov.au). The reporting protocol for KPI 16 was provided to the Conservation Commission in 2006, however at that time the Conservation Commission decided that further work needed to be done before the protocol could be approved. The revised protocol has not been received by the Conservation Commission and key issues identified with the KPI 16 protocol remain unresolved A further 8 protocols have been developed in draft form to collect key data required for reporting on in the mid-term audit of performance. The Conservation Commission has not been provided with these draft protocols. Implemented and ongoing. The Department continues to be involved with the Commonwealth in the implementation of the Montreal Indicator program through representation on both the Montreal Implementation Group and the National Forest Inventory Steering Committee for Australia. The Department and Forest Products Commission contributed to the State of the Forests Report 2008.

commencement & ongoing).	

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

The Department uses Works Improvement Notices and Management Letters as part of the monitoring and compliance system. The system is designed to alert external agencies, operating on land managed by the Department, to breaches in compliance of environmental and approved management requirements, or to an unsatisfactory environmental outcome (refer Action 3.1 for a definition of Works Improvement Notices and Management Letters). The responses from the Forest Products Commission to incidents identified by the Department, particularly in the early years of implementation of the FMP, were not satisfactory to the Department or Conservation Commission. Many Works Improvement Notices and Management Letters have not been responded to by the Forest Products Commission and most have not been closed or have been closed but classified as unsatisfactory. The Department has identified a number of system issues associated with the use of Works Improvement Notices and Management Letters in this context which include:

- inadequate recognition by the Forest Products Commission of the seriousness of many incidents;
- failure of the Forest Products Commission to undertake required remedial action; and
- continued re-occurrence of the same types of incidents.

In the Department's view many incidents are as a result of inadequate management by Forest Products Commission contractors and inadequate supervision by the Forest Products Commission.

The Conservation Commission has undertaken several FMP performance assessments since commencement of the plan. A common thread concerns difficulties in operationalising the requirements of the FMP. A primary example relates to the importance of having policy incorporated at the operational level. The extent to which policy is communicated from the administrative level to managers and implemented in the field is a cause for concern.

Objective 33. Adaptive management

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

Progress with implementation of actions proposed

Action	Status of implementation
33.1 The Department and the Forest Products	Implemented in part and ongoing.
Commission will, in cooperation with the Water and	
Rivers Commission and the Water Corporation, and in	The Department developed and costed a concept plan
consultation with the Conservation Commission, conduct	for research to address this action. The cost of
research in relation to the extent to which stream zones	proposed research was substantial and required
in informal reserves adequately protect biodiversity,	commitment over 6 years. Forest Products
water quality and water quantity in areas subject to	Commission and Waters and Rivers Commission
timber harvesting (in year 2 & end of year 5).	declined to contribute funds towards the project. The
	matter was raised at the August 2005 meeting of the
	FMP Implementation Coordinating Committee – Policy
	Group and it was resolved that information relevant to
	this action would be provided by research and
	monitoring associated with the Wungong Catchment
	trial, and existing research being undertaken by the

	Department's Science Division in relation to streamflow following timber harvesting, and stream biodiversity
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 (by year 5 & ongoing).	Implemented and ongoing. Adaptive management trials have been undertaken on the management of soil disturbance during timber harvesting, particularly under moist soil conditions. Results have been analysed and prepared for publication.
	The Department has established an adaptive management trial to investigate the ecological effects and practical issues associated with establishing a fine grain mosaic of patches of vegetation at different stages of post-fire development. This mosaic is being achieved through frequent introduction of planned fire at the forest block scale in a landscape of jarrah forest and open shrubland. The effectiveness of silvicultural treatments applied in <i>Phytophthora</i> dieback affected forest is also being investigated by a research program commenced in 2007.
	The Department is also involved with the Water Corporation in a trial of silviculture to enhance water production as part of the Wungong Catchment trial.
33.3 The Forest Products Commission will test methods	Implemented and ongoing.
second grade standards (in year 2 & ongoing).	During the last two years, through a joint venture arrangement between Advance Timber Concepts at University of Western Australia and the Forest Products Commission, work has been undertaken on a short length jarrah project. The aim of this project has been to utilise downgraded or low grade sawn jarrah product to manufacture furniture components.
	Utilisation of jarrah bole residue logs into sawn products has continued under a contract to Whittakers Ltd and more recently with a second customer. Third grade jarrah and karri sawlogs continue to be sold by the Forest Products Commission to a number of customers for the production of sawn products.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

The approval and determination of acceptable limits for adaptive management trials has often proved to be a difficult decision making process for the Conservation Commission. The concept of adaptive management is often interpreted as a sign that current management practices are inadequate and that limits trialled under adaptive management projects will be locked in as normal practice. This popular interpretation has the potential to impact on the choices managers make with regard to adaptive practices. The Conservation Commission views adaptive management to be a process which can be used to respond to new knowledge as it becomes available and as an opportunity to expand current knowledge bases. To encompass the range of natural environmental variability and to consider all the effects of management practices on ecosystems requires a substantial amount of resources and long timeframes. Long-term research projects are set up to address these concerns. Adaptive management trials provide a low-risk framework to look at a range of options and assess potential improvements to operational practices in a relatively short timeframe and with a reasonable level of resources.

Objective 34. Review

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

Progress with implementation of actions proposed

Action	Status of implementation
34.1 The Department and the Conservation Commission	Implemented and ongoing.
will:	
34.1.1 develop or maintain a comprehensive suite of	The Department has made progress in the
operational guidance documents (see Appendix 1) (on	development of the key guidelines required by the
plan commencement & ongoing);	FMP (See also response to Actions 3.1, 7.2 and 20.1).
34.1.2 evaluate the results from research, monitoring,	Silviculture Guidelines will be reviewed in 2009.
audits and trialling of adaptive management practices to	Defende the report on KDI 22 leter in this charter and
determine whether the plan, or guidelines and policies	Refer to the report on KPI 33 later in this chapter and
endering):	to Appendix A for further details.
34.1.3 amend the plan if required according to the CALM	The Conservation Commission's view on the
and FP Acts (as required):	Department's development of guidelines is provided
34.1.4 initiate an independent expert review of	below and in Chapter 2.
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 (in year 8 & end of	
year 9);	
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 mem (as required); and	
34.1.6 take action that is reasonable and practicable to	
address problems identified in management systems (as	
iequiieu).	

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

It is the view of the Department that the consultation and approval processes required by the FMP for guidance documents is an impediment to the review and updating of these documents because of the requirement for the Department to prepare these documents with community consultation, submit them to the Conservation Commission for advice, and have them approved by the Minister for the Environment. This process is considered to require an unnecessary level of resourcing to undertake the review and updating of operational guidance documents. The consultation and approval level required under the FMP is inconsistent with that adopted by the Department for documents not developed under the FMP, where more limited consultation and lower level approval requirements encourage more timely review and updating of operational guidance documents. It is noted that it would be appropriate to have a hierarchy of consultation and approval levels commensurate with the nature of the document, where documents with an operational focus have lower requirements than those with a policy focus.

Objective 35. Community involvement

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:

Progress with implementation of actions proposed

Action	Status of implementation
35.1 The Department and the Forest Products	Implemented and ongoing.
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 (as required).	As required by the FMP the Department undertakes public consultation on forward plans for timber harvesting and prescribed burning. Two draft guidelines were released for public comment in 2008 (See response to Actions 3.1 and 20.1). A guide for the release of and analysis of public comment has been developed for the 3-year timber harvest plans and guidelines. The Department ensures that public consultation is notified through local press and ConsultWA (Department of Premier and Cabinet) and is published on the web.
	Refer to the report on KPI 29 at the end of this chapter and to Appendix A for further details.
35.2 The Department will:	Implemented in part and ongoing.
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	Information relevant to the FMP is updated on the Department's website (<u>www.dec.wa.gov.au</u>). Documents made available on the Department's website include the 3-year timber harvest plan (November 2007) and two draft guidelines (March 2008). Community Forest Inspections have been undertaken in Swan, South West and Warren regions.
35.2.4 provide a range of opportunities for volunteers to be involved in forest management activities. (on plan commencement & ongoing).	Development of community education opportunities and information relating to the sustained yield statistics and models has not progressed due to resources being directed to other issues. The Department has recently released its new website and is working to expand and update the content on managing Western Australian forests, including the provision of educational information on the sustained yields and models. Since 2004, an earlier publication documenting the design, methodology and results of the jarrah timber inventory that underpins the sustained yields was reprinted and distributed to libraries. The modelling of <i>Phytophthora</i> dieback spread used to adjust the sustained yield for future disease was presented to an international scientific conference, subsequently published, and applied in a strategic <i>Phytophthora</i> dieback risk project with Natural Resource Management groups across the Regions. A number of publications on growth and yield statistics are in preparation. Public consultation processes have been established as required. Refer also to the responses to Actions 35.1, 35.2.3 and 35.2.4. Refer to the report on KPI 29 at the end of this

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

Due to resources being allocated to other issues, information relating to sustained yield statistics and models is not yet available to the public.

Objective 36. Management and performance standards

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

Progress with implementation of actions proposed

Action	Status of implementation
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 (in year 2 & ongoing).	Commenced. Early in the period of the FMP the Department decided to place priority on implementing key changes in policy and practice committed to in the
	FMP. As a consequence development of an EMS was deemed to be of lower priority and there has been limited progress to date. Refer to the report on KPI 32 later in this chapter and to Appendix A for further details.
36.2 (Plantations): The Forest Products Commission will	Implemented and ongoing.
independently accredited as conforming to AS/NZS ISO 14001 (on plan commencement & ongoing).	The Forest Products Commission has maintained an independently accredited EMS accredited to ISO 14001: 2004 for plantation operations during the period 2004-2007, and is committed to maintaining this as required.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

Extensive resources are required to develop an EMS and the capacity of the Department to achieve an independently accredited EMS, without impacting on other high priority programs and projects, is limited. The Department has advertised on two occasions for a suitably qualified person to undertake work in this area but has been unsuccessful in filling the position. Nevertheless, work is being done to advance a more systematic approach to environmental management within the Sustainable Forest Management Service, with a focus on provision of a more systematic and risk based approach to monitoring. For further details on the Department's development of the EMS refer to KPI 32 and Appendix A.

Objective 37. Roles and responsibilities in management The plan proposes the following Actions for the purpose of seeking to facilitate effective management of forests:

Progress with implementation of actions proposed

Action	Status of implementation
37.1 The Department and the Forest Products	Implemented in part and ongoing.
Commission will:	
37.1.1 identify key roles and responsibilities in forest	The Department and Forest Products Commission
operations and specify the persons who are responsible	have continued to operate according to draft working
for fulfilling those roles and responsibilities; and	arrangements prepared in accordance with the
37.1.2 identify key tasks associated with implementation	Memorandum Of Understanding (MOU) signed in
of the plan and specify the persons who are responsible	March 2001 by the then Executive Director of the
for undertaking those tasks (in year 2 & end year 2).	Department of Conservation and Land Management
	and the General Manager of the Forest Products
	Commission. Documentation of works programs and

financial arrangements for services that the
Department provides to the Forest Products
Commission are prepared on an annual basis for fire
management, native forest operations and for
plantations operations on Department managed land.
Following changes implemented as a result of a
decision by the Expenditure Review Committee of the
Department of Treasury and Finance in March 2004 in
regard to funding arrangements for services by the
Department to the Forest Products Commission a
Ministerial MOU has been drafted. In 2007, temporary
working arrangements for planning and authorisation
of timber harvesting in native forests were signed by
the Director General of the Department and the
General Manager of the Forest Products Commission.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

The lack of agreed and comprehensive working arrangements between the Department and the Forest Products Commission is unsatisfactory and has led to time consuming negotiations regarding roles and responsibilities associated with forest management and timber harvesting in native forests and plantations. This has diverted resources away from implementing parts of the FMP that otherwise could have been further progressed; for example, the preparation of subsidiary management guidelines.

Objective 38. Knowledge

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:

Progress with implementation of actions proposed

Action	Status of implementation
38.1 The Department will develop and implement	Implemented and ongoing.
research programs, in cooperation with the Conservation	
Commission, including the research referred to in Actions 9.1 and 9.2 (on plan commencement & ongoing).	The Department continues to implement a range of research addressing aspects of sustainable forest management including forest health, fire, silviculture and hydrology. Collaborative research is also undertaken with a variety of organisations including CSIRO, Cooperative Research Centres and universities. Individual research project summaries and details of collaborative research are provided in the Annual Research Activity Report published by the Science Division, available on the Department's website. (www.dec.wa.gov.au)
	Specific requirements for biological survey, monitoring and research into the effects of forest management activities on biological diversity are reported against Actions 9.1 and 9.2.
	Refer to the report on KPI 31 later in this chapter and to Appendix A for further details.
38.2 The Department and the Forest Products Commission will take reasonable and practical steps to:	Implemented and ongoing.
38.2.1 identify the skills required to competently	The Department maintains an active training program to
undertake the key tasks referred to in Action 37.1.2;	address recognised performance gaps and to provide for
38.2.2 review the skills and competency levels of	career development of staff. Training programs are
persons responsible for undertaking those tasks; and	available for a wide range of subject areas including fire
38.2.3 Initiate training and other programs to increase	management, silviculture, field operations, flora and
vear 2 & end vear 2 & ongoing).	organisational leadership. The Department publishes an

Organisational Learning and Development Manual at the beginning of each year to make staff aware of opportunities for training and development.
In 2007 the Forest Products Commission commenced a process to define the job-related requirements for operational field staff at all levels. These competencies now form the basis for the Operational Training Framework and include key tasks as outlined in Action 37.1. The Forest Products Commission has commenced a skills audit of all operational field staff to review their skills and competency levels which is being completed as part of a skills recognition process attached to nationally recognised qualifications in forestry at Certificate III, IV and Diploma levels. Once this process is completed, the Forest Products Commission will use this information to
determine skill gaps and arrange appropriate training activities to address these gaps.

Compliance monitoring

There are no findings from compliance monitoring relevant to this objective.

Implementation issues

Attraction and retention of staff in a highly competitive employment market has proved challenging for both the Department and the Forest Products Commission. This has impacted on the capacity to maintain a workforce with the skills and competencies required to undertake a number of the actions from the FMP.

Key performance indicators

KPI 29 - Public involvement, education, awareness and extension

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.

Nearer to Nature and Eco-Education programs

The Department facilitates programs covering a variety of ways in which the public can experience and learn about the forest environment and its management.

The Department manages a number of environmental education centres, and forest education programs are provided in each of the forest regions. The Warren Region focuses on the Perup Forest Ecology Centre. The South West Region uses the Wellington Forest Discovery Centre and the Wharncliffe Discovery Centre. The Swan Region uses the Perth Hills National Parks Centre (previously The Hills Forest Discovery Centre).

Interpretative information about forest management for visitors in state forests and national parks is provided primarily through signs and exhibits. A history of forest management and the timber industry is a component of the Swarbrick and Valley of the Giants Wilderness Discovery Centre sites within the Walpole Wilderness and also at Harewood Forest near Denmark, and along the Total Forest Trail within the Wellington Forest.

Demonstration sites of silvicultural activities including non-commercial thinning are being developed as part of the Wungong Catchment Trial. Site design and development, along with the interpretation, are in the conceptual stage. Educational and professional development group visits are being trialled by the Swan Region.

Table 20 provides an example of the different ways in which members of the public can participate in nature based and forestry interpretive activities as part of the Department's *Nearer to Nature* and Eco-Education programs. A general increasing level of participation can be observed.

Communication field	Definition of activity	Num partic	ber of ipants
		2006	2007
Public Involvement	Direct participation as a contract guide or volunteer to deliver educational and interpretive activities within a forest environment.	70	70
Public Education	Participants in community or schools- based forestry related interpretive activities within a forest environment.	499	938
Awareness	Visitation to the forest environment with a more passive involvement in learning including people who have camped in the forest, attended nature-based activities as an accompanying parent and visitors to the forest for recreational pursuits such as bike riding and hiking.	28,538	35,759
Extension Programs	Participants who have attended a <i>Nearer to Nature</i> interpretive activity in a non-forest environment involving active participation in learning concepts such as habitat protection, conservation and environmental protection in non forest ecosystems.	6,402	6,433

Table 20. Public participation in Nearer to Nature and Eco-Education programs.

DEC Bush Rangers

Bush Rangers WA is another component of EcoEducation encompassing curriculumlinked programs and activities. Students undertaking these programs range from Years 8 to 12. The Bush Ranger courses are now endorsed Curriculum Council courses for Senior School study and recognition in the Western Australian Certificate of Education. Many of the Bush Ranger programs and activities are conducted in forest environments during camps or investigations.

No separate figures are available for Bush Rangers work and study in forest environments. However, 1,141 Bush Rangers contributed over 300,000 volunteer hours to conservation and community projects in 2007. Ninety DEC staff members worked with Bush Rangers to achieve their environmental goals.

Aboriginal Heritage Unit

The Department's Aboriginal Heritage Unit develops and implements programs that seek to provide the community with culturally significant educational opportunities and information. The unit also has a role in training DEC staff on cultural aspects of forest management. The unit conducts around 100 programs a year involving around 3,000 to 7,000 participants.

Volunteers

The number of community projects involving volunteers varies from year to year as projects are undertaken as required by individual Districts (Figure 12). The number of volunteers providing support to work programs undertaken by the Department has declined since 2005 and may reflect a more general trend in volunteering where fewer people are contributing to unpaid community service (Figure 13). However, the overall effort expressed in the number of volunteer hours has increased, indicating that the level of contribution per volunteer has also increased (Figure 14).



Figure 12. The number of community projects with volunteer involvement in the FMP area for the period 2004-2007.



Figure 13. The number of volunteers involved in community projects within the FMP area for the period 2004-2007.



Figure 14. Contribution of hours worked by volunteers in community projects within the FMP area for the period 2004-2007

Landscope Magazine

Around 7,000 copies of Landscope magazine are produced quarterly. The magazine is devoted to conservation, forest management, wildlife and nature-based recreation and tourism in Western Australia.

Library services

Kensington Forest Sciences Library and Woodvale Wildlife Science Library are publicly accessible, containing journals, books, videos, microfilm, photos, maps, historical brochures and posters. These facilities receive around 50 visitations per year from members of the public.

Documents relating to Forest Management on the Department's website

Information relating to Western Australia's public native forests is made available on the Department's website (<u>www.dec.wa.gov.au</u>). This includes the FMP and related documents. Key documents are available for the public to download and in some cases provide feedback or comments. Indicative levels of interest may be reflected by the number of visits, or 'hits' to the website, some examples are provided below.

The Forest Management Plan and Ministerial conditions received approximately 7,000 hits. Maps for the three year indicative timber harvesting plan are posted each year and receive around 1,500 hits. A number of items of general information about forest related issues including tuart and wandoo decline, recovery plans and research working group reports receive around 3,000 to 4,000 hits. The recently released draft Guidelines for Soil and Water and Guidelines for the Protection of the Values of Informal Reserves and Fauna Habitat Zones received around 1,000 hits each.

Community forest inspections

Community forest inspections are an initiative established from 2003 to build on the commitment from the Labor Government's 2001 *Protecting our old-growth forests* policy to improve community involvement in, and understanding of, forest

management. The then State Government's environment policy from the 2005 election maintained this commitment to undertake community forest inspections.

The objectives of community forest inspections are to provide an opportunity for the community to:

- inspect timber harvesting operations;
- increase its understanding of the purpose of timber harvesting operations; and
- understand why timber harvesting operations lead to particular outcomes.

Community forest inspections can involve representatives from peak conservation groups and locally based organisations. They are not intended as an audit of operating standards by the Forest Products Commission, but non-compliance with standards may be identified as a result of a community forest inspection. The outcomes of community forest inspection are provided to all participants and invited community representatives, with matters identified during inspections followed up, or reported on, by staff of the Department or the Forest Products Commission as appropriate. Community forest inspections have been undertaken in each of the Department's regions within the FMP area since 2004.

Performance measure	The extent to which the Department demonstrates the capacity and commitment to develop and maintain the essential skills of staff.
<i>Performance target(s)</i>	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.

KPI 30 – Develop and maintain human resource skills across relevant
disciplines

The Forest Products Commission and the Department are not in a position to report in a quantitative manner against the performance target for this KPI because of resource constraints. Explanatory text is provided below indicating the extent to which the agencies demonstrate the capacity and commitment to develop and maintain the essential skills of staff. Additional information in relation to this KPI is provided in Appendix A.

The Forest Products Commission has three major components to its training programs for operational staff:

- training provided for new staff (recruits);
- training for existing experienced staff who have been with the organisation or the Department for over 10 years; and
- an EMS that highlights areas of environmental risk and the training required to address these.

The Forest Products Commission initiated a training program for recruits in mid-2004 and 42 staff have now completed this program. There are 14 recruits currently

completing the program. The aim of the program is to provide recruits with extensive and targeted training in their first year of employment to equip them with the skills, understanding and competencies necessary to undertake the functions and activities of the Operations Division. The Forest Products Commission is also undertaking a skills recognition project to document the skills and competencies needed by operations staff at different levels in the agency. This training program has been auspiced through Great Southern TAFE to ensure Australian Quality Training Framework requirements, standards and access to qualifications are met.

The Department maintains an active training program to address recognised performance gaps and to provide for career development of staff. Training programs are available for a wide range of subject areas including fire management, field operations, flora and fauna conservation, occupational health and safety, cultural development, licensing and regulation and organisational leadership. In addition, staff are able to undertake undergraduate and postgraduate courses, scholarships, international exchange, or self-directed education and training. The Department's Training Centre manages and maintains status as a Registered Training Organisation. Responsibilities include the development, implementation, evaluation and continuous improvement of a quality training and assessment system, which meets the twelve Australian Quality Training Framework standards and the operational needs of the Department. This system is being implemented across most training and assessment activities, and all Departmental divisions.

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.

KPI 31 – Development of scientific understanding of ecosystem characteristics and functions

Expenditure on research related to ecologically sustainable forest management increased slightly from 2004 to 2005 and remained constant in 2005/06 and 2006/07 (Figure 15). The majority of funding for research on ecologically sustainable forest management is allocated through the service provider agreement between the Sustainable Forest Management Division and the Science Division. Smaller amounts of funding have also been obtained from external funding sources.





Figure 15. Expenditure by the Department on research relevant to ecologically sustainable forest management from 2004-2007

Research effort quantified by the number of scientific and technical staff engaged in Departmental research relevant to ecologically sustainable forest management has been maintained at about twenty-five full time equivalent person years from 2004-2007 (Figure 16). Output quantified by the number of papers published in peer reviewed scientific journals has remained relatively stable at between eleven and thirteen per year. Most research effort has been directed towards biodiversity conservation, with less effort on ecosystem health and vitality and soil and water conservation. Further information about the subject area of published papers is provided in Appendix A.



Figure 16. Person years and peer reviewed articles published by the Department on research relevant to ecologically sustainable forest management from 2004-2007.

KPI 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.

The performance measure for KPI 32 requires development of a Departmental environmental management system (EMS) to a standard suitable for accreditation by December 2005. This target has not been achieved. The Department has investigated the reasons for this and the following represents the response to target shortfall.

Early in the life of the FMP the Department decided to place priority on implementing key changes in policy and practice committed to in the FMP. As a result of resource constraints, competing priorities and increased expectations to service other requirements of the FMP, an EMS was deemed to be of lower priority and there has been limited development.

The Department has experienced difficulty in attracting a suitably qualified person to undertake development of an EMS for the Sustainable Forest Management Division.

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 midterm.
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.

KPI 33 – Operational control

The performance measure for KPI 33 requires all guidance documents to be prepared or reviewed by the mid-term of the FMP in December 2008. This target has not been achieved. The Department has investigated the reasons for this and the following represents the response to target shortfall. See also the report on KPI 33 in Appendix A.

As at November 2008, the status of the twelve documents identified in the KPI reporting protocol is as follows:

- three have been completed;
- one has been approved, and held pending completion of a related document;
- two have been released for public comment;

- one is approaching the public comment phase;
- two are in preparation; and
- three have not been commenced.

The status of proposed and existing documents is shown in Table 21 below.

Table 21: Status of guidance documents required by the FMP

Guideline name	Date prepared	Date reviewed (progressive)	Status/Comment
Propos	ed Guidelines		
Guidelines for the Management of Informal Reserves and Fauna Habitat Zones To be prepared by the Department by 31 December 2004 in accordance with Action 3.1.2 and 7.2.2.			Draft for public comment released March 2008. Revised document submitted to the Conservation Commission for advice
Cuidelines for Selection of Found Liebitat Zanas			In October 2008.
To be prepared by the Department by 31 December 2004 in accordance with Action 7.2.2.			Draft for public comment substantially complete.
Goals for Understorey Structural Diversity			
To be prepared by the Department by 31 December 2005 in accordance with Action 4.1.			In preparation.
Fauna Distribution Information System To be prepared by the Forest Products Commission in accordance with Action 8.4. (No completion date set)			Referred to the Conservation Commission August
Native Forest Timber Harvest Planning Guidelines			2001.
To be prepared by the Department by 31 December 2008 in accordance with Action 34.1.1			In preparation
Soil and Water Conservation Guidelines			
To be prepared by the Department by 31 December 2005 in accordance with Action 20.1.2.			Draft for public comment released March 2008.
be returned to native vegetation			Not commenced.
To be prepared by the Department in accordance with Action 15.4.2. (No completion date set)			
Forest Monitoring Guidelines			
To be prepared by the Department by 31 December 2005 in accordance with Action 34.1.1.			Not commenced.
Key Performance Indicator Protocols			Published (includes
To be prepared by the Department in accordance with Action 32.6. (No completion date set)	March 2007		protocols for 20 of the 33 KPI)
Guidelines for the preparation of area management plans for conservation reserves.			Interim guidelines developed (see table A40). These will have broader application than
To be prepared by the Conservation Commission in accordance with Action 5.2. (No completion date set)			the area covered by the FMP.
Indigenous Heritage Management Guidelines			
To be prepared by the Department in accordance with action 25.2 (No completion date set)			Not commenced
Non-indigenous Heritage Management Guidelines			Further development
To be prepared by the Department in accordance with action 25.2 (No completion date set)	Draft Guideline April 2004		constrained by resources and competing priorities.
Existin	ng guidelines		
Phytophthora cinnamomi and Disease Caused by it – Volume 1. Management Guidelines	January 1999 *		
To be reviewed by the Department by 31 December 2008 in accordance with Action 18.2.1.			

Jarrah Silviculture Guidelines	November
reviewed by 31 December 2004	2004
Karri Silviculture Guidelines reviewed by 31 December 2004	January 2005
Wandoo Silviculture Guidelines	November
reviewed by 31 December 2004	2004

The main reasons for the performance shortfall in meeting KPI 33 relate to resource constraints, competing priorities and increased expectations to service other requirements of the FMP.

In addition, three of the proposed guidelines (Indigenous Heritage Management Guidelines, Non-indigenous Heritage Management Guidelines and Guidelines for the Preparation of Area Management Plans for Conservation Reserves) have broader application outside the FMP area. Therefore, development and review of these documents is influenced by matters beyond those directly relevant to the implementation of the FMP. The Interim Guidelines for the Preparation of Terrestrial Conservation Reserve Management Plans were published by the Conservation Commission in 2006.

Issues to be addressed from 2009

On the basis of the above, the mid-term audit process identified the following issues to be addressed from 2009.

The Department continues to move towards a formal environmental management system and will focus its resources in areas where a more systematic approach will provide the greatest benefits. The achievement of an environmental management system to a standard suitable for accreditation is unlikely in the term of this FMP without significant additional resources or change in priorities.

The response from the Forest Products Commission to Works Improvement Notices and Management Letters issued by the Department, particularly in the early years of implementation of the FMP, demonstrates that improvements to the systems around monitoring and audit are required. Improvement can be progressed in three areas:

Firstly, these issues reflect the inadequate legislative clarity of the Department's relationship with proponents and how they operate on Department-managed land.

Secondly, the development of working arrangements for native forests and plantations, as was envisaged under the 2001 MOU signed by agency heads, should be given a high priority for completion during 2009, and revision after legislative change.

Thirdly, a protocol should be agreed by the Department and Forest Products Commission to notify the Department of incidents identified by the EMS used by the Forest Products Commission.

Conservation Commission advice

With respect to the above issues identified for Plan implementation, the Conservation Commission provides the following advice:

With respect to Objective 35 – Community involvement: as part of improving the transparency and public understanding of information and processes that underpin

forest management, the Conservation Commission expects that the Department will place a higher priority on making information relating to sustained yield statistics and models available to the public. To facilitate this action, the Conservation Commission, in consultation with the Department, will investigate accessing the services of a scientific communicator.

With respect to Objective 36 – Management and performance standards and KPI 32 – Environmental Management System, the Conservation Commission is concerned by the lack of an EMS. The current operational monitoring procedures and the use of Work Improvement Notices and Management Letters can only be considered as a portion of a functioning EMS. Furthermore, the current system appears to relate to the monitoring of the Forest Products Commission's implementation of the plan and not the Department's implementation of the plan.

The FMP (p.10) clearly states that an EMS should be developed:

The development and certification of an environmental management system (EMS) to the ISO 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.

Therefore the Conservation Commission finds the Department's statement that development of the EMS is considered a lower priority a matter of concern and will discuss options with the Department to resolve this shortfall.

With respect to KPI 29 and, in particular, Community Forest Inspections, the Conservation Commission acknowledges the extended process of invitation, reporting and follow-up. Although the recommended number of inspections was not carried out in the annual timeframes in the earlier years of the FMP, this process has improved in recent years. The Conservation Commission encourages the Department to continue with, and improve, this process.

With respect to KPI 30, the Conservation Commission notes that the Forest Products Commission has an established EMS and expects that the Forest Products Commission will report on the performance target of the KPI by 31 July 2009.

It is the considered view of the Conservation Commission that there are a number of issues of particular concern in relation to Plan implementation.

With respect to Objective 32 – Monitoring and audit, the Conservation Commission notes that it is often difficult to ensure that management reforms are driven down to operational levels and more effort appears to be required here. The Conservation Commission's future FMP performance assessments will continue to focus attention on this matter.

The Conservation Commission is concerned that the development of the remaining unapproved KPI protocols has taken too long. The KPIs were developed to assess the effectiveness of the plan in meeting its objectives and to measure progress towards the implementation of the actions proposed. Regular reporting on the KPIs would identify, in a timely manner, whether targets are being reached or, conversely, would bring to the attention of the Conservation Commission any performance target shortfalls. The Conservation Commission requests that the Department and Forest Products Commission are responsible for by 31 July 2009. For KPIs which require other agencies involvement, the Conservation Commission will work with the Department to finalise the protocols by 31 December 2009. The Conservation Commission also notes that there may also need to be a revision of KPIs where data availability will continue to be an issue.

The Conservation Commission notes that many Works Improvement Notices and Management Letters remain outstanding. The Conservation Commission expects the Forest Products Commission to provide a more timely response to Works Improvement Notices and Management Letters and will continue to monitor this matter.

With respect to Objective 34 – Review – Subsidiary management guidelines, the Conservation Commission recognises that close compliance with deadlines is not always possible, given competing priorities and limited resources, and notes that consultation and approvals can be time-consuming. Nevertheless, the Conservation Commission is of the view that these processes need not be an impediment to the review and update of guidance documents. Guidelines are an important tool for providing guidance on management decisions and practices, and provide a framework which allows for a greater level of consistency in applying the actions and intentions of the FMP.

The Conservation Commission considers the lack of timely attention to subsidiary management guidelines by the Department to be unsatisfactory and recommends that the development of guidelines be made a priority and resources allocated accordingly. The Conservation Commission does not believe that it is appropriate to simply extend the deadlines and wait for compliance to occur at some time in the future. The Conservation Commission requests that those guidelines listed in Appendix C be completed by 31 July 2009. The Conservation Commission will make some resources available to assist the Department in meeting these deadlines.

With respect to Objective 37 – Roles and responsibilities in management, the Conservation Commission supports the finalisation of a Working Arrangement between the Department and the Forest Products Commission as a priority.

With respect to the inadequate legislative clarity of the Department's relationship with proponents and how they operate on Department-managed land, the Conservation Commission offers the Department support in seeking appropriate powers under the *Conservation and Land Management Act 1984.*

While the Conservation Commission should not become an enforcement agency in its own right, circumstances may arise when there appears to be a risk of substantial non-compliance with the FMP that could lead to serious environmental consequences. Such circumstances are highly unlikely to occur but give rise to a public expectation that the Conservation Commission as the vested body act in some way. One option is to create a statutory duty for the Conservation Commission to provide advice to the Minister for Environment and for the Minister to table that advice in Parliament.

The Conservation Commission will provide advice to the Minister for Environment concerning amendments to the *Conservation and Land Management Act 1984* to create a statutory duty for the Conservation Commission to provide advice to the Minister for Environment, and for its tabling in Parliament, when substantial non-compliance with the FMP leading to serious environmental consequences appears likely.

11. References

- Minister for the Environment. Statement that a proposal may be implemented (pursuant to the provisions of the Environmental Protection Act 1986). Forest Management Plan (2004-2013). Ministerial Statement No. 000641. 4 December 2003.
- Orell, P. and Morris, K. (1994). *Chuditch Recovery Plan*. Department of Conservation and Land Management, Como, Western Australia.
- Possingham, H, Jarman, P and Kearns, A (2004). 'A review of the Western Shield program'. *Conservation Science Western Australia* 5 (2).
- Rab, M.A, Bradshaw, F.J., Campbell, R.G., and Murphy, S. (2005). Review of factors affecting disturbance, compaction and trafficability of soils with particular reference to timber harvesting in the forests of south-west Western Australia, Consultants Report to Department of Conservation and Land Management, Western Australia, Sustainable Forest Management Series, SFM Technical Report No. 2, 146 pp.
- Robinson, R.M (2008). Forest health surveillance in Western Australia: a summary of major activities from 1997 to 2006. *Australian Forestry* 71, 202-211.
- Smolinski, H. and Kuswardiyanto, K. (2007). Soil Survey and Assessment of Trafficability in the South-West Forests of Western Australia – Adaptive Management and Operational Trials Harvested in Winter 2004, Consultants Report to Department of Environment and Conservation, Western Australia, Sustainable Forest Management Series, SFM Technical Report No. 3.
- Start, A., Burbidge, A. and Armstrong, D. (1995). *Woylie Recovery Plan*. Department of Conservation and Land Management, Como, Western Australia.
- Stukely, M.J.C, Crane, C.E., McComb, J.A. and Bennett, I.J. (2007). Field survival of clonal, micropropogated *Eucalyptus marginata* selected for resistance to *Phytophthora cinnamomi. Forest Ecology and Management* 238, 330-334.
- Whitford, K., Stoneman, G., Seymour, A. and Murray, P. (in review) *The effects of* cording, timber load and soil gravel content on soil compaction caused by timber harvesting in Western Australia.

Appendix A

Report on Key Performance Indicators for the Report on the Mid-term Audit of Performance for the Forest Management Plan 2004-2013

> Department of Environment and Conservation Forest Products Commission

Note:

The basis for reporting of many of the KPI in this report is the Protocols for Measuring and Reporting on the Key Performance Indicators of the Forest Management Plan 2004-2013. This Appendix also includes reporting for a number of KPI which do not have published protocols (KPI 5, 6, 9, 10, 11, 12 and 16). For some of these protocols, more background or context is provided to assist interpretation than is the case for KPI with published protocols.

Biological Diversity

Three KPI are reported below in relation to biological diversity.

KPI 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 ten 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.

Objective of KPI 1

The objective of KPI 1 is to assess the success of the implementation of the Forest Management Plan in achieving its targets for representation of forest ecosystems in conservation reserves, through tracking the progress in the establishment of formal reserves.

Results and explanatory notes

Tenure changes

As of March 2008, 141 of the 305¹⁰ land category changes have been implemented (Figures A1 and A2), with consultation for a further 85 at an advanced stage. All national parks proposed under the *Protecting our old-growth forests* policy have been created. Most land tenure changes achieved to date took place between 2004 and 2006.

¹⁰ The FMP lists 318 identifier numbers for land category changes. Eight identifiers did not require action (remained as the current land category type) and five are no longer to be pursued.



Number of individual land category changes required to fully implement all proposed changes.
 Number of individual land category changes completed at 30 March in each reporting period.

Figure A1. Number of proposed land category changes that have been fully implemented to 31 March in each reporting period. Land category changes include, but are not limited to, those that result in addition to the formal conservation reserve system.

Table A1. Area (ha) of formal conservation	reserves established since the start of 2004,
by land category, for each reporting period.	

Land Category	Area (ha) im	Total area proposed under		
	2004	2006	2008	the FMP
Nature reserves	0	58,000	58,000	96,900
National parks	200	465,300	465,400	605,900
Conservation parks	200	13,100	13,100	91,900
CALM Act section 5 (1) (g) & (h)				
reserves	0	0	0	7,600
Total	400	536,400	536,500	802,300

As of March 2008, 67 percent of the area of land category changes proposed by the FMP for formal conservation reserve had been achieved.



Figure A2. Area (ha) of formal conservation reserves by land category that have been established since 2004 in the area of FMP to 31 March in each reporting period.

Forest ecosystems

As of March 2008, the overall reservation level for native forest ecosystems was 23.4 percent of pre-1750 extent within formal conservation reserves compared to the target reservation level of 26.7 percent when the FMP is fully implemented. Most forest ecosystems are well progressed towards target levels of reservation (Table A2) except for jarrah north east, and to a lesser extent western wandoo forest and western wandoo woodland.

Table A2. Representation of each forest ecosystem in formal conservation reserves for each reporting period in relation to the percent that will occur when all reserves are established.

Forest ecosystem	Ecosystem representation in formal reserves (per cent of pre-1750 extent)				
, , , , , , , , , , , , , , , , ,	<u></u>			All gazetted and proposed	
	2004	2006	2008	reserves (FMP)	
Jarrah dominant		r	%		
Jarrah Blackwood	2.4	22.0	22.0	23.6	
Jarrah Leeuwin	4.6	13.6	13.6	14.0	
Jarrah Mt Lindesay	1.2	14.4	14.4	14.4	
Jarrah North East	4.4	6.9	6.9	15.5	
Jarrah North West	7.7	12.4	12.4	13.6	
Jarrah Rate's Tingle	65.9	77.1	77.1	77.1	
Jarrah Red Tingle	41.1	64.2	64.2	65.1	
Jarrah Sandy	8.0	16.5	16.5	22.4	
Jarrah South	9.4	40.0	40.0	40.4	
Jarrah Unicup	6.4	18.7	18.7	19.1	
Jarrah Woodland	11.0	22.0	22.0	26.0	
Jarrah Yellow Tingle	15.2	65.3	65.3	65.5	
sub total	6.3	18.8	18.8	22.0	
Karri dominant					
Karri Main Belt	19.2	35.7	35.7	36.2	
Karri Rate's Tingle	71.6	71.6	71.6	71.6	
Karri Red Tingle	68.3	71.5	71.5	72.6	
Karri West Coast	27.0	28.5	28.5	31.3	
Karri Yellow Tingle	15.3	71.0	71.0	71.1	
sub total	21.2	38.9	38.9	39.6	
Wandoo dominant					
Western Wandoo forest	7.4	11.8	11.8	17.9	
Western Wandoo woodland	8.4	12.5	12.5	20.5	
sub total	7.7	12.0	12.0	18.7	
Other					
Bullich and Yate	53.9	53.8	53.8	77.1	
Darling Scarp	4.7	8.0	8.0	9.7	
Peppermint & Coastal Heath	66.9	67.9	67.9	72.4	
Rocky Outcrops	17.0	28.5	28.5	31.4	
Sand Dunes	97.8	98.7	98.7	99.9	
Shrub, Herb, & Sedgelands	21.9	48.8	48.8	49.6	
Swamps	33.8	39.4	39.4	40.7	
sub total	28.8	49.2	49.2	50.7	
Total native ecosystems	10.6	23.4	23.4	26.7	

KPI 2 - The status of (critically endangered, endangered, vulnerable, conservation dependent) forest-dwelling species and ecological communities as determined by listing

Performance measure	List of species and ecological communities and their status that tracks movements of species between protection categories.
Performance target(s)	No species or ecological community will move to a higher category of threat as a result of management activities.
Reporting	Annually with the review of the lists.
Response to target shortfall	The Department to investigate the cause of a change to a more threatened category and report to the Conservation Commission and to the Minister for the Environment. The Conservation Commission to evaluate the need for revision of management practices, in the context of its assessment and auditing function, in consultation with the Department.

Objective of KPI 2

The objective of KPI 2 is to assess the success of the implementation of the Forest Management Plan in achieving its targets through monitoring the status (protection category) of threatened flora, fauna and ecological communities, so that ecosystem management activities can be assessed and appropriate actions to better achieve the objective can be identified.

Results and explanatory notes

New species are added to lists as information becomes available and a nomination is endorsed by the Threatened Species Scientific Committee and agreed by the Minister. Listing of a species can occur for a number of reasons including; that sufficient information has been compiled to support a nomination (does not necessarily mean that the conservation status of the species has declined), there has been a change to the taxonomic classification of the species or that there is sufficient evidence that the species has suffered a decline in population numbers. Species elevated to a higher category of threat since the commencement of the FMP in 2004 are listed in Table 1 together with explanation for the change in status over this period.

Flora

Eight species of flora within the FMP area have moved to a higher category of threat since 2004. Six were previously listed as priority species and two species were new additions to the list. It is the view of the Department that there is no evidence to suggest that these species have been elevated to a higher category of threat as a consequence of management activities, but rather the additional level of survey and information available for these species has supported their listing as declared rare flora which will enable a higher level of protection and management attention in the future (refer Table A3 for detailed explanations for individual species). These listings do not represent a shortfall in relation to the performance target for this KPI. Effective implementation of actions identified in the FMP relating to management of fire, weeds, pests and diseases and recreational activities will be important for conservation of these species.

Fauna

Four species of vertebrate fauna have moved to a higher category of threat since 2004 (refer Table A3 for detailed explanations for individual species). The elevation in category of threat of the noisy scrub-bird is not related to management activities and therefore is not a shortfall in relation to the performance target for this KPI. This species was increased to endangered on a precautionary approach recognising that areas of core habitat in and adjoining the Two Peoples Bay Nature Reserve (outside the FMP boundary) may be subject to increased fire frequency as a result of climate change.

For the red-tailed black cockatoo it is uncertain if the move to a higher category of threat is related to management activities. The Department will report to the Conservation Commission and Minister for Environment in 2009.

For the brush-tailed phascogale it is uncertain if the move to a higher category of threat is related to management activities. Due to the uncertainty the Department reported to the Conservation Commission and the then Minister for the Environment in March 2008. Under the FMP requirements the Conservation Commission has been evaluating the need for a revision of management practices, in the context of its assessment and auditing function, in consultation with the Department. A working group comprised of officers from the Department and the Conservation Commission was formed with the purpose of assessing precautionary measures, beyond a pure research approach, for the management of the brush-tailed phascogale. An evaluation was presented at the Conservation Commission's meeting of 10 November 2008 with the resolution that the report findings be further investigated with the aim of identifying options for immediate action.

The conservation status of the woylie changed from conservation dependent to endangered in 2008. The woylie was the first species to be removed from the threatened species list in 1996 due to management actions. Ongoing monitoring of this species has detected a substantial decline in population numbers such that it again met the criteria for listing as threatened. Population declines have been observed throughout the range of the woylie, affecting both extant natural populations and re-introduced populations. The Department has initiated a major research project and a comprehensive project report has been prepared and findings from a range of investigations were presented to a workshop in February 2008. Details of this research are available at www.dec.wa.gov.au/programs/saving-our-species/woylie-conservation-researchproject.html. Results to date indicate that the decline in woylie populations is unlikely to be driven by habitat loss or fragmentation, fire or other direct human intervention. The Department is of the view that the elevation in category of threat of the woylie is not related to management activities and therefore is not a shortfall in relation to the performance target for this KPI. Further information about the decline in woylie populations and possible factors contributing to decline are provided in the report on KPI 3.

Threatened ecological communities

The only change to the conservation status of threatened ecological communities occurred between 2005 and 2006 when the availability of higher resolution mapping resulted in one community that was listed as Vulnerable being identified as outside the boundary of the FMP area.

Table A3. List of species elevated to	a higher	category of threat	(2004-2008).
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Species	Category	New category	Reasons why elevated	Due to manage ment activities
Flora				
2004				
No species elevated	to higher catego	ory in 2004		
2005	to higher estage	nuin 2005		
2006	i to nigher catego	iry iii 2005		
Andersonia annelsii	New addition	CR	Sufficient information compiled to support a nomination for listing based on the occurrence from a single known population. Potential threats identified in the nomination include fire, drought and <i>Phytophthora cinnamomi</i> .	No
Laxmannia grandiflora	P2	VU	Sufficient information compiled to support a nomination for listing based on occurrence from only four known populations following thorough searching.	No
Reedia spathacea	P4	EN	Sufficient information compiled to support a nomination for listing based on inability to locate additional populations despite extensive survey, and the decline of two populations known to exist a decade earlier. This species is dependent on groundwater seepage and may be adversely affected by recent trends of lower rainfall. Drier conditions may also lead to peat swamps, where this species occurs, becoming more vulnerable to fire. Some populations are being disturbed by feral pigs.	No
Stylidium semaphorum	New addition	CR	Sufficient information compiled to support a nomination for listing based on the occurrence from a single known population. Potential threats identified in the nomination include successive fires and weeds.	No
2007			•	
No species elevated	to higher catego	ory in 2007		
2008 Cryptandra congesta	P	VU	Sufficient information compiled to support a nomination for listing based on the occurrence from a single known population at Mt Lindesay, within a national park proposed in the FMP. Key threatening processes include <i>Phytophthora cinnamomi</i> , inappropriate fire regimes and drying habitat conditions. Feral pig activity and incidental recreational activities such as motorbike riding and bushwalking also have the potential to contribute to population decline.	No
Eremophila glabra subsp. chorella,	Ρ	CR	This species is known from two populations, one being in the Mogumber Nature Reserve which is within the area covered by the FMP. The second population is within the metropolitan area and is subject to development pressure.	No
Goodenia arthrotricha	P	EN	This species is known from six populations, the largest of which is located on private property. Populations have declined at one site due to railway maintenance activities, and due to grazing and mining activities at a second site.	No
Grevillea fuscolutea	P	VU	Sufficient information compiled to support a nomination for listing based on the occurrence from a single known population in the Mt Lindesay area within a national park proposed in the FMP. Survey data indicate that this population has declined in size and condition compared with earlier surveys a decade or more ago. Key threatening processes having the potential to reduce the extent of the population include <i>Phytophthora</i> cinnamomi inappropriate fire	No

Species	Category	New category	Reasons why elevated	Due to manage ment activities
			regimes and drying habitat conditions. Feral pig activity and incidental recreational activities from motorbikes and walkers also have the potential to contribute to population decline.	
_				
Fauna				
2004 No species elevater	to higher catego	ry in 2004		
2005		y 111 2004		
Calyptorhynchus banksii naso (red-tailed black cockatoo)	P3	VU	Status of this species was increased to vulnerable because of concerns about the limited availability of nesting sites, and the loss of known nesting sites monitored by the WA Museum. Nesting sites have been lost due to cumulative habitat loss associated with clearing for agriculture, competition from feral bees and other birds, and to loss of mature trees resulting from bushfires and associated fire suppression operations.	Uncertain
2006	•		1	1
Atrichornis clamosus (noisy scrub-bird)	VU	EN	Status of this species was elevated to Endangered on a precautionary approach recognising that areas of core habitat in and adjoining the Two Peoples Bay Nature Reserve may be subject to increased fire frequency as a result of climate change. These reserves are not within the area covered by the FMP. Recommendation included a requirement to review the status after five years to determine whether in fact the species had continued to decline.	No
Phascogale tapoatafa subsp. WAM M434) (brush-tailed phascogale)	P3	VU	This species is now recognised as a Western Australian sub-species. Population sizes have declined across the range of the species and appear to be amongst the lowest on record. Populations are known to fluctuate widely, and the species is difficult to survey except when abundant.	Uncertain
2007				
No species elevated	to higher catego	ry in 2007		
2008	•			
Bettongia penicillata (woylie)	Conservation dependent	EN	Re-listed as Endangered following declines in population size (>50 per cent) across the range of the species, within both State forest and conservation reserve	No

KPI 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.

Objective of KPI 3

The objective of KPI 3 is to assess the success of the implementation of the Forest Management Plan in achieving its targets for conservation of biodiversity through protecting and assisting the recovery of threatened and conservation dependent species of fauna.

Results and explanatory notes

Data relevant to KPI 3 are provided by the Western Shield program. Monitoring sites have been established to provide information about population trends of fauna in the critical weight range (35–5,500 g) in response to fox control by 1080 baiting. Some information is also obtained about reptiles and birds. Survey methodology is intended to measure population changes at a landscape level. Data presented here relate to the woylie (*Bettongia penicillata*) and the chuditch (*Dasyurus geoffroii*) as both species have target capture rates defined in recovery plans.

Woylie

The Woylie Recovery Plan (Start *et al.* 1995) established a capture rate of 7.5 per cent at monitoring sites as one of the criteria for successful recovery. Woylies were re-introduced to Batalling in 1982 with fox baiting commenced but not maintained. Capture rates at Batalling consistently exceeded 7.5 per cent within four years of the introduction of quarterly fox baiting in February 1991 (Figure A3). Capture rates began to the decline in 2003 and since 2006 have been below the 7.5 per cent criteria for successful recovery. Woylies were also re-introduced at Julimar and Centaur and while these populations have persisted, capture rates have remained below 7.5 per cent. Both Julimar and Centaur have a moderately high abundance of chuditch which is a known predator of the woylie, and it is possible that predation by chuditch may have contributed to the lack of recovery success.

Population declines have been observed throughout the range of the woylie, affecting both extant natural populations and re-introduced populations. The Department has initiated a major research project involving a number of partner agencies to investigate potential causes of the decline. A comprehensive project report has been prepared and findings from a range of investigations were presented to a workshop in February 2008. Details of this research are available at www.dec.wa.gov.au/programs/saving-our-species/woylie-conservation-research-project.html. Results to date indicate that the
decline in woylie populations is unlikely to be driven by habitat loss or fragmentation, fire or other direct human intervention. The hypothesis proposed to explain the decline is that woylie populations are being affected by a disease that renders them vulnerable to predation, with cats and foxes the most important predators. The pathogen associated with the disease has not been confirmed.

For the woylie the trap success rate is below the target specified in the recovery plan and therefore the performance target of this KPI is not achieved. The Department will investigate the cause and report to the Conservation Commission and the Minister for the Environment.



Figure A3. Capture rates for woylie at selected monitoring sites within the area of the FMP.

Chuditch

The Chuditch Recovery Plan (Orell and Morris 1994) established a capture rate of one per cent at monitoring sites as one of the criteria for successful recovery. Capture rates from the monitoring sites at Batalling, Julimar, Centaur and Noggerup have been sustained at or above one per cent within three years of quarterly baiting being implemented. Capture rates exceeding eight per cent indicate very high densities of chuditch. Capture rates at Batalling dropped after woylie capture rates reached 20 per cent and this is likely due to competition for traps, with woylies being more likely to enter a trap to the exclusion of chuditch. Chuditch have not been recorded at Batalling since 2006 and the reason for this has yet to be established.



Figure A4. Capture rates for chuditch at selected monitoring sites within the area of the FMP.

Productive Capacity

Nine KPI are reported below in relation to productive capacity.

KPI 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 target shortfall	The Forest Products Commission to advise the Conservation Commission how it will manage removals to be under the end of plan target. The Conservation Commission to evaluate the need for a revision of harvesting levels in the context of its assessment and auditing functions, in consultation with the Department.

Objective of KPI 5

The objective of KPI 5 is to report on the level of production of jarrah and karri sawlogs relative to the sustained yield determined for the period of the Forest Management Plan (FMP).

Background and context

The yield from the jarrah and karri forests is regulated on the basis of sawlogs, so this KPI focuses on sawlog removals over annual and three-year rolling periods to monitor removals, recognising that relatively small annual variations may be necessary in response to market and operational factors.

Annual harvest plans are prepared that make available a sufficient mix of forest areas to meet the sustained yield targets. Each area cut over, or coupe, is separately identified and

all log products removed by Forest Products Commission contractors are tracked for accounting purposes in a computer database known as the Logging Operations Information System (LOIS). This system is regularly audited and has been used to report and monitor log removal and product sales over several successive forest management plans.

Each truckload of logs is issued with a Delivery Note that records the origin and product details of the load, and the net weight of the logs and customer information is subsequently obtained and uploaded into LOIS. All logs recovered and sold from State forest and timber reserves are tracked through LOIS (including logs arising from mining, road and infrastructure clearing).

Because the sustained yield is determined in units of volume and log deliveries are recorded in tonnes, appropriate weight:volume conversion factors have been determined and are applied to the various products. The reconciliation of sustained yield and removals is therefore undertaken on a volumetric basis.

LOIS provides an efficient and accurate basis for monitoring sawlog removals for this KPI, but generally provides an underestimate of the total volume of non-sawlog products made available during harvesting if there are insufficient markets for all the material produced. The high demand and ready market for sawlogs maximises the recovery and removal of sawlogs from coupe operations, while varying proportions of the other products may be sold, stockpiled for later sale, or retained on site (felled or standing) in the forest. The utilisation monitoring plots that provide the basis for reporting on KPI 11 can be used to provide a separate sample estimate of that portion of the non-sawlog resource made available but not removed.

There is a range of log products delivered to Forest Products Commission customers equivalent to the first and second grade sawlog specifications. These include, for example, veneer logs, electricity poles and bridge piles. Consequently, for consistent reporting against this KPI and the FMP over a series of years, a set of product groups has been defined and an appropriate weight:volume conversion factor allocated to each product.

The annual volume figures reported in this KPI will differ from those published in Annual Reports and documents such as the State of the Environment (2007) Report. This is largely because the figures for this KPI are collated and reported by calendar years for direct comparison with the basis of the FMP sustained yield calculations and planning period (2004 to 2013). In contrast, the Forest Products Commission is required to publish annual log production figures on a financial year basis.

Results and explanatory notes

Jarrah first and second grade sawlogs

The performance target of not more than 10 per cent more than the average annual yield to be removed in any one year has been met in each year (Table A4).

Table A4. Jarrah first and second grade sawlog removals during 2004 to 2007 relative to the 131,000 m³ annual sustained yield.

Jarrah firs	arrah first and second grade sawlog volume (cubic metres)						
	Annual	volumes			Cumulativ	ve volumes	
Year	KPI	Annual	Variation	n Period KPI Periodic Va			
	upper	removals			upper	removals	
	limit				limit		
2004	144,100	120,251	- 23,849				
2005	144,100	135,677	- 8,423				
2006	144,100	120,507	- 23,593				
2007	144,100	122,598	- 21,502				
				2004 to	412,650	376,435	- 36,215
				2006			
				2005 to	412,650	378,782	- 33,868
				2007			

Karri first and second grade sawlogs

Except in 2006, the annual removal of first and second grade karri sawlogs was within the annual performance target of 10 per cent more than the average annual yield in each year. The three-year periodic removals have been within the performance target.

Table A5. Karri first and second grade sawlog removals during 2004 to 2007 relative to the 54,000 m³ annual sustained yield.

Karri first	Karri first and second grade sawlog volun			(cubic met	tres)		
	Annual	volumes			Cumulativ	ve volumes	
Year	KPI	Annual	Variation	Period	KPI	Periodic	Variation
	upper	removals			upper	removals	
	limit				limit		
2004	59,400	51,986	- 7,414				
2005	59,400	53,691	- 5,709				
2006	59,400	60,325	+ 925				
2007	59,400	55,151*	- 4,249				
				2004 to	170,100	166,002	- 4,098
				2006			
				2005 to	170,100	169,167	- 933
				2007			

* Figure incorporates an adjustment to the raw delivery data to reflect a change in the minimum sawlog size that was accepted by customers in 2007.

Annual volume of jarrah and karri sawlogs below first and second grade.

The annual volume of logs below first and second grade is included in the figures reported below for 'other volume'.

It is not possible to compute the volume sold for value added products, as the ultimate processing and product recovery from separate categories of lower-grade logs is not recorded in existing information systems.

Annual volume of other sawlog products and species.

Year	Annual	Cumulative	KPI cumulative
	removals	total removals	limit
2004	308	308	
2005	13	321	
2006	637	958	
2007	214	1,172	
2004 -2013			13,000

 Table A6.
 Wandoo sawlog volume (cubic metres)

The cumulative total removals of wandoo sawlog to the end of 2007 was 1,172 m³, which constitutes nine per cent of the total allowable volume over the 10 years of the FMP.

Year	Annual	Cumulative	KPI cumulative
	removals	total removals	limit
2004	170	170	
2005	478	648	
2006	668	1,316	
2007	766	2,082	
2004 -2013			16,000

Table A7. Blackbutt sawlog volume (cubic metres)

The cumulative total removals of blackbutt sawlog to the end of 2007 was 2,082 m³, which constitutes 13 per cent of the total allowable volume over the 10 years of the FMP.

Year	Annual	Cumulative	KPI cumulative
	removals	total removals	limit
2004	404	404	
2005	355	759	
2006	310	1,069	
2007	98	1,167	
2004 - 2013			19,000

Table A8. Sheoak sawlog volume (cubic metres)

The cumulative total removals of sheoak sawlog to the end of 2007 was 1,167 m³, which constitutes six per cent of the total allowable volume over the 10 years of the FMP.

The comparatively lower volumes of wandoo, blackbutt and sheoak sawlogs sold to date are due to a combination of factors, including a reduced market for the various products and the variable availability of these species within the suite of coupes that have been available on annual harvest plans.

N	Annual	FMP	Cumulative	FMP	Cumulative
rear	removais	limit	total	limit	Variation
			Terriovais		FMP)
2004	132,432	534,000	132,432	534,000	- 401,568
2005	201,804	534,000	334,236	1,068,000	- 733,764
2006	150,349	534,000	484,585	1,602,000	- 1,117,415
2007	160,996	534,000	645,581	2,136,000	- 1,490,419

The annual and cumulative volumes of jarrah other bole volume removed to the end of 2007 are significantly less than the upper limits specified in Table 4 of the FMP. This reflects an absence of markets for lower grades of log material produced during integrated harvesting operations, and the limited extent to date of thinning operations in young regrowth stands. The figures do not include that portion of the non-sawlog volume made available but retained either standing or felled within the operations.

Year	Annual removals	FMP upper limit	Cumulative total removals	FMP cumulative limit	Cumulative variation (Actual – FMP)
2004	143,504	117,000	143,504	117,000	+ 26,504
2005	147,252	117,000	290,756	234,000	+ 56,756
2006	170,249	117,000	461,005	351,000	+ 110,005
2007	148.727*	117.000	609.732	468.000	+ 141.732

Table A10. Karri other volume (cubic metres)

* Figure incorporates an adjustment to the raw delivery data to reflect a change in the minimum sawlog size (and hence proportion sold as other bole volume) that was accepted by customers in 2007.

The annual and cumulative volume of karri other bole volume removed each year has exceeded the upper limit specified in Table 4 of the FMP. Examination of the operations from which these volumes were sourced, and the average volume removed in each operation type, indicate the following reasons for the annual removals ranging between 123 per cent to 146 per cent of the limits specified in the FMP:

- The majority of the karri other bole volume arises from the first thinning of young regrowth karri stands regenerated since 1970;
- The volume yield per hectare obtained from these stands depends upon the timing and intensity of the thinning, which is related to the age and site quality of the stand. The yield also varies markedly between stands that have been planted and those regenerated from seed;
- During the period 2004-2007 approximately 1,005 ha of young regrowth stands have been thinned each year. This total area is consistent with the base area settings of up

to 1,260 ha per annum adopted in the woodflow projections that contributed to the FMP;

• However, the relative mix of site quality, planting/seeding origin and age has varied significantly, as well as the average volume yielded per hectare. The projected volumes for first thinning treatments ranged from 62 to 93 m³ha⁻¹ of karri other bole volume. In practice, the realised volumes have ranged from 78 to 162 m³ha⁻¹, with a high proportion of the area thinned each year being in the higher yielding stands.

Consequently, while the KPI figures indicate the FMP volume limit for this product has been exceeded, this results from consistently higher yields being recovered than assumed in the base settings for the FMP. This reflects a short-term bias toward the higher site quality or seeded/hand planted origin of stands being thinned to date and the relative proportions of site quality assumed to be accessed during this period.

There is no consequence to the sawlog sustained yield of the higher non-sawlog production reported above. The karri sawlog sustained yield is forecast to increase substantially in future decades (more than double the current sustained yield) as the large areas of regrowth karri mature.

In response to the elevated level of production, the Forest Products Commission has advised the Conservation Commission that it does not believe the additional production of karri other bole volume relative to the upper limit represents a significant departure from the intent of the FMP, and recommends that the upper limit be varied:

The Forest Products Commission has previously advised the Conservation Commission that the level of production of karri other bole volume is consistent with achieving Objective 16, and in doing so provides for volumes greater than the quantities specified in Table 4 of the FMP. The Forest Products Commission considers that it is producing other bole volume from thinning of young karri in a manner as indicated in the FMP (page 33) "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 karri forest."

The expanded program of karri first thinning operations is driven by Objective 16 (FMP page 38) that encourages the thinning of regrowth stands to realise the productive capacity of the forest.

The additional volumes that have been generated from the expanded program of thinning young karri forest (see KPI 12) have been sourced from operations that are consistent with the Department's Silvicultural Guidelines, and have not resulted in an excessive yield of sawlogs (see Table A5 above). The quantities specified in Table 4 should be varied as proposed by the FMP where this volume is sourced in this manner.

In addition, elsewhere in this report the following statement is made: "Karri thinning operations that would allow for relatively safer and less costly prescribed burning of regrowth have been limited to an area of about 5,000 ha distributed over numerous, widely scattered coupes that cannot be readily aggregated into consolidated areas that could be burnt as buffer zones. An expanded program of thinning could be beneficial to fire protection but the scale of the program is constrained by the FMP."

It is the Forest Products Commission's view that due to the expanded program of karri thinning, and the volume yield thereby provided, is consistent with the FMP and, if necessary, Table 4 should be varied to reflect the yield derived from this program.

Year	Annual removals	FMP upper limit	Cumulative total removals	FMP cumulative limit	Cumulative variation (Actual – FMP)
2004	8,889	196,000	8,889	196,000	- 187,111
2005	7,326	196,000	16,215	392,000	- 375,785
2006	18,212	196,000	34,427	588,000	- 553,573
2007	25,989	196,000	60,416	784,000	- 723,584

 Table A11. Marri all logs volume (cubic metres)

The annual and cumulative volumes of marri (all bole volume) removed to the end of 2007 are significantly less than the upper limits specified in Table 4 of the FMP. This reflects an absence of markets for lower grades of log material produced during integrated harvesting operations and thinning operations in young regrowth stands. The figures do not include that portion of the non-sawlog volume made available but retained either standing or felled within the operations.

KPI 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.

Objective of the KPI

The objective of KPI 6 is to assess the success of the implementation of the Forest Management Plan by reporting trends in the total area harvested for each silvicultural objective in the context of the total forest area available for timber production.

Background and context

The native forest available for timber production comprises a broad range of forest structure and composition, on sites of varying productivity. Consequently, when areas are cut over, the silvicultural guidelines seek different silvicultural objectives according to the existing stand structure and condition. For example, where there is a predominance of vigorously growing trees, the stand may be thinned to promote growth on the retained trees whilst providing a yield of log products; where this is not the case, the stands are harvested with the object of regenerating them.

The total area that is cut over each year to the various silvicultural objectives provides a general indication of the rate of harvest across that portion of the forest that is available for timber production. Changes in the relative proportion of area cut over to the different objectives will reflect variations in the structure and composition of the forest made available on an annual harvest plan, as well as the degree of consistency in the application of the Silviculture Guidelines.

Annual targets for the area cut over to each objective have not been set. This is for several reasons. The placement of coupes onto an annual harvest plan is influenced by a number of operational and planning factors aside from the structure and composition of the forest, including the seasonal prescribed burning program and the need for geographic spread across timber supply zones. Annual fluctuations in the areas cut over to each silvicultural objective are therefore expected due to the variation inherent in the mix of forest in coupes in annual and three-year harvest plans. The month of harvest completion can also influence the year for which figures are recorded, with apparent spikes in the total area for one year sometimes being partly an artefact of the size of the coupes and lengthy period that harvest operations may have taken to completion.

Results and explanatory notes

During the period 2004 to 2007, the total area of native forest cut over each year averaged 9,582 ha, or 1.1 per cent of the total area of 848,380 ha of native forest available for timber production under the FMP. Most of this area was jarrah (average of 7,972 ha per year or 1.1 per cent of available 751,910 ha), followed by karri (average of 1,510 ha per year or 2.5 per cent of available 60,000 ha), with small areas of wandoo (average of 100 ha per year or 0.3 per cent of available 36,470 ha). Note that the annual area cutover relative to the total area available for timber production does not infer a

rotation length for the species, due to the inclusion of thinning and partial cutting objectives in the area cut over.

While the total area of jarrah and karri cut over has been relatively consistent each year, the proportion cut to each silvicultural objective has fluctuated across the reporting period (Table A12).

Table A12. Annual area (hectares) of native forest cut over to each silvicultural objective.

Forest type	Silvicultural objective			Area cut o	over ^{#^} (ha)	
			2004	2005	2006	2007
Jarrah	Promote growth on retained trees (thinning)		470	410	1,020	360
	Release regeneration (gap)		480	230	680	410
	Establish regeneration-eastern jarrah (shelterv	vood)	770	720	1,090	500
	Establish regeneration-western jarrah (shelter	wood)	3,040	2,160	1,710	2,540
	Single tree selection (retention in dieback area	is)	1,420	1,810	2,230	2,200
	Selective		1,460	520	1,070	1,190
	Other (mining and clearing for utilities)		910	920	650	920
		Jarrah total	8,550	6,770	8,450	8,120
Karri	Establish jarrah/karri regeneration		80	30	60	20
	Establish regeneration (karri clearfall)		170	480	350	440
	Establish regeneration (partial karri clearfall)		120	10	0	100
	Promote growth on retained trees (thinning)		930	1,090	1,160	1,000
		Karri total	1,300	1,610	1,570	1,560
Wandoo	Establish regeneration		0	0	90	20
	Promote growth on retained trees (thinning)		0	30	220	40
		Wandoo total	0	30	310	60

* Stands that have been cutover and retain a high proportion of cull (unmerchantable trees), and in which limited silvicultural treatments have been applied.

These statistics will vary slightly from figures published in previous DEC and FPC Annual Reports due to the subsequent updating of some objectives following later silvicultural treatments.

[^] The areas reported are the net area cut over, which is equal to the entire coupe area LESS the area of informal reserves and other uncut patches within the coupe.

Over half of the area of jarrah forest cut over each year was cut to shelterwood or single tree selection (dieback) objectives. Cutting to release regeneration (gap) or thinning to promote growth on retained trees were the smallest proportion of the area cut over each year. In contrast, the thinning objective was sought in over two-thirds of the total area of karri cut over each year. This is principally first thinning treatments in regrowth karri stands aged less than 30 years.

The figures in Table A12 are the aggregated area recorded as cut to the particular objective. They do not directly indicate whether a particular silvicultural objective as applied in the field was the most appropriate choice for the stand structure and composition. Field monitoring suggests that during the period 2004 to 2006 there was considerable variation in the scale (i.e. minimum patch size) at which the jarrah silvicultural objectives were defined in the field, and in the consistency of treemarking. Moreover, some of the jarrah objectives may not be achieved unless appropriate treatments are applied following harvesting to attain the necessary stand density. While the extent of the silvicultural treatments is recorded by the Forest Products Commission, supplementary data on the outcome achieved are not recorded post-treatment. The

Department will progress improved reporting of silvicultural outcomes with the Forest Products Commission.

KPI 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.
Response to target shortfall	The Forest Products Commission to initiate a control program.

Objective of KPI 8

The objective of KPI 8 is to assess the success of the implementation of the Forest Management Plan in achieving its target of not allowing Sirex to become established in plantations, and thus minimising the impact of Sirex on the productive capacity of pine plantations in the plan area.

Results and explanatory notes

Over the period from 2004 to 2008 the Forest Products Commission has only established trap trees as per the protocol outlined in KPI 8 in one year (2005-6). The result is show in Table A13.

Various reasons have been provided as to why the trap pole establishment was discontinued, including availability of staff, the non availability of technical support and a lack of confidence in the procedure. Advice provided suggests that:

- It is difficult to ensure the trap trees die at the correct rate to attract the Sirex wasp if it were present;
- Trap trees are rapidly infested with the *lps grandicolis* insect and this may deter any infestation with *Sirex*; and
- Sirex need to be in high numbers to infest trap trees and this may preclude any possibility of control.

Plantations	Number of	Number of
assessed	trees assessed	infested trees
Gnangara	9	Nil
Pinjar	8	Nil
Yanchep	11	Nil
Baudin	5	Nil
Murray	6	Nil
Brunswick	6	Nil
Wellington	6	Nil
Ferndale	4	Nil
Folly	5	Nil
Gorrie	5	Nil
Greystone	5	Nil
Grimwade	5	Nil
Lewana	4	Nil
Ludlow	4	Nil
McLarty	6	Nil
Myalup	7	Nil
Southamton	6	Nil
Stockton	4	Nil
Vasse	9	Nil

Table A13. Trap tree establishment in 2005/6

Note – The trap trees were checked periodically by field staff for the evidence of Sirex.

The Forest Products Commission has maintained its membership of the National Sirex Coordination Committee and a system using static traps has been trialled (Table A14) to replace the trap poles. The static traps are designed to attract the *Sirex* wasp and when the insect attempts to land, it falls into a fluid reservoir and is killed. Samples are taken away later for identification.

The benefits of using static traps include reduced variability associated with trap trees, *Ips* infestations are not a factor, *Sirex* can be detected at low numbers, *Sirex* can be detected as they appear rather than after they have infested a tree and emerged, and traps can be located close to points of entry to detect insects prior to reaching plantations.

Plantations	Number of	Number of
assessed	trees assessed	infested trees
Gnangara	1	Nil
Myalup	1	Nil
Wilcock	1	Nil
Napier (Albany)	1	Nil

 Table A14. Static trap establishment in 2007/8

KPI 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.	

Objective of KPI 9

The objective of KPI 9 is to assess the success of the implementation of the Forest Management Plan in achieving its targets in regard to the time taken to regenerate harvested areas.

Background and context

Completing regeneration treatments following harvesting operations is essential in maintaining the long term productive capacity, flora composition and structural attributes of native forests. Time delays between harvesting and regeneration reduce the ability to achieve prescribed burn outcomes and may lead to site degradation. Ensuring that areas are regenerated within target timeframes increases the likelihood of achieving effective regeneration and potentially reduces the time taken for biodiversity to return to predisturbance levels.

The time taken to harvest an individual coupe will vary according to a number of factors including volume of product to be harvested and seasonal access restrictions. The date that harvesting is considered complete is when all fellers' blocks within the coupe have been certified as complete. It should be noted that further transportation of timber products from landings to customers will usually occur after this date.

Regeneration of harvested areas involves the completion of a sequence of tasks e.g. harvesting, post-harvest treatments, burn preparation, burning and in some cases planting. The date of the last operation in the sequence of regeneration treatments is seen as the date regeneration treatments were completed.

Results and explanatory notes

The performance target for jarrah was not met in the sample of coupes harvested during the first three years of the plan for which data was available (Table A15).

Table A15. Per cent of sampled jarrah harvest coupes in various categories of time between harvest and completion of regeneration treatments. The sample covers coupes in which harvesting was completed during the period 2004-2006, in which regeneration was not based on planting of seedlings and hence where the performance target is 100 per cent of areas treated to be completed within 18 months. Numbers in parentheses refer to the number of coupes contributing data for that year.

Year harvest completed	Less than 18 months	18 to 30 Months	Greater than 30 months	Regeneration not recorded at 30/6/08	Total
2004	13% (1)	38% (3)	38% (3)	13% (1)	100% (8)
2005	29% (2)	57% (4)	0% (0)	14% (1)	100% (7)
2006	50% (8)	6% (1)	6% (1)	38% (6)	100% (16)
Total	35% (11)	26% (8)	13 (4)	26% (8)	100% (31)
Target	100%				

In response to this shortfall, the Forest Products Commission has advised the Department that the lengthy periods can be attributed to a number of factors, most of which relate to the capacity to conduct the regeneration burns in a timely manner or under suitable conditions:

- a large backlog of areas was awaiting regeneration burns at the commencement of the FMP;
- a lack of markets for forest residue logs has generated delays in the removal of logs from landing stockpiles in preparation for regeneration burns;
- the need to time the burning to be coincident with the maturation of seed crops;
- restricted opportunities to undertake burning due to seasonal conditions;
- delays in completing other silvicultural treatments;
- operational preferences to maintain coupes available for access during moist soil conditions;
- competition for equipment and staff resources to conduct regeneration burning when wildfire suppression or prescribed burning programs are underway; and
- the opportunity to undertake some burns has been restricted to comply with smoke management requirements.

The Forest Products Commission has indicated it will address the shortfall by reviewing its performance against those aspects which it has an element of control over, and has requested the cooperation of the Department in a review of its performance to conduct regeneration burns in a timely manner and under suitable conditions. The Department will determine the need for a revision of management practices, in consultation with the Conservation Commission.

The performance target was partially met in the available sample of karri coupes (Table A16).

Table A16. Per cent of sampled karri harvest coupes in various categories of time between harvest and completion of regeneration treatments. The sample covers coupes in which harvesting was completed during the period 2004 to 2006, in which regeneration was based on planting of seedlings and hence where the performance target is 75 per cent of areas treated to be completed within 18 months and 100 per cent of areas treated to be completed within 18 months and 100 per cent of areas treated to be completed within 30 months. Numbers in parentheses refer to the number of coupes contributing data for that year.

Year harvest	Less than	18 to	Greater than	Regeneration not	Total
complete	18 months	30	30 months	recorded at 30/6/08	
		months			
2004	50% (2)	50% (2)	0% (0)	0% (0)	100% (4)
2005	70% (7)	30% (3)	0% (0)	0% (0)	100% (10)
2006	100% (7)	0% (0)	0% (0)	0% (0)	100% (7)
Total	76% (16)	24% (5)	0% (0)	0% (0)	100% (21)
Target	75%	100 %			

The target of 75 per cent was not met in the first two years of the FMP. In response to this shortfall the Forest Products Commission has advised the Department that delays were due to a reduced capacity to conduct regeneration burns in a timely manner due to restrictions to comply with smoke management requirements. More areas are now being prepared to facilitate late autumn burning. The Department will determine the need for a revision of management practices, in consultation with the Conservation Commission

KPI 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.

Objective of KPI 10

The objective of KPI 9 is to assess the success of the implementation of the Forest Management Plan in achieving its targets in regard to the effective regeneration of forest and plantation areas.

Background and context

In order to maintain the productive capacity of forest and plantation areas and to provide for a range of other forest values, forest and plantation areas must be regenerated after particular types of disturbance.

Departmental and Forest Products Commission guidance documents detail a number of survey requirements to assess the effectiveness of native forest regeneration following harvesting. Regeneration areas are sample surveyed to determine whether adequate stocking rates have been achieved following establishment operations. Areas that fall below the standards for each regeneration type receive remedial treatment to ensure that targets are met in the following year. A low requirement for remedial treatment indicates that management practices are adequate. A high level of remedial treatment would indicate that management practices need to be reviewed.

Results and explanatory notes

The proportion of the area of forest regenerated each year to karri, jarrah and pine plantation that required remedial treatment is summarised in Tables A17, A18 and A19 respectively. The target for regeneration success in native forest areas has been consistently achieved, although there remains a significant backlog of survey work in jarrah to be completed.

Table A17. Annual area of karri forest regenerated that was surveyed and required remediation to achieve stocking density standards specified in the Silviculture Guidelines.

Year	Area (ha) regenerated in previous year	Area (ha) surveyed	Area (ha) understocked	Area requiring remedial treatment (% of area surveyed)
2004	1,409.6	1,381.5	8.4	0.6
2005	1,323.0	1,314.6	5.9	0.4
2006	737.5	731.6	1.0	0.1
2007	674.5	673.5	4.0	0.6

Table A18. Annual area of jarrah forest regenerated that was surveyed and required remediation to achieve stocking density standards specified in the Silviculture Guidelines.

Year	Area (ha) regenerated in previous year	Area (ha) surveyed	Area (ha) understocked	Area requiring remedial treatment (% of area
2004	1,614.7	952.1	0	0
2005	962.6	512.2	0	0
2006	287.7	222.4	0	0
2007	302.9	173.8	0	0

Table A19. Annual area of plantation (pine) forest regenerated that was surveyed and required remediation to achieve stocking density standards specified in the Silviculture Guidelines.

Year	Area (ha) regenerated in previous year	Area (ha) surveyed	Area (ha) understocked	Area requiring remedial treatment (% of area
				surveyed)
2004	1,418.1	1,418.1	105.0	7.4
2005	1,455.8	1,455.8	143.0	9.8
2006	1,432.7	1,432.7	45.0	3.1
2007	1,511.5	1,511.5	52.0	3.4

The target for regeneration success in plantation areas was not achieved in the first two years. The Forest Products Commission has advised the Department that:

- the shortfall in 2004 and 2005 in plantation establishment stocking targets has received remedial treatment; and
- the performance in 2006 and 2007 indicates there is no systematic deficiency in achieving the required performance target.

The Department has consulted with the Conservation Commission and determined that management practices are adequate.

KPI 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.

Objective of KPI 11

The objective of KPI 11 is to assess the implementation of the FMP through tracking the volume of jarrah and karri sawlogs removed in harvest operations relative to the volumes forecast in the calculation of sustained yields.

Results and explanatory notes

A total of 126 inventory plots were re-established prior to timber harvesting commencing in coupes to compare predictions of the sawlog yield with the volume removed during harvest. Analysis of the 96 plots available from jarrah operations was the priority for this report, because the 30 plots in karri operations are in varying stages of completion and data entry. The majority of the karri plots are located in thinning operations which contribute a smaller proportion of sawlog supply. The data presented below therefore refer only to jarrah sawlog.

Measurements in a total of 96 plots in jarrah forest harvested during the period 2004 to 2007 were analysed to compare predictions of the sawlog yield with the volume removed during harvest. These analyses compared the volume harvested in individual plots to the forecast yield for the geographic and silvicultural strata used in the sustained yield calculation (Table A20).

Table A20. Per cent of the volume of jarrah sawlog removed in sample plots relative to the volume forecast for combinations of silvicultural objective and region. Figures in parentheses are the number of plots contributing to the calculation.

Silvicultural objective of harvest operation	Per cent of sawlog removed relative to forecast (number of plots)			
	Swan South-west Warren			
	Region Region Region			
Promote growth on retained trees (thinning)	81 (5) 114 (5)			
Release regeneration (gap)	81 (1) 55 (1) 11 (3)			
Establish regeneration – eastern	100 (1) 79 (10)			
(Shellerwood)				
(shelterwood)				
Single tree selection (dieback areas)	53 (6) 155 (14) 355 (2)			
Selective*	48 (6) 42 (5)			
Jarrah sourced from mixed karri stands	0 (1) 148 (3)			

* Stands that have been cut over and retain a high proportion of cull (unmerchantable trees), and in which limited silvicultural treatments have been applied.

The number and geographic representation of the plots monitored is strongly influenced by the sequence and location of coupes on the annual harvest plans, and hence a balanced plot representation in all silvicultural and regional strata is difficult to achieve in a short period.

The small sample size for many combinations of silvicultural objective/region indicates that the absolute figures should be interpreted with caution. While further data will accrue, there is a clear trend of the volume of sawlog removed in the Swan Region being less than the forecast yields. Averaged across all plots in all regions the volume removed was 15 per cent less than forecast. The persistence of such a trend to 2013 would influence the settings adopted for the next FMP when calculating the sustained yields.

These trends were detected by year three of the FMP and detailed analysis for each plot was undertaken in collaboration with the Forest Products Commission. This analysis considered individual tree attributes, product specifications, silvicultural treemarking, and measurement precision. A range of factors was identified as contributing to the differences, with the individual factors and their magnitude varying between regions and silvicultural objectives:

- Variation between modelled and actual treemarking. The yield forecasts assume stands are treemarked to the precise thresholds in silvicultural guidelines. While field variation is expected, in some instances, more sawlog was retained in the forest because more trees than required by the guidelines were retained as crop or habitat trees within the stands. These trees remain available to potentially contribute to future yield;
- Trees forecast to be available for harvest were not taken. In areas containing a significant proportion of sawlogs of minimum size or marginal quality, trees included in the yield forecast were not removed due to a variety of market, operational safety and other reasons. These trees also remain available to contribute to future yield;
- Variation between modelled and applied sawlog specifications. Within a harvested tree bole, variations arose between the proportion of a log that was actually cut as sawlog in the field relative to the proportion of the log forecast (modelled) as a sawlog. Examples

include where a higher sawlog standard was applied in the field and hence not all sawlogs that met the minimum specification as modelled were removed; and

• The silvicultural objective that was implemented was not always consistent with the silvicultural objective assumed in the modelling. An overall reduction in the area cut to release regeneration (refer KPI 6) and higher than forecast area cut to establish regeneration (shelterwood) meant that more areas were marked to objectives that retain more trees per hectare than forecast.

In 2006 the Forest Products Commission undertook actions to enhance silvicultural training and improve log grading consistency. The issue of sawlogs of minimum size and quality being retained is ongoing and reflects in part the economic constraints on sawmilling and the absence of markets for other residue components of such logs (refer to KPI 5). The Department will seek to enhance the present monitoring system with improved quantification of log grading standards beyond the stump / plot basis. However, resource constraints have, and will continue to have, an impact on the level of monitoring that is achievable. The Department and the Forest Products Commission will put further emphasis on training in the implementation of silvicultural guidelines.

KPI 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.

Objective of KPI 12

The objective of KPI 12 is to assess the implementation of the FMP through tracking the area of regrowth jarrah and karri forests that have received a first thinning, relative to the area provisionally scheduled in the calculation of sustained yields.

Context

The sustained yields in the FMP assume that regrowth jarrah and karri stands are periodically thinned to promote sawlog growth. The timing and intensity of thinning treatments are prescribed in the Silviculture Guidelines. Depending on the site quality (productivity), stage of stand development and the stand density, areas of forest are provisionally scheduled for future thinning. Detailed stratification of the forest estate into these categories assists the scheduling of thinning operations, but such stratification is only progressed as resources permit, and is still being refined for jarrah stands. Such stratification work would be an important refinement to the calculation of sustained yields for the next FMP, but the extent of such work will need to be weighed against other priorities.

The achievement of early (first) thinning is particularly important because extended delays over years can, in jarrah stands, lead to an overstocked condition and markedly slower growth rates. This KPI therefore aims to monitor progress toward achieving the provisionally scheduled level of thinning in the regrowth jarrah and karri forests.

The woodflow projections for the sustained yields adopted broad strata of site quality and stand condition, and provisionally scheduled stands for thinning within aggregated five-year periods. Field inspection associated with the preparation of three-year harvest plans is used to refine the scheduling, which may include the deferral of thinning into the next period depending on the stage of stand development.

Results and explanatory notes

Karri

The total area of karri regrowth provisionally scheduled to be thinned during the period of the FMP comprised a base set of schedules and, given the strong commercial market for the regrowth wood and the availability of detailed stand stratification, provision was made for an expanded program up to a level that would not impact on the sawlog sustained yield. The total area provisionally scheduled for thinning averaged up to 1,260 hectares per annum (2,520 ha per biennium) over the period of the FMP, with a higher proportion of the area scheduled to be thinned in the latter period of the plan (2009-2013).

The area of regrowth karri thinned to December 2007 relative to the scheduling indicates that the thinning program is progressing ahead of the schedule (Table A21), but is within the overall average for the entire FMP.

Table A21. Area (hectares) of regrowth karri provisionally scheduled and actually thinned during the period 2004 to 2007. The figure for the area scheduled includes provision for an expanded first thinning program as provided for in the FMP.

Operation period	Area provisionally scheduled for first thinning (ha)	Area thinned (ha)	Variation (ha)
2004 – 2005	1,452	2,020	+ 568
2006 - 2007	2,103	2,160	+ 57

The faster rate of thinning will not impact future sawlog sustained yields (refer to KPI 11 for further information), and is considered by the Department to facilitate the reintroduction of strategic prescribed burning into these younger stands.

Jarrah

First thinning operations in regrowth jarrah were nominally scheduled to commence in 2006 in stands in the Warren Region that had been regenerated between 1974 and 1984. A program of approximately 450 hectares per annum was provisionally scheduled, based on broad site quality and stand age strata.

To October 2008, thinning in these stands has not commenced. Preliminary field inspection of some of the scheduled stands has indicated that refinement of the site stratification will be necessary to reschedule many areas, as they are not yet ready for thinning due to variable stocking and slower growth rates. The current absence of a market for the small residue jarrah and marri logs has delayed these operations, as non-commercial thinning will require significant funds and potentially complicate fire protection in these stands. The Forest Products Commission has been investigating markets and suitable harvesting equipment for these operations.

While a delay of several years in conducting thinning operations in these stands is not significant, lengthy delays will generate large backlogs and require alternate yield regimes to be adopted into the next FMP.

The causes of the delay in commencing first thinning operations in the regrowth jarrah stands and the consequences for sustained yield will be reported to the Conservation Commission by the Department and the Forest Products Commission.

KPI 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.

Objective of KPI 14

The objective of KPI 14 is to assess the success of the implementation of the Forest Management Plan through the management of the production of honey and by providing information on the number of apiculture sites.

Results and explanatory notes

Trend information is not available for apiary site data for 2004-2008. It is anticipated that trends will be reported for the next five year period of the plan. As at March 2008, there were 1,243 registered apiary sites located on lands managed by the Department within the FMP area. The proportion of sites varies between tenures, ranging from 68 per cent of sites located in State forest to four per cent within nature reserves (Table A22).

Table A22. Number of registered apiary sites (as at March 2008) by land tenure category within the Forest Management Plan area.

Land category / purpose	Number of apiary sites
State forest	803
National park	295
Conservation park	45
Nature reserve	47
Timber reserves	46
Unvested reserves	7

The Department continues to provide access for apiculture within the FMP area.

KPI 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.

Objective of KPI 15

The objective of KPI 15 is to assess the success of the implementation of the Forest Management Plan in seeking to sustain the productive capacity of the forest through monitoring the removal of wildflowers and seed.

Results and explanatory notes

Data for 2006 and 2007 have not been supplied for this review, limiting the reporting of trends to the comparison of 2004 and 2005 activity levels. The number of wildflower and seed picking endorsements and the relative quantity of stems harvested reduced by approximately 10 per cent between 2004 and 2005 (Tables A23 and A24).

Table A23. Registration, location and harvest statistics for wildflower pickers for 2004 and 2005.

	2004	2005
Number of grid reference squares* for which wildflower harvesting licenses were issued	19	19
Number of grid reference squares in which wildflowers were harvested	16	16
Number of registered [#] wildflower pickers	454	412
Number of registered wildflower pickers who submitted a value return^	92	77
Total number of wildflowers harvested (number of stems)	9,935,886	9,108,337

* Data are not available for "forest blocks" so data were analysed on the basis of the state-wide "grid reference" squares. The following grid reference squares were used to encompass the south west forests of WA (1811, 1812, 1813, 1814, 1911, 1912, 1913, 1914, 2004, 2011, 2012, 2013, 2014, 2102, 2111, 2112, 2113, 2114, 2123)

This is the total number of Commercial Purposes Licensees for the calendar year. i.e. any Commercial Producer's Licensee is able to take seed / wildflowers if they obtain the correct permissions / endorsements. Applicants specify these details on an application form, but these data are not reflected on their licence.

^ A return on which a value was given for stem / seed picked for that year. Therefore this number does not include those licensees who harvested but did not submit their return, or those licensees who submitted a "Nil" return.

Table A24. Registration, location and harvest statistics for seed pickers for 2004 and 2005.

	2004	2005
Number of grid reference squares for which seed collecting licenses were issued	19	19
Number of grid reference squares in which seed was harvested	15	13
Number of registered [#] seed pickers	454	412
Number of registered seed pickers who submitted a value return [^]	58	47
Total amount of seed collected (kg)	40,360.78 ¹	8,004.8 ²

Data are not available for "forest blocks" so data were analysed on the basis of the state-wide "grid reference" squares. The following grid reference squares were used to encompass the south-west forests of WA (1811, 1812, 1813, 1814, 1911, 1912, 1913, 1914, 2004, 2011, 2012, 2013, 2014, 2102, 2111, 2112, 2113, 2114, 2123)

This is the total number of Commercial Purposes Licensees for the calendar year. i.e. any Commercial Producer's Licensee is able to take seed / wildflowers if they obtain the correct permissions / endorsements. Applicants specify these details on an application form, but these data are not reflected on their licence.

A return on which a value was given for stem / seed picked for that year. Therefore this number does not include those licensees who harvested but did not submit their return, or those licensees who submitted a "Nil" return. 1

Data concerns due to reported collection of 30,000kg of Banksia grandis seed which is suspected to be cones for the

woodturning market, 4,047kg of Macrozamia riedlei seed and 4500kg of Paraserianthes lophantha seed.

2 Data concerns due to reported collection of 5000kg of Xanthorrhoea preissii seed.

Management of commercial harvesting

With respect to sustainability and species conservation from a flora harvesting perspective, the Department has recently produced Management of Commercial Harvesting of Protected Flora in Western Australia 1 July 2008 - 30 June 2013. This document has been endorsed by the Department of the Environment, Water, Heritage and the Arts, and has been developed by the Department to satisfy the requirements of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and to meet the legislative, policy and other requirements of the Western Australian Government for the period from 1 July 2008 to 30 June 2013. It is intended to address the goals of the National Strategy for the Conservation of Australia's Biological Diversity and the Department's draft Biodiversity Conservation Strategy. The plan is designed to meet the requirements for approval of a Wildlife Trade Management Plan under the EPBC Act.

The document covers management measures and strategies, and monitoring and assessment of the industry as a whole, including Crown land. It describes the various elements of the management system in place for the conservation of commercially harvested native plant taxa in WA.

In addition, leading on from this is the Department's Operations Manual for Management of the Flora Industry. This covers policy and management, regional operations and research on the flora industry.

Ecosystem Health and Vitality

One KPI is reported below in relation to ecosystem health and vitality.

KPI 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.

Objective of KPI 16

The objective of KPI 16 is to assess the success of the implementation of the Forest Management Plan in achieving its targets in relation to the management of fire by providing information on the temporal diversity of 'time since fire' within each Landscape Conservation Unit.

Context

The Department applies prescribed fire to achieve a 'time since fire' frequency distribution that accords with a theoretical negative exponential distribution. This theoretical distribution is based on inputs relating to the life history attributes and requirements of the vegetation occurring in forest areas. In particular the time to first flowering is considered in determining the minimum inter-fire period and the time to senescence is considered in determining the maximum inter-fire period. This approach to diversity in 'time since fire' ensures a fire induced diversity of the vegetation across the landscape. The approach is further described by Burrows (2008) Linking fire ecology and fire management in southwest Australian forest landscapes, Forest Ecology and Management: 2394-2406. Diversity in vegetation across the landscape ensures a diversity of habitats that facilitates diversity and persistence of the biota dependent on these habitats. Spatial and temporal diversity in 'time since fire' is one of the primary considerations of the Master Burn Planning process undertaken each year.

The frequency distribution of fuel age is examined at a whole of forest scale as well as Landscape Conservation Units within the FMP area. The degree to which the fuel age distribution conforms to the theoretical negative exponential curve gives an indication of how well the Department's fire management program is achieving the fire management for biodiversity conservation objectives of the FMP.

In reality, significant areas within a prescribed burn boundary (in the order of 10 per cent to 30 per cent) and even within a bushfire boundary are left unburnt. However, records depict the total area to which prescribed fire was applied within the boundaries of each prescribed burn unit. These unburnt areas continue to accumulate fuel until they are burnt at some future time. The data used in reporting for this KPI does not recognise the mosaic of fuel ages within these burnt areas. This limitation of the data means that there are significant areas of 'older fuels' within areas recorded as being burnt recently and being assigned a 'young' fuel age. This results in the fuel age distribution curves significantly under-representing the true quantum and extent of 'older' fuel ages. This deficiency in the data will be rectified over coming decades as more detailed records are

collected using remote sensing technology that allows the fine scale differentiation of burnt and unburnt areas within a prescribed burn or bushfire.

The fuel age category 'Unknown' is the area for which departmental records do not contain a fuel age record. These areas are usually small and consist of areas of land recently reserved to the Crown estate or small reserves on the periphery of the main forest belt.

In interpreting the results it is important to recognise that:

- the amount of older fuel ages is significantly under represented; and
- the desired match with a negative exponential curve is approximate and not exact.

Results and explanatory notes

The two data sets presented are:

- A frequency distribution of fuel age (time since fire) for the entire forest (defined as the total area of native vegetation on estate managed by the Department in the area covered by the Forest Management Plan) shown as Figure A5; and
- Frequency distribution of fuel age (time since fire) for each major Landscape Conservation Unit shown as Figures A6 to A22.

Whole of Forest Scale

The degree to which the fuel age distribution conforms with the theoretical negative exponential curve in Figure A5 gives an indication of how well the Department's fire management program is achieving the fire management objectives of the FMP at a 'whole of forest' scale.

Given the data limitations discussed above, Figure A5 shows a strong correlation with the desired negative exponential curve indicating that vegetation structural diversity is highly probable at an 'all of forest' scale for the FMP area.



Figure A5. Frequency distribution of 'time since fire' as a proportion of the entire area covered by the FMP. Reserved lands refers to areas in the formal conservation reserve system in this figure and all other figures in this KPI.

Landscape Conservation Unit Scale

The frequency distribution of fuel age for each of the Landscape Conservation Units gives an indication of the diversity of fuel age and by corollary understorey structural diversity and therefore habitat diversity at an individual Landscape Conservation Unit scale. The degree to which the fuel age distribution conforms to the theoretical negative exponential curve gives an indication of how well the Department's fire management program is achieving the fire management for biodiversity conservation objectives of the FMP within each Landscape Conservation Unit. It must be borne in mind that applying or withholding prescribed fire is also undertaken in each Landscape Conservation Unit to achieve land management objectives other than biodiversity conservation such as strategic bushfire risk management, research and silviculture. The fuel age distribution will be affected in balancing the requirements of these other land management objectives against the achievement of the desired distribution for biodiversity conservation.

Many of the Landscape Conservation Units on the Swan Coastal Plain or on the edges of the main forest belt are relatively small. Much of the land managed by the Department within these Landscape Conservation Units is fragmented with small area to boundary ratios. The age class distributions for these Landscape Conservation Units often lack diversity as single fire events can affect a large proportion of a small Landscape Conservation Unit. In addition, any decision to treat these areas with prescribed fire is significantly influenced by other land management considerations such as salinity and water logging effects, implications for invasive weeds and the requirements of neighbouring landholders. As a result the achievement of a negative exponential distribution is not considered feasible for these smaller, more fragmented Landscape Conservation Units.

The frequency distribution for the larger and more contiguous Landscape Conservation Units is set out in the following pages. The fuel age distributions for these Landscape Conservation Units indicate general conformity with the theoretical negative exponential distribution. In general, exceedances above the theoretical curve in younger age classes can be explained by the occurrence of recent bushfires or the need to manage fuels to mitigate the risk of bushfire to adjacent private assets. Exceedances in older age classes is generally due to the necessity to protect areas such as fire vulnerable karri regeneration until it is mature enough to be exposed to fire without causing unacceptable tree damage.



Figure A6. Frequency distribution of 'time since fire' for the Blackwood Plateau Landscape Conservation Unit.

The frequency distribution for time since fire for the Blackwood Plateau Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A6).



Figure A7. Frequency distribution of 'time since fire' for the Central Blackwood Landscape Conservation Unit.

The frequency distribution for time since fire for the Central Blackwood Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A7). The Landscape Conservation Unit is quite fragmented and a high proportion of asset protection burns is required to protect plantations and community values in and adjacent to the Central Blackwood Landscape Conservation Unit.



Figure A8. Frequency distribution of 'time since fire' for the Central Jarrah Landscape Conservation Unit.

The frequency distribution for time since fire for the Central Jarrah Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A8). The Landscape Conservation Unit abuts private property to the west along the scarp and a high proportion of asset protection burns is required to protect community values in and adjacent to the Landscape Conservation Unit.



Figure A9. Frequency distribution of 'time since fire' for the Central Karri Landscape Conservation Unit.

This Central Karri Landscape Conservation Unit contains large tracts of young karri regrowth that require fire exclusion for up to 25 years before they become tolerant to fire and can be burnt without unacceptable bole damage, hence the discrepancy between the desired and actual shape of the curve (Figure A9). Unfavourable weather conditions in the last three years have limited the opportunity for low intensity burning in karri stands.



Figure A10. Frequency distribution of 'time since fire' for the Collie Wilga Landscape Conservation Unit.

The frequency distribution for time since fire for the Collie Wilga Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A10).



Figure A11. Frequency distribution of 'time since fire' for the Monadnocks Uplands valley Landscape Conservation Unit.

The frequency distribution for time since fire for the Monadnocks Landscape Conservation Unit has a discrepancy with the desired shape of the curve (Figure A11) as a result of a large bushfire at Mt Cooke in 2003 resulted in a large area of five year-old fuels.



Figure A12. Frequency distribution of 'time since fire' for the North Western Jarrah Landscape Conservation Unit.

The frequency distribution for time since fire for the North Western Jarrah Landscape Conservation Unit has a discrepancy with the desired shape of the curve (Figure A12) because of the effect of the large Perth Hills wildfire of 2005.



Figure A13. Frequency distribution of 'time since fire' for the Northern Karri Landscape Conservation Unit.

The frequency distribution for time since fire for the Northern Karri Landscape Conservation Unit has a discrepancy with the desired shape of the curve (Figure A13) because this Landscape Conservation Unit contains large tracts of young karri regrowth that require fire exclusion for up to 25 years before they become tolerant to fire and can be burnt without unacceptable bole damage. Unfavourable weather conditions in the last three years have limited the opportunity for low intensity burning in karri stands.



Figure A14. Frequency distribution of 'time since fire' for the Northern Sandy Depression Landscape Conservation Unit.

The frequency distribution for time since fire for the Blackwood Plateau Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A14) and there is an impact from the large Perth Hills wildfire of 2005.



Figure A15. Frequency distribution of 'time since fire' for the Northern Upper Collie Landscape Conservation Unit.

The frequency distribution for time since fire for the Northern Upper Collie Landscape Conservation Unit was impacted by five large prescribed burns in this Landscape Conservation Unit over the last six years (Figure A15).



Figure A16. Frequency distribution of 'time since fire' for the South Eastern Upland Landscape Conservation Unit.

The frequency distribution for time since fire for the South Eastern Upland Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A16). Significant large interface with private lands containing eucalypt plantation north of Denbarker and south of Lake Muir requiring significant areas to be prescribed burnt for strategic fuel management.



Figure A17. Frequency distribution of 'time since fire' for the Southern Dunes Landscape Conservation Unit.

The Southern Dunes Landscape Conservation Unit is Located along south-west coast within D'Entrecasteaux NP and constituted of large areas of coastal heath vegetation (Figure A17).



Figure A18. Frequency distribution of 'time since fire' for the Southern Hilly Terrain Landscape Conservation Unit.

The Southern Hilly Terrain Landscape Conservation Unit was impacted by large wildfires in the Denbarker area in 2003 resulting in a large area of five year old fuels (Figure A18).


Figure A19. Frequency distribution of 'time since fire' for the Southern Karri Landscape Conservation Unit.

The frequency distribution for time since fire for the Southern Karri Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A19).

This Landscape Conservation Unit contains large tracts of young karri regrowth that require fire exclusion for up to 25 years before they become tolerant to fire and can be burnt without unacceptable bole damage. Areas around these stands have been burnt to provide strategic protection to this regrowth asset.



Figure A20. Frequency distribution of 'time since fire' for the Southern Swampy Plain Landscape Conservation Unit.

The Southern Swampy Plain Landscape Conservation Unit is characterised by inaccessible and sparsely roaded heath and forest vegetation (Figure A20). Several large prescribed burns have been implemented in the past five years.



Figure A21. Frequency distribution of 'time since fire' for the Strachan Cattaminup Landscape Conservation Unit.

The frequency distribution for time since fire for the Strachan Cattaminup Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A21). Extensive interaction with private property boundaries in the north of the Landscape Conservation Unit requires burning for strategic fuel management.



Figure A22. Frequency distribution of 'time since fire' for the Yornup Perup Landscape Conservation Unit.

The frequency distribution for time since fire for the Yornup Wilga Perup Landscape Conservation Unit generally conforms with the desired shape of the curve (Figure A22).

Soil and water

One KPI is reported below in relation to soil and water.

KPI 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 0).
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.

Objective of KPI 21

The objective of KPI 21 is to assess the success of the implementation of the Forest Management Plan in achieving its targets by providing information on the amount of soil damage as a result of timber harvesting.

Context

A number of changes to the soil management and monitoring system occurred during the reporting period and a consistent methodology providing comparable results that would readily identify trends is not available. The main elements contributing to this are:

- the definition of risk periods changed significantly and progressively in order to allow increased access during moist soil conditions whilst continuing to adopt a pro-active approach to achieve the intent of the FMP of avoiding unnecessary soil damage;
- timing of surveys shifted from active operations to completed operations; and
- definition of soil disturbance categories and assessment techniques were modified.

Figure A23 below shows the changes which occurred in the definition of risk periods between 2004 and 2006.

Additionally, the data are not a random or unbiased sample of operations. Surveillance and monitoring undertaken by the Department are carried out in a risk management framework and often focused on sites that are at the highest risk of exceeding disturbance limits.

A significant amount of monitoring and surveillance relating to the protection of soil values had been undertaken by the Forest Products Commission. These data have not been included, primarily because monitoring is conducted prior to completion of operations and does not represent the final level of disturbance for a feller's block.

	SDI					
Risk Category	Spring	Autumn				
High	< 250	< 100				
Medium to high	250 - 500	100 - 500				
Medium	501 - 1000					
Low	> 1000					

Risk period	1 Mar to 31 Aug (trans/pre-trans)	1 Mar to 31 Aug (post-trans)	1 Sep to 28 Feb
High	TI = 0	TI = 0	TI = 0
Medium High	$0 < TI \le 50$	$0 < TI \le 250$	$0 < TI \le 250$
Medium	$50 < TI \le 500$	$250 < TI \le 500$	$250 < TI \le 750$
Low	TI > 500	TI > 500	TI > 750

Tl _{spi} value	Pre-trans & transitional (1 Mar-31 Aug)	Post-tra (1 Mar-	nsitional 31 Aug)	Spring / Summer (1 Sep-28 Feb)		
	All soils	UGS soils	Non-UGS soils	UGS soils	Non-UGS soils	
TI=0	MH	H-	Н	H-	Н	
0 <ti≤50< th=""><th>MH</th><th>MH</th><th>H-</th><th>MH</th><th>H-</th></ti≤50<>	MH	MH	H-	MH	H-	
50 <ti≤250< th=""><th>М</th><th>MH</th><th>H-</th><th>MH</th><th>H-</th></ti≤250<>	М	MH	H-	MH	H-	
250 <ti≤500< th=""><th>М</th><th>M</th><th>М</th><th>М</th><th>M</th></ti≤500<>	М	M	М	М	M	
500 <ti≤750< th=""><th>L</th><th>L</th><th>L</th><th>М</th><th>M</th></ti≤750<>	L	L	L	М	M	
TI>750						

UGS = Upland gravels and sands (excluding the Blackwood Plateau)¹
L = Low risk period
M = Medium risk period
MH = Medium to high risk period
H = High risk period
H = High risk period if it is raining or free water is present, or Medium to high risk period if it is not raining and no free water is present

Figure A23. Changes to definition of risk periods between 2004 and 2006

Results and explanatory notes

Risk period

Where high levels of disturbance were recorded by transect survey, it was generally independent of the risk period in which operations were conducted. High levels of disturbance were more related to coupe management (with the exception of rutting). All instances of disturbance exceeding allowable limits recorded by survey of rutting and erosion occurred during the High and Medium to high risk periods.

Operation type

For karri clearfell operations allowable limits for soil disturbance are significantly higher than other types. Well managed operations should not exceed these limits. Karri thinning operations are usually undertaken with a significant amount of brushing and matting, particularly during moist soil conditions. Due to the default disturbance categories allocated on brushed and matted extraction tracks these operations should not exceed allowable limits where brushing and matting remains intact. Operations where limits were exceeded were almost entirely in jarrah forest.

Disturbance category

For very severe disturbance, no instances where allowable limits were exceeded were recorded by transect survey. Very severe disturbance was only reported for one instance of significant erosion resulting from the failure of an erosion control structure and three instances where allowable limits for rutting were exceeded. For severe disturbance, all cases where allowable limits were exceeded were due to primary extraction tracks. This usually occurred where three or more primary tracks were present for a single landing. For moderate disturbance, all cases where allowable limits were exceeded were due to secondary extraction tracks. Occasionally excessive moderate disturbance was attributed to machine movements off the extraction track network by either scalping of soil or mounding due to tracks of a machine harvester or the bucket of front end loader.

 Table A25. Soil damage in each risk period for 2005.

			Soil da	mage categ	ory	Landing size		Rutti	Rutting	
		Number of soil	Moderate	Severe	Very severe	Number	Excondance of	Number of rutting	Excoodance of	
Risk period		surveys	Exceedance	e of allowat	ole limit	surveys	allowable limit	surveys	allowable limit	
	Harvest type	conducted		(%)		conducted	(%)	conducted	(%)	
High & Medium-										
high	Karri thinning	9	0	0	0	0	0	0	0	
Medium -high	Jarrah	9	44	11	0	5	20	0	0	
	Karri clearfall	5	0	0	0	0	0	0	0	
	Jarrah	8	50	50	0	5	40	0	0	
Medium	Karri clearfall	0	0	0	0	0	0	0	0	
	Karri thinning	2	0	0	0	0	0	0	0	
	Jarrah	4	25	25	0	0	0	0	0	
Low	Karri clearfall	0	0	0	0	0	0	0	0	
	Karri thinning	0	0	0	0	0	0	0	0	
Total (su	irveys)	37	27	16	0	10	30	0		

Table A26. Soil damage in each risk period for 2006.

			Soil damage category		Landing size		Rutting		
		_	Moderate	Severe	Very severe	Number	Excondance of		Excondance of
Risk period	Harvest type	Number of soil surveys	Exceedanc	e of allowal (%)	ble limit	surveys conducted	allowable limit (%)	Number of rutting surveys conducted	allowable limit (%)
High & Medium- high	Karri thinning	3	0	0	0	38	3	0	0
	Jarrah	1	0	0	0	4	0	0	0
Medium -high	Karri clearfall	0	0	0	0	1	0	0	0
	Jarrah	5	0	0	0	1	0	0	0
	Karri clearfall	0	0	0	0	0	0	0	0
Medium	Karri thinning	0	0	0	0	0	0	0	0
	Jarrah	17	35	18	0	20	5	0	0
	Karri clearfall	0	0	0	0	0	0	0	0
Low	Karri thinning	0	0	0	0	4	0	0	0
Total (su	urveys)	26	23	12	0	68	3	0	

Table A27. Soil	damage in	each risk	period for	2007.
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			Soil damage category			Landing size		Rut	Rutting	
Risk period	Harvest type	Number of soil surveys	Moderate Exceeda	Severe ance of all (%)	Very severe owable limit	Number of landing surveys conducted	Exceedance of allowable limit (%)	Number of rutting surveys conducted	Exceedance of allowable limit (%)	
High & Medium- high	Karri thinning	3	0	0	0	29	0	1	100	
Medium -high	Jarrah Karri clearfall	4 0	0 0	50 0	0 0	2 0	0 0	3 0	67 0	
Medium	Jarrah Karri clearfall Karri thinning	4 0 0	0 0 0	25 0 0	0 0 0	3 2 5	33 0 0	0 0 0	0 0 0	
Low	Jarrah Karri clearfall Karri thinning	9 0 0	33 0 0	33 0 0	0 0 0	21 7 26	38 29 4	0 0 0	0 0 0	
Total (surveys)		20	15	30	0	95	(12)	4	75	

			Soil	damage c	ategory	Lar	nding size	Rutting	1
Risk period	Harvest type	Number of soil surveys	Moderate Exceeda	Severe ance of all (%)	Very severe owable limit	Number of landing surveys	Exceedance of allowable limit (%)	Number of rutting surveys	Exceedance of allowable limit (%)
High & Medium-high	Karri thinning	0	0	0	0	0	0	0	0
Medium -high	Jarrah Karri clearfall	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Medium	Jarrah Karri clearfall Karri thinning	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
Low	Jarrah Karri clearfall Karri thinning	9 5 7	11 0 14	44 20 0	0 0 0	13 11 7	0 18 57	3 0 0	0 0 0
Total (surv	eys)	21	10	24	0	31	19	3	0

Table A28. Soil damage in each risk period for January to June 2008.

Interpretation of reasons why limits were exceeded

Soil disturbance recorded by transect survey

Instances where allowable limits for soil disturbance as recorded by transect survey were exceeded were generally related to the management of extraction tracks. All instances were for machine harvested areas and problems were often associated with either new machine operators or supervisors. Preventable instances occurred where extraction occurred on secondary tracks on every corridor made by machine harvester and/or more than two primary extraction tracks were used. Less preventable instances where limits were exceeded were related to:

- Small or narrow cells with high volume of timber;
- Dieback coupes of irregular shapes, with multiple primary snig tracks being used to access each tongue of dieback; and
- Machine harvested areas on steep slopes where cross-slope machine movement is unsafe resulting in closely spaced tracks at right angles to the contour.

Rutting

Exceedence of allowable rutting limits occurred during winter on susceptible soils where operations were carried out without adequate protective treatments and due to failure to stop operations at the onset of significant rutting.

Landing size

In general, landing size limits were not exceeded due to poor management. Instances where landing size limits were exceeded were related to:

- Small and very small cells of one to three hectares where the prescribed limits are not feasible; and
- Small to medium sized cells (6 10 ha) with high volume where the prescribed limits are difficult to achieve whilst providing a safe working environment.

In general, management practices did not contribute to landing size limits being exceeded. Safety is an additional factor to consider with landing management. Landings are generally the most dangerous areas on which to operate and a minimum landing size is required in order to maintain a safe workplace.

See the sub-section on compliance monitoring under the section on objective 20 on soil for information on the management response to exceedance of the soil disturbance limits.

The Department has investigated the cause of operations exceeding allowable limits of soil disturbance. The report above is the report to the Conservation Commission in response to target shortfall.

Natural and Cultural Heritage

Three KPI are reported below in relation to natural and cultural heritage.

KPI 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.

Objective of KPI 23

The objective of KPI 23 is to assess the success of the implementation of the Forest Management Plan in achieving its targets by providing information on registered heritage sites identified in management planning and the adequacy of their protection during disturbance operations.

Results and explanatory notes

There were 1023 non-indigenous cultural heritage sites, including 16 moveable heritage items, recorded in the Department's Recreation and Tourism Information System as at 31 December 2007. Of these, 875 lie in the area covered by the FMP. These records were maintained and updated by a Recreation and Tourism Information System officer and were accessible to Departmental staff.

The Department does not maintain a separate database for Indigenous heritage places and values, however spatial information was maintained by the Department's Geographic Information Services Section and updated monthly with information received from the Department of Indigenous Affairs which maintains a Aboriginal Site Register under section 38 of the State's *Aboriginal Heritage Act* 1972.

The Department continues to cooperate with the Department of Indigenous Affairs, the Heritage Council and other external agencies in relation to the identification, recording and management of cultural heritage.

Management of Disturbance

Table A29 summarises the disturbance of heritage sites in conjunction with native forest timber harvesting operations on estate managed by the Department in the Swan, South-West and Warren regions. The information was collated from the Pre-harvest Checklist prepared by the Forest Products Commission for approval by Departmental staff. The data show that nine Indigenous sites and three non-indigenous sites were identified during planning for timber harvesting operations during 2007, none of which was disturbed. A formal database to capture statistics relevant to KPI 23 is in development. The data presented were compiled by manually reviewing all approvals issued during one year (2007).

Table A29. Disturbance of heritage sites on lands managed by the Department of Environment and Conservation for 2007.

	Indigenous sites identified in planning for disturbance operations	Non- indigenous cultural heritage sites identified in planning for disturbance operations	Heritage sites that were not disturbed	Heritage sites disturbed with formal approval	Heritage sites disturbed without formal approval
Disturbance operations managed by the Forest Products Commission	9	3	12	0	0

KPI 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.

Objective of KPI 24

The objective of KPI 24 is to assess the success of the implementation of the Forest Management Plan through monitoring progress towards the establishment and performance of the Nyoongar working group.

Results and explanatory notes

The Department has not established a formal Nyoongar working group. The Department has investigated the reasons for the proposed Nyoongar working group not being established and the following represents the report to the Conservation Commission on the response to target shortfall.

The reason is that the Department has adopted an alternative approach of liaising directly with local Indigenous representatives on issues relating to Aboriginal cultural heritage in the plan area. This approach is considered to address the objective and the intent of the proposed action.

The Department has a formal Memorandum of Understanding with the South West Aboriginal Land and Sea Council, the native title representative body for the plan area, for the purpose of seeking to work with Aboriginal people to identify, interpret, protect and manage significant cultural sites. The various native title claimant groups have established working parties (supported by South West Aboriginal Land and Sea Council) to negotiate and facilitate interests in the claim area. The Department has an established relationship with the working parties. Through the above mechanisms the Department has been able to identify traditional owners and custodians with authority and knowledge relating to Aboriginal cultural heritage.

The Department and the Forest Products Commission notify South West Aboriginal Land and Sea Council for all disturbance activities that have the potential to impact on Aboriginal values and proposed actions are often formally presented to South West Aboriginal Land and Sea Council. The notification and protection process often includes; field visits and site inspections with traditional owners and custodians with authority and knowledge relating to Aboriginal cultural heritage, Indigenous representatives on site during earthworks and incorporation of cultural heritage messages and themes in onsite information. In liaising with local Aboriginal groups and custodians the Department ensures that sensitive information is protected from unnecessary disclosure.

In circumstances that necessitate a registered Indigenous site to be disturbed, appropriate Ministerial consent is required; the proponent of the disturbance activity must apply to the

State Aboriginal Cultural Heritage Materials Committee for approval to undertake the activity in the vicinity of the registered site.

KPI 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.

Objective of KPI 25

The objective of KPI 25 is to assess the success of the implementation of the Forest Management Plan in achieving its targets for the protection of heritage places/sites in the conservation reserve system.

Results and explanatory notes

Since 2004 the number of heritage places represented in formal and informal reserves has increased from 60 per cent of target to 95 per cent of the end of FMP target in 2008 as a result of implementation of land category changes (Table A30). The large increase in the number of Aboriginal sites in informal reserves between 2006 and 2008 reflects improved information being added to the database rather than the discovery of new sites.

Table A30. The representation of heritage places in the conservation reserve system.

Reserve	Heritage	FMP	Dec 04	Dec 06	Dec 08
type	list	proposed			
Informal	Heritage Council	n/a	7	10	11
	Aboriginal sites	n/a	286	282	338
	Heritage Council	23	13	19	22
Formal	Aboriginal sites	313	189	262	296
	Total	336	202	281	318
	% of end of FMP target		60	84	95

Socio-economic Benefits

Two KPI are reported below in relation to socio-economic benefits.

KPI 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.

Objective of KPI 26

The objective of KPI 26 is to assess the success of the implementation of the Forest Management Plan in achieving its targets through the provision of recreational opportunities and tourism.

Results and explanatory notes

Type and number of facilities

National parks are the main focus for recreation within the FMP area but State forest also offers opportunities and facilities for recreation, particularly overnight camping (Table A31). Day use recreation sites associated with information, interpretation and bushwalking opportunities are the most common type provided. Day use sites are also provided in conservation parks. Associated facilities including information displays and toilets are currently better provided for in national parks and State forest than in conservation parks.

Table A31. Type and number of recreation and tourism facilities by proposed land category for the areas of the FMP.

	Number of recreation facilities							
Land Category	Accommodation	Camping	Day use	BBQ	Info	Toilets	Bush walk	4WD
National park	3	37	121	61	38	138	89	41
Nature reserve	0	0	4	0	1	8	0	0
Conservation park	1	6	52	7	2	18	35	1
State forest, timber reserve	10	39	70	41	26	91	60	17
CALM Act section 5(1)(g)	0	12	10	9	5	42	13	5
Total	14	94	257	118	72	297	197	64

Level of visitation

Figure A24 indicates a general increase in visitation over the four-year period for recreation sites in the FMP area, with annual visits to national parks increased by half a million. Visitation levels to State forest decreased over the period 2004-2007. This trend can be attributed to several factors including the increase in the number of sampling sites in other land tenures, conversion of areas of State forest to national park and more accurate estimates of visitation from improved technology.



Figure A24. Number of visits to selected recreation areas by proposed land category for the area of the FMP from 2004 to 2007.

Level of visitor satisfaction





The visitor satisfaction index for selected recreation sites in the FMP area has increased over the reporting period.

KPI 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.

Objective of KPI 27

The objective of KPI 27 is to assess the success of the implementation of the Forest Management Plan through the supply of basic raw materials.

Results and explanatory notes

The extraction of basic raw materials is recorded by the Notice of Entry system. No basic raw materials were extracted from existing or proposed conservation reserves. Since commencement of the FMP, approximately 60,000 m³ of material have been extracted from State forest and timber reserves, predominantly comprised of gravel (Table A32). Lesser amounts of sand and small amounts of shale have been extracted in the Warren Region. There are no clear trends in extraction of basic raw materials over the period 2004-2007. Figure A26 below shows a slight increasing trend in the number of Notices of Entry over the reporting period. However, the trends cannot be used to infer volume of material removed.

Notices of Entry generally occur in response to roading projects and are only recorded in the year of pit establishment. Once a pit is established and operating, the volume of ongoing removals is not tracked by this process. This is likely to be the reason that no data are available for the Swan Region where several large regional pits already exist. Notices of Entry only reflect a portion of basic raw material extraction and do not include extraction by the Main Roads Department, Forest Products Commission or the Department.

Table A32. Extraction of basic raw material by land category (as proposed in the ForestManagement Plan) for area of the FMP.

Year	Material Extracted	Land Category - State forest	Land Category - Existing and proposed Conservation Reserves	Notices of Intended Entry Warren Region	Notices of Intended Entry South West Region	Notices of Intended Entry Swan Region	Quantity Removed (m ³)
	Shale	0	0	0	0	0	0
	Sand	1	0	1	0	0	1,500
2004	Clay	0	0	0	0	0	0
	Gravel	2	0	1	1	0	21,500
	Limestone	0	0	0	0	0	0
	Shale	1	0	1	0	0	100
	Sand	1	0	1	0	0	1,500
2005	Clay	0	0	0	0	0	0
	Gravel	2	0	0	2	0	1,700
	Limestone	0	0	0	0	0	0
	Shale	1	0	1	0	0	180
	Sand	1	0	1	0	0	1,500
2006	Clay	0	0	0	0	0	0
	Gravel	4	0	1	3	0	50
	Limestone	0	0	0	0	0	0
	Shale	1	0	1	0	0	180
	Sand	2	0	2	0	0	7,899
2007	Clay	0	0	0	0	0	0
	Gravel	2	0	1	1	0	24,000
	Limestone	0	0	0	0	0	0



Figure A26. Trends in the number of Notices of Entry served to the Department for the extraction of basic raw materials over annual reporting periods.

Plan Implementation

Five KPI are reported below in relation to plan implementation.

KPI 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.

Objective of KPI 29

The objective of KPI 29 is to assess the success of the implementation of the Forest Management Plan in achieving its targets by tracking progress in the number of programs for public involvement and the numbers of the community exposed to forest-related programs.

Results and explanatory notes

Nearer to Nature and EcoEducation programs

The Department facilitates programs covering a variety of ways in which the public can experience and learn about the forest environment and its management.

The Department manages a number of environmental education centres and forest education programs are provided in each of the forest regions. The Warren Region focuses on the Perup Forest Ecology Centre. The South West Region uses the Wellington Forest Discovery Centre and the Wharncliffe Discovery Centre. The Swan Region uses the Perth Hills National Parks Centre (previously The Hills Forest Discovery Centre).

Interpretative information about forest management for visitors in State forests and national parks is provided primarily through signs and exhibits. A history of forest management and the timber industry is a component of the Swarbrick and Valley of the Giants Wilderness Discovery Centre sites within the Walpole Wilderness Area and also at Harewood Forest near Denmark, and along the Total Forest Trail within the Wellington Forest.

Demonstration sites of silvicultural activities including non-commercial thinning are being developed as part of the Wungong Catchment Trial. Site design and development, along with the interpretation, are in the conceptual stage. Educational and professional development group visits are being trialled by the Swan Region.

Table A33 provides an example of the different ways in which members of the public can participate in nature based and forest interpretive activities as part of the Department's Perth Hills *Nearer to Nature* and EcoEducation programs. A general increasing level of participation can be observed.

Table A33. Public participation in Perth Hills *Nearer to Nature* and EcoEducation programs.

Communication field	Definition of activity	Num partic	per of ipants
		2006	2007
Public Involvement	Direct participation as a contract guide or volunteer to deliver educational and interpretive activities within a forest environment.	70	70
Public Education	Participants in community or schools-based forestry related interpretive activities within a forest environment.	499	938
Awareness	Visitation to the forest environment with a more passive involvement in learning including people who have camped in the forest, attended nature-based activities as an accompanying parent and visitors to the forest for recreational pursuits such as bike riding and hiking.	28,538	35,759
Extension Programs	Participants who have attended a <i>Nearer to</i> <i>Nature</i> interpretive activity in a non-forest environment involving active participation in learning concepts such as habitat protection, conservation and environmental protection in non-forest ecosystems.	6,402	6,433

EcoEducation also constitutes formal programs which are curriculum linked and support students to understand sustainability concepts and achieve outcomes across a range of learning areas. The program encourages students to develop values, environmental responsibility and social and civic responsibility. Programs have three elements linked to the outcomes of all curriculum learning areas: professional learning for educators; classroom resources; and excursions or camp activities based at a number of venues in the metropolitan area and in the State's south-west. The learning programs are conducted by trained leaders. By participating in EcoEducation, students can understand the biodiversity and ecological components of forest environments and management of forests by:

- Investigating habitats and different ecosystems within forests;
- Identifying organisms, their adaptations for survival and their different roles in maintaining biodiversity in the forest;
- Using scientific/geographic measurement in fieldwork to measure biodiversity and monitor wildlife;
- Recognising the challenge to Australian biota of introduced species;
- Exploring landform-soil-organism associations and the water cycle;
- Identifying natural and human impacts and forest management issues on biodiversity and the environment;
- Understanding traditional Aboriginal culture in the natural environment;
- · Developing all their senses in exploring the environment;
- Recognising the number and importance of the resources provided by forest ecosystems for our survival;

- Understanding the interrelatedness and interdependence of all life on Earth;
- Understanding their personal impact on parks and the natural environment and then contributing to their own or community conservation and rehabilitation projects; and
- Promoting the importance of the forest environment in providing for mental and physical wellbeing and a healthy lifestyle.

Teachers can:

- Contribute and encourage their schools to contribute to activities in the natural environment;
- Engage in professional learning provided by EcoEducation;
- Report on findings of investigations into the natural environment; and
- Work with other schools on EcoEducation programs such as Bush Rangers.

EcoEducation programs are promoted in newsletters, external electronic chat lists, external electronic diaries, promotional brochures and fliers, newspaper articles, journals and the DEC website.

DEC Bush Rangers

Bush Rangers WA is another component of EcoEducation encompassing curriculumlinked programs and activities. Students undertaking these programs range from Years 8 to 12. The Bush Ranger courses are now endorsed Curriculum Council courses for Senior School study and recognition in the Western Australian Certificate of Education. Many of the Bush Ranger programs and activities are conducted in forest environments during camps or investigations.

No separate figures are available for Bush Rangers work and study in forest environments. However, 1,141 Bush Rangers contributed over 300,000 volunteer hours to conservation and community projects in 2007. Ninety DEC staff members worked with Bush Rangers to achieve their environmental goals.

Volunteers

The number of community projects involving volunteers varies from year to year as projects are undertaken as required by individual Districts (Figure A27). The number of volunteers providing support to work programs undertaken by the Department has declined since 2005 and may reflect a more general trend in volunteering where fewer people are contributing to unpaid community service (Figure A28). However, the overall effort expressed in the number of volunteer hours has increased, indicating that the level of contribution per volunteer has also increased (Figure A29). These figures do not include Bibbulmun Track volunteers or the Bush Rangers program mentioned above.



Figure A27. The number of community projects with volunteer involvement in the FMP area for the period 2004-2007.



Figure A28. The number of volunteers involved in community projects within the FMP area for the period 2004-2007.



Figure A29. Contribution of hours worked by volunteers in community projects within the FMP area for the period 2004-2007.

Landscope Magazine

Around 7,000 copies of the Department's Landscope magazine are produced quarterly. The magazine is devoted to conservation, forest management, wildlife and nature-based recreation and tourism in Western Australia.

Library services

Kensington Forest Sciences Library and Woodvale Wildlife Science Library are publicly accessible, containing journals, books, videos, microfilm, photos, maps, historical brochures and posters. These facilities receive around 50 visits per year from members of the public.

Community forest inspections

The objectives of community forest inspections are to provide an opportunity for the community to:

- inspect timber harvesting operations;
- increase understanding of the purpose of timber harvesting operations; and
- understand why timber harvesting operations lead to particular outcomes.

Community forest inspections can involve representatives from peak conservation groups and locally based organisations. They are not intended as an audit of operating standards by the Forest Products Commission, but non-compliance with standards may be identified as a result of a community forest inspection. The documented outcomes of community forest inspection are provided to all participants and invited community representatives, with matters identified during inspections followed up or reported on by staff of the Department or the Forest Products Commission as appropriate. Community forest inspections have been undertaken in each of the Department's regions within the FMP area.

Documents relating to forest management on the Department's website

Information relating to Western Australia's public native forests is made available on the Department's NatureBase website. This includes the FMP and related documents. Key documents are available for the public to download and in some cases provide feedback or comments. Indicative levels of interest may be reflected by the number of visits, or 'hits', to the website received, which are shown in Table A34 below. The FMP and Ministerial Conditions received approximately 7,000 hits. Maps for the three-year indicative timber harvesting plan are posted each year and receive around 1,500 hits. A number of items of general information about forest related issues including tuart and wandoo decline, recovery plans and research working group reports receive around 3,000 to 4,000 hits. The recently released draft Guidelines for Soil and Water and Management of Informal Reserves and Fauna Habitat Zones received around 1,000 and 2,000 hits respectively.

Table A34. Number of website visitation (hits) for a range of forest-related information available on the Department's website.

Category	Document Name	Date	Hits to
Category	Ecrest Industry Statement - January 2004	lanuary 2004	2008
	Forest Management Plan 2004 2012: KPI Protocole		7,210
	Forest Management Plan 2004 2013. KFT F101000015	July 2007	7,019
Forest	Forest Management Plan 200422013	January 2004	7,052
Manageme	Conditions)	December 2002	7 000
nt	Cuidelines for the Management of Informal Deserves	December 2003	1,322
	Guidelines for the Management of Informal Reserves	March 2009	2 0 2 0
	Soil and Water Concernation Cuideling (Droft)	March 2008	2,030
	Indiantive 2 year Map South west	Soptombor 2007	1,202
	Indicative 3-year Map - South-West	September 2007	2 1 2 5
Timber	Indicative 3-year Map - Swart	September 2007	2,135
Harvesting	South west Pagion Course Listing (2008-2010)	September 2007	1,094
Plans	Such Region Coupe Listing (2008-2010)	September 2007	1,920
	Warran Region Coupe Listing (2008-2010)	September 2007	2,105
	Concerning our Tuerte (Prochure)		1,004
Conserving	Tools for Identifying Indicative High Conservation Twart	July 2002	2,703
our Tuart	Woodland	March 2004	3 3/1
Strategies	Draft Tuart Strategy	December 2004	1 681
Otrategies	Tuart Conservation and Protection Status Report -	December 2004	1,001
Reports	August 2002	August 2002	1 693
	Surveying wandoo crown decline - a guide for	7 laguet 2002	1,000
	assessors	March 2007	4.699
Conserving	Wandoo Crown Decline Action Plan	November 2006	4.623
our	Wandoo Crown Decline Survey Sheet (incl. Crown		,
Wandoo	Decline Diagrams)	April 2007	4,108
	Wandoo Distribution Map	February 2007	4,428
	Wandoo Research Strategy	March 2007	4,678
	Comparison of changes to water levels in deep bores		
	1975-2004, Helena catchment	October 2004	2,979
Wandoo	Healthy Ecosystems - Inland wandoo woodland case		
Articles	study, Wyalkatchem Nature Reserve	July 2006	2,950
	Wondering About Wandoo - LANDSCOPE Autumn		0.400
14/	2005 Wandas Despanse Crewn News Pulletin Jacus 04	March 2005	3,136
wandoo	Wandoo Response Group News Bulletin - Issue 01	March 2007	3,086
Response	Wandoo Response Group News Bulletin - Issue 02	March 2007	3,223
Bulloting	Wandoo Response Group News Bulletin - Issue 03	December 2005	3,020
Duileuns	Accessment of E (Mondee) Brogross Bonert	March 2007	3,101
	Assessment of E. (Wandoo) – Progress Report	May 2000	400
	wandoo crown decline surveys 2006	lune 2007	2 554
	Crown decline in Wandoo: Observations from	Julie 2007	2,004
	Wundabiniring Brook 1999-2005	July 2005	2 892
WPC	Crown decline in Wandoo: Observations from		2,002
Reports	Wundabiniring Brook 1999-2006	July 2006	3.259
Керонз	Wandoo Crown Condition 2007	May 2008	409
	Wandoo Crown Decline Situation Statement - July 2006	huby 2000	2 1 2 2
	Wandoo Crown Decline: Summary of Research	November 2006	2 963
	Wandoo Decline: A Forest Manager's Perspective	November 2006	2,903
Sustainable			2,000
Forest			
Manageme		M 0005	0 - 0 -
nt	Review of Factors Affecting Disturbance of Soils	May 2005	3,585
Technical			
Reports			

Aboriginal Heritage Unit

The Department's Aboriginal Heritage Unit develops and implements programs that seek to provide the community with culturally significant educational opportunities and information. The Unit also has a role in training Department staff on cultural aspects of forest management. Examples of programs and activities conducted by the Unit are given below:

- Training Department staff at cultural protocol days at Walyunga National Park including presentation on the cultural significance of the Park and visiting the archaeological site and traditional bush garden;
- Healthy Parks, Healthy People with partnership through the Office for Seniors Interests and Volunteering;
- Working with Elders from Quairading to return sacred boulders to Mount Stirling. This connects Aboriginal and non-Aboriginal people back to country for their future wellbeing;
- Assisting Species and Communities Branch in developing partnerships with the Balardong (Quairading) community elders to gain Aboriginal cultural input on sites of cultural significance;
- The provision of advice to Department staff regarding Aboriginal involvement on the DEC-managed estate (e.g. assisting with management plans);
- Providing the link for ongoing liaison between Department regional and district staff and the Aboriginal community;
- Male staff from the Aboriginal Heritage Unit attending a Noongar maarman (men's) meeting to build partnerships with other Noongar men in the community;
- Assisting, along with Department Aboriginal staff, Noongar Elders to conduct a healing ceremony at the Dwellingup Training Centre.
- Conducting ceremonies at the Dwellingup Training Centre in order to welcome Aboriginal trainees from different regions throughout the state.

A summary of the number of programs and participants in public involvement activities and public education programs between 2004 and 2008 is shown in Table A35 below. The data shows the Aboriginal Heritage Unit conducts around 100 programs a year involving around 3,000 to 7,000 participants with no clear trends evident over time.

Table A35. The number of programs and participants for different communication fields run by the Department's Aboriginal Heritage Unit between 2004 and 2008.

Communication	2004-05		2005-06		2006-07		2007-08	
Field	Number of	Number of participants						
Bublic Involvement	o		e	NI/A*	12		10	
Activities ⁽¹⁾	0	IN/A	0	IN/A	43	IN/A	12	IN/A
Public Education ⁽²⁾	93	6,767	61	3,203	66	3,673	79	5,345
TOTAL	101	6,767	67	3,203	109	3,673	91	5,345

* Numbers of participants are not recorded for public involvement activities due to the variable nature of the programs and involvement with individuals over a period of time.

(1) Public Involvement Activities

Issues relating to planning and management and partaking in activities to address those issues.

(2) Public Education

Programs that involve establishing learning programs for special interest groups with defined outcomes embraced as a 'contract' between the learning facilitator and the learner or their representative. Also called community education.

KPI 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.

Objective of KPI 30

The objective of KPI 30 is to assess the success of the implementation of the Forest Management Plan in achieving its targets by examining the extent to which the Department and Forest Products Commission demonstrate the capacity and commitment to develop and maintain the essential skills of staff.

Results and explanatory notes

The Forest Products Commission and the Department are not in a position to report in a quantitative manner against the performance target for this KPI because of resource constraints. Explanatory text is provided below indicating the extent to which the agencies demonstrate the capacity and commitment to develop and maintain the essential skills of staff.

Forest Products Commission

The Forest Products Commission has three major components to its training programs for operational staff which include:

- training provided for new staff (recruits);
- training for existing experienced staff who have been with the organisation or the Department of Environment and Conservation for over 10 years; and
- an Environmental Management System (EMS) that highlights areas of environmental risk and the training required to address these.

The Forest Products Commission initiated a training program for recruits in mid-2004 and 42 staff have now completed this program. There are 14 recruits currently completing the program. The aim of the program is to provide recruits with extensive and targeted training in their first year of employment to equip them with the skills, understanding and competencies necessary to undertake the functions and activities of the Operations Division. The program runs over eight to 10 months and consists of a mix of structured courses and mentored on-the-job training. Training is conducted under the auspices of Great Southern TAFE which is a Registered Training Organisation and is responsible for ensuring that training and assessment meets the Australian Qualification Training Framework and aligns with the Forest Products Industry training package (FPI 05). On successful completion recruits receive a Certificate 3 in Forest Growing and Management issued by Great Southern TAFE.

The second key aspect, and one that will prove to be significant, is the "skills recognition" program for existing Operations Division staff. The Forest Products Commission documented the skills and competencies needed by operations staff at each of the Government Officers Salaries, Allowances and Conditions Award levels 3, 4, and 5, then linked or mapped them to the FPI 05 training package. Level 3 equates to a Certificate 3 in Forest Growing and Management, Level 4 to a Certificate 4 in Forests Operations, and Level 5 to a Diploma in Forests and Forest Products. This training program has also been auspiced through Great Southern TAFE to ensure Australian Qualification Training Framework requirements, standards and access to qualifications are met. Operations staff commenced this program in early 2008. The training and assessment process will allow experienced and competent staff to achieve a gualification at their existing level and responsibility, and will also highlight to the organisation areas or gaps where training is required. It is expected that about half of existing experienced staff will graduate with either a Certificate 3, a Certificate 4 or a Diploma, in addition to the Certificate 3 recruits, at the end of the 2008 calendar year.

Meanwhile the EMS has highlighted the key training requirements of the five main operational areas, Nursery, Seed Technology, Plantations, South West Forests and Arid Forest. The Environmental Training Register nominates the training required to ensure each area's operational controls can be met. Training and assessment in the key areas, up to March 2008, meet at least a 90 per cent achievement. Employees receiving this training are mostly recruits who have it programmed throughout the year.

Department of Environment and Conservation

The Department maintains an active training program to address recognised performance gaps and to provide for career development of staff. Training programs are available for a wide range of subject areas including fire management, field operations, flora and fauna conservation, occupational health and safety, cultural development, licensing and regulation and organisational leadership. In addition, staff are able to undertake undergraduate and postgraduate courses, scholarships, international exchange or self-directed education and training.

The Department's Training Centre manages and maintains Registered Training Organisation status. Responsibilities include the development, implementation, evaluation and continuous improvement of a quality training and assessment system, which meets the 12 Australian Quality Training Framework standards and the operational needs of the Department. This system is being implemented across most training and assessment activities, and all Departmental divisions.

The Department publishes an Organisational Learning and Development Manual at the beginning of each year to make staff aware of opportunities for training and development. The Training Centre maintains an electronic register, called the Australian Training Register, which lists over 70,000 public access training programs, courses, conferences and seminars. Electronic broadcasts provide updates on courses during the year.

The Department's Employee Performance Development Plan system forms an integral part of the process of establishing a training and developmental plan for each employee. It is a requirement that every employee meets with their supervisor at least once a year to establish or review their development plan. During this meeting training needs are identified and courses or on-the-job training programs are selected. In addition, the meeting is used to plan and review work performance and outcomes and define tasks to be performed, standards to be met and agreed timeframes.

The Forest Policy and Practices Branch has conducted specific (in-house) training for Departmental and Forest Products Commission staff to rollout new requirements under the FMP as these are developed. This training has been conducted for soil management, silviculture and the use of Works Improvement Notices and Management Letters.

KPI 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.

Objective of KPI 31

The objective of KPI 31 is to assess the success of the implementation of the Forest Management Plan through monitoring the development of scientific understanding in relation to sustainable forest management.

Results and explanatory notes

Expenditure on research related to ecologically sustainable forest management increased slightly from 2004 to 2005 and remained constant in 2005/06 and 2006/07 (Figure A30). The majority of funding for research on ecologically sustainable forest management is allocated through the service provider agreement between the Sustainable Forest Management Division and the Science Division. Smaller amounts of funding have also been obtained from external funding sources.



Figure A30. Expenditure by the Department on research relevant to ecologically sustainable forest management from 2004-2007.

Research effort quantified by the number of Departmental scientific and technical staff engaged in research relevant to ecologically sustainable forest management has been maintained at about 25 full time equivalent person years from 2004-2007 (Figure A31). Output quantified by the number of papers published in peer reviewed scientific journals has remained relatively stable at between 11 and 13 per year.



Figure A31. Person years (full line) and peer reviewed articles (dashed line) published by the Department on research relevant to ecologically sustainable forest management from 2004-2007.

Information about the subject area of research and published papers is provided in Tables A36 to A38 below. The figures show the highest area of funding consistently allocated towards jarrah, followed by whole of forest and karri ecosystems. Key disciplinary areas of research are biodiversity, ecosystem health and vitality, and soil and water. Funding and staff resources are allocated to provide a balance between long-term strategic research, specific projects identified in proposed actions within the FMP, and shorter term applied research to address issues of immediate relevance or priority. Examples include:

- Long-term strategic research into hydrology and timber harvesting in the jarrah forest (15 year+ time horizon);
- Specific projects targeting FMP proposed actions such as stream biodiversity monitoring (KPI 20), and population genetics as a basis for defining seed collection zones; and
- Shorter-term applied research on cording and matting of snig tracks.

Table A36. Total number of published articles, person-years of scientific research and expenditure by disciplinary area of study in the field of sustainable forest management for the financial year of 2004/2005.

Ecosystem	Disciplinary area	Articles	Expenditure
	of study	published	(\$)
	Biological diversity	6	700,402
	Productivity		20,239
	Ecosystem health	3	277,984
Le me L	and vitality		
Jarran	Soil and water		99,274
	Natural and		
	cultural heritage		
	Socio economic benefits	1	
	Biological diversity		39,414
	Productivity		40,358
	Ecosystem health		59,502
Karri	and vitality		
Nam	Soil and water		
	Natural and cultural heritage		
	Socio economic benefits		
	Biological diversity		45,4461
	Productivity		68,000
	Ecosystem health and vitality	1	178,994
Whole of forest	Soil and water		341.942
	Natural and cultural heritage		,
	Socio economic benefits	1	
		Ĩ	
	Biological diversity	6	1,194,277
	Productivity		128,597
Total	Ecosystem health and vitality	4	516,480
	Soil and water		441.216
	Natural and cultural heritage		
	Socio economic benefits	2	
Total	1	12	2,280,570

Table A37. Total number of published articles, person-years of scientific research and expenditure by disciplinary area of study in the field of sustainable forest management for the financial year of 2005/2006.

Ecosystem	Disciplinary area	Articles	Expenditure
	of study	published	. (\$)
Jarrah	Biological diversity	8	917,198
	Productivity		25,387
	Ecosystem health	3	20,2240
	and vitality		
	Soil and water		53,467
	Natural and		
	cultural heritage		
	Socio economic benefits		
Karri	Biological diversity		8,307
	Productivity		28,335
	Ecosystem health		92,254
	and vitality		
	Soil and water		
	Natural and		
	cultural heritage		
	Socio economic benefits		
Whole of	Biological diversity		594,781
forest	Productivity		
	Ecosystem health		149,760
	and vitality		
	Soil and water		463,752
	Natural and		
	cultural heritage		
	Socio economic benefits		
Total	Biological diversity	8	1,520,286
	Productivity		53,722
	Ecosystem health	3	444,254
	and vitality		
	Soil and water		517,219
	Natural and		
	cultural heritage		
	Socio economic benefits		
Total		11	2,535,481

Table A38. Total number of published articles, person-years of scientific research and expenditure by disciplinary area of study in the field of sustainable forest management for the financial year of 2006/2007.

Ecosystem	Disciplinary area	Articles	Expenditure
	of study	published	(\$)
Jarrah	Biological diversity	2	945,695
	Productivity		36,419
	Ecosystem health	5	194,791
	and vitality		
	Soil and water	1	69,041
	Natural and		
	cultural heritage		
	Socio economic		
	benefits		
Karri	Biological diversity	2	5,000
	Productivity		28,335
	Ecosystem health		103,404
	and vitality		
	Soil and water		
	Natural and		
	cultural heritage		
	Socio economic		
	benefits		
Whole	Biological diversity		604,244
of forest	Productivity		
	Ecosystem health	3	118,152
	and vitality		
	Soil and water		466,750
	Natural and		
	cultural heritage		
	Socio economic		
	benefits		
Total	Biological diversity	4	1,554,939
	Productivity		64,754
	Ecosystem health	8	416,347
	and vitality		
	Soil and water	1	535,791
	Natural and		
	cultural heritage		
	Socio economic		
	benefits		
Total		13	2,571,831

KPI 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.

Objective of KPI 32

The objective of KPI 32 is to assess the success of the implementation of the Forest Management Plan by providing information on the development of an Environmental Management System (EMS).

Results and explanatory notes

The performance measure for KPI 32 requires development of a Departmental environmental management system (EMS) to a standard suitable for accreditation by December 2008. This target has not been achieved. The Department has investigated the reasons for this and the following represents the response to target shortfall.

Early in the life of the FMP, as a result of resource constraints, competing priorities and increased expectations in servicing other requirements of the FMP, the Department decided to place priority on implementing key changes in policy and practice committed to in the FMP. As a consequence development of an EMS was deemed to be of lower priority and there has been limited development.

The Department has experienced difficulty in attracting a suitably qualified person to undertake development of an EMS for the Sustainable Forest Management Division.
KPI 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.

Objective of KPI 33

The objective of KPI 33 is to assess the success of the implementation of the Forest Management Plan in achieving its targets by ensuring that guidance documents maintain their currency.

Results and explanatory notes

The performance measure for KPI 33 requires all guidance documents to be prepared or reviewed by the mid-term of the FMP in December 2008. This target has not been achieved. The Department has investigated the cause of delays in preparation of guidance documents. The report below is the report to the Conservation Commission in response to target shortfall.

As at November 2008, the status of the 12 key documents proposed in the FMP is as follows:

- three have been completed;
- one has been approved, and held pending completion of a related document;
- two have been released for public comment;
- one is approaching the public comment phase;
- two are in preparation; and
- three have not been commenced.

The status of proposed and existing documents is shown in Table A39 below.

As an interim measure to completion of proposed documents, a number of advisory notes and an interim manual have been produced to guide and support operations while formal arrangements and procedures are established between the Department and Forest Products Commission. These documents are shown in Table A40 below.

Table A39: Status of guidance documents required by the FMP.

Guideline name	Date prepared	Date reviewed (progressive)	Status/Comment
Propos	sed Guidelines	1	
Guidelines for the Management of Informal Reserves and Fauna Habitat Zones			Draft for public comment released March 2008. Revised document submitted to the
To be prepared by the Department by 31 December 2004 in accordance with Action 3.1.2 and 7.2.2.			Conservation Commission for advice in October 2008.
Guidelines for Selection of Fauna Habitat Zones			
To be prepared by the Department by 31 December 2004 in accordance with Action 7.2.2.			Draft for public comment substantially complete.
Goals for Understorey Structural Diversity			
To be prepared by the Department by 31 December 2005 in accordance with Action 4.1.			In preparation.
Fauna Distribution Information System			Referred to the
To be prepared by the Forest Products Commission in accordance with Action 8.4. (No completion date set)			Conservation Commission August 2007.
Native Forest Timber Harvest Planning Guidelines			
To be prepared by the Department by 31 December 2008 in accordance with Action 34.1.1			In preparation
Soil and Water Conservation Guidelines			
To be prepared by the Department by 31 December 2005 in accordance with Action 20.1.2.			Draft for public comment released March 2008.
Guidelines for the rehabilitation of plantation areas to be			
returned to native vegetation			
To be prepared by the Department in accordance with Action 15.4.2. (No completion date set)			Not commenced.
Forest Monitoring Guidelines			
To be prepared by the Department by 31 December 2005 in accordance with Action 34.1.1.			Not commenced.
Key Performance Indicator Protocols			Published (includes
To be prepared by the Department in accordance with Action 32.6. (No completion date set)	March 2007		protocols for 20 of the 33 KPI)
Guidelines for the preparation of area management plans for conservation reserves.			Interim guidelines developed (see table A40). These will have
To be prepared by the Conservation Commission in accordance with Action 5.2. (No completion date set)			broader application than the area covered by the FMP.
Indigenous Heritage Management Guidelines			
To be prepared by the Department in accordance with action 25.2 (No completion date set)			Not commenced
Non-indigenous Heritage Management Guidelines			Further development
To be prepared by the Department in accordance with action 25.2 (No completion date set)	Draft Guideline April 2004		constrained by resources and competing priorities.
Existi	ng guidelines	1	
Phytophthora cinnamomi and Disease Caused by it – Volume 1. Management Guidelines	January 1999 *		
To be reviewed by the Department by 31 December 2008 in accordance with Action 18.2.1.		Neuester	
Jarran Silviculture Guidelines		November	
Karri Silviculture Guidelines		2004	
reviewed by 31 December 2004		January 2005	
Wandoo Silviculture Guidelines		November	
reviewed by 31 December 2004		2004	

* Date recorded as published to the Department of Conservation and Land Management Intranet

Table A40: Other guidance and supporting documents that have been prepared.

Guidance document name	Date prepared	Status / Comment
SFM Advisory Note 1 Rehabilitation of Landings and Extraction Tracks that have been Corded or Matted	28/2/2005	To be superseded, at least in part, by guidelines
SFM Advisory Note 2 Blade-up Access in Informal Reserves and other Protected Areas within State Forest and Timber Reserves	23/6/2006	To be superseded, at least in part, by guidelines
SFM Advisory Note 3 Management of Access in Informal Reserves and other Protected Areas within State Forest and Timber Reserves	21/9/2006	To be superseded, at least in part, by guidelines
SFM Advisory note 4 Procedures for the Use of Work Improvement Notices and Management Letters	21/11/2006	To be superseded, at least in part, by guidelines
SFM Advisory note 5 Salvage of Logs in Association with Informal Reserves	1/3/2007	To be superseded, at least in part, by guidelines
SFM Manual No. 1 Interim Manual of Procedures for the Management of Soils Associated With Timber Harvesting in Native Forests	31/5/2005 13/6/2006 6/9/2006 31/5/2007	To be revised to support proposed Soil and Water Conservation Guidelines
Guidelines for the preparation of area management plans for conservation reserves. To be prepared by the Conservation Commission in accordance with Action 5.2. (No completion date set)	March 2006	Interim guidelines developed. These will have broader application than the area covered by the FMP
SFM Interim Guideline No. 1 Interim Guideline for Silvicultural Practice in the Jarrah Forest of the Wungong Catchment	13/11/2007	Will be used to guide operational practice on an initial trial basis. It is intended that the initial trial will be during 2007 and early 2008 and that the review of the Interim Guidelines will form part of the Water Corporation's first stakeholder project review for the overall Wungong project,
SFM Interim Guideline No. 2 Interim Guideline for the First Thinning of Bauxite Rehabilitation Areas Established After 1988 with Native Species in the Wungong Catchment	23/5/2007	Will be used to guide operational practice on an initial trial basis. It is intended that the initial trial will be during 2007 and early 2008 and that the review of the Interim Guidelines will form part of the Water Corporation's first stakeholder project review for the overall Wungong project,
SFM Interim Guideline No. 3 Interim Guideline for the First Thinning of Bauxite Rehabilitation Areas Established Before 1988 with Exotic Species in the Wungong Catchment	17/8/2007	Will be used to guide operational practice on an initial trial basis. It is intended that the initial trial will be during 2007 and early 2008 and that the review of the Interim Guidelines will form part of the Water Corporation's first stakeholder project review for the overall Wungong project,
SFM Technical Report No 2 Review of Factors Affecting Disturbance, Compaction and Trafficability of Soils with Particular Reference to Timber Harvesting in the Forests of South-West Western Australia	May 2005	Information to support guideline and manual content
SFM Technical Report No 3. Soil Survey and Assessment of Trafficability in the South-West Forests of Western Australia - Adaptive Management and Operational Trials Harvested in Winter 2004	Feb 2007	Information to support guideline and manual content

The main reasons for the performance shortfall in meeting KPI 33 are:

- the level of resources available to the Department to implement the FMP;
- the inevitable ramp-up in capacity to develop guidance documents within relevant parts of the Department. Some deadlines had passed before an increased capacity was in place;
- the difficulties that arose in implementing the FMP and hence the resources used in resolving these difficulties, with consequent impacts for work on implementing the FMP that otherwise would have progressed;

- the relationship between the Department and the Forest Products Commission has, in some cases, impeded the implementation of the FMP as time and resources have been directed to interagency issues;
- a move in office location for two work groups that resulted in increase rent payments that would otherwise have been used to employ staff to implement the FMP;
- emerging new priorities that the Department was required to service e.g. the Timber Industry Working Group in 2006 and 2007, with consequent impacts for work on implementing the FMP that otherwise would have progressed;
- additional work to service the Conservation Commission beyond that required by the FMP, for example for field surveys of old growth forest and procedures and consultation involved in finalising fauna habitat zones, with consequent impacts for work on implementing the FMP that otherwise would have progressed;
- some initiatives in the FMP, such as soil management, have required substantially
 more resources than anticipated because of the increased complexity that has evolved
 (to develop the Trafficability Index system, undertake adaptive management trials,
 revise the soil management system on several occasions), with consequent impacts for
 work on implementing the FMP that otherwise would have progressed;
- involvement in fire emergencies which has seasonally impacted to a significant extent on works programs, with consequent impacts for work on implementing the FMP that otherwise would have progressed; and
- staff attraction and retention issues, as have been experienced across most sectors of the Western Australian economy, as a result of the resources boom.

In addition, three of the proposed guidelines (Indigenous Heritage Management Guidelines, Non-indigenous Heritage Management Guidelines and Guidelines for the Preparation of Area Management Plans for Conservation Reserves) have broader application outside the FMP area, and therefore development and review of these documents is influenced by matters beyond those directly relevant to the implementation of the FMP. The Interim Guidelines for the Preparation of Terrestrial Conservation Reserve Management Plans were published in 2006.

Appendix B

Conservation Commission performance assessments

Performance Assessment Name	
Fauna habitat zones	Further action
Objective of the performance assessment was to assess the process for finalising the indicative	
fauna habitat zone locations	
Recommendation 1	Finding 7 to be further
The Guidelines for the Selection and Management of Fauna Habitat Zones which are being developed by CALM should detail the relative emphasis to be applied when the considerations from Appendix 4 of the FMP are applied. The Conservation Commission should provide guidance to CALM in relation to any preferences to be applied to the FMP Appendix 4 considerations.	explored through the upcoming assessment of marri retention.
Recommendation 2	
A map of the indicative Harvest Plan with fauna habitat zone locations should be distributed for review by District and Regional staff to enable them to express interest in any fauna habitat zones in close proximity to harvest areas (within approximately 1.5 km) which they considered it necessary for them to have input (e.g. the presence of monitoring plots that required specific treatment that may not be compatible with fauna habitat zone management). At the time of finalising the fauna habitat zones such input should be obtained and included in the planning process. To verify that consultation has been undertaken, a formal sign-off process by those officers who are consulted should be implemented.	
Sustainable Forest Management should seek broad guidance from CALM Science and Nature Conservation Program Leaders on the status of <i>Phytophthora</i> dieback affected areas with	
respect to fauna habitat, particularly in relation to diverse ecotype zones or other ecosystems which may otherwise be preferred for inclusion in fauna habitat zones. This information should be used to guide future decision making through inclusion in the final Guidelines for the Selection and Management of Fauna Habitat Zones.	
The timeliness of the provision of information to third partice requires improvement. This is	
expected to occur as longer term planning for harvesting operations is enhanced. It is recommended that it should be the objective of CALM to provide all relevant planning information to interested third parties five weeks prior to the operational need for the finalisation of the fauna habitat zone location to enable them to provide any relevant input. This will be monitored by the Conservation Commission.	
Recommendation 5 Routine and appropriate field demarcation of all fauna habitat zone boundaries should be undertaken by FPC prior to any other internal coupe demarcation. In relation to fauna habitat zones finalised in areas not associated with harvesting operations CALM should develop a guideline to identify other management activities that would trigger the need for fauna habitat zone boundary demarcation. This should be developed in consultation with the Conservation	
Commission	
Recommendation 6	
The harvested area within Taree fauna habitat zone should be accounted for in CALM records as though it were an existing informal reserve and thus not contribute to the area of State forest set aside for fauna habitat zones in FMP. Recommendation 7	
CALM and FPC should review and report to the Conservation Commission on their systems of collecting, exchanging and utilising fauna habitat zone map information and silvicultural records map information with the objective of determining the reasons for the failure by both CALM and FPC to correctly identify the harvest area boundary and whether similar instances to this may be occurring elsewhere due to a weakness in the management system. This review should include any recommendations for improvements. This will be made available to the public. Upon receipt of this report the Conservation Commission will consider the need for undertaking any further performance assessment of this aspect of the management system.	
 The overall response to the recommendations by DEC have been adequately implemented, however the delay in producing the guidelines was unforeseen at the time of the assessment. After the 12 month review there were two key findings where it is considered that further work was required. These findings relate either directly or indirectly to the incursion of timber harvesting activities into the fauna habitat zone in Taree block, as follows:- Key Finding 5 relates to the demarcation of fauna habitat zone boundaries. DEC response regarding implementation status: Field demarcation of fauna habitat zone boundaries associated with timber harvesting is an FPC responsibility, and is monitored as part of routine coupe surveillance. The specific coupes reported upon in this Performance Assessment were active coupes at the commencement of the FMP, and the fauna habitat zones were therefore incorporated into ongoing coupe demarcation activities at that time. DEC has developed a pre- 	
operations checklist for assessing proposed operations that will disturb the forest. The checklist incorporates a trigger in relation to the need to identify and demarcate the boundary of a formal or informal reserve or a fauna habitat zone. In addition, the guidelines for the Management of	

Informal Reserves will incorporate management of fauna habitat zones and as part of that they will also include guidance on the type of activity that would trigger the need for fauna habitat	
 Key Finding 7 relates to a request for detail on the method of collecting silvicultural boundaries as it relates to the fauna habitat zone in Taree block. DEC response regarding implementation status: DEC remains of the view that a detailed report is not warranted, and has not implemented this recommendation. 	
An area of fauna habitat zone in Taree was logged due primarily to the area not being demonstrated as an informatic	
 This incursion within the fauna habitat zone was not identified or recorded in any of the numerous processes which should have identified it such as:- routine inspections by FPC and DEC, fauna habitat zone boundary inspections by DEC staff, and the silvicultural boundary recording process. 	
The Conservation Commission believes that an emphasis needs to be placed upon the appropriate implementation of guidelines which will clearly identify the roles of the two agencies (FPC and DEC) in relation to demarcation to ensure that situations such as this are avoided in the future. As the development of guidelines for fauna habitat zone implementation is a requirement of the FMP, and it is well overdue, it is requested that these guidelines are finalised as a priority.	
In the original DEC comment relating to Finding 7, the DEC indicated the following; "Following application of silvicultural treatments (including burning), aerial photography is acquired and, with FPC consultation, final boundaries of the silvicultural outcomes are confirmed. During that phase, amendments to harvest boundaries may occur. In this instance, it would be expected an amended boundary would capture the 3 hectare patch in question."	
It is considered that it is not productive to debate whether the logged area in the fauna habitat zone would have been identified after the final boundaries of the silvicultural outcomes are confirmed (as indicated in the initial DEC response). Even if this were to be the case the perception that (in this final phase of operations) amendments to external harvesting boundaries	
may be occurring is of concern. The Conservation Commission still holds the view that further clarity is required in relation to Finding 7. It is acknowledged that this fauna habitat zone assessment may not be the most relevant assessment forum for seeking this further detail. Therefore, as part of the upcoming FMP performance assessment of marri retention, extra	
emphasis will be placed upon the analysis of the general process for the achievement & recording of silvicultural outcomes in jarrah forest. DEC will be advised through the Conservation Commission's PARC process of the detail in relation to this upcoming assessment.	
Maatay Duwa Dian and Draaayihad huwaing	
Master Burn Plan and Prescribed burning	Further action
Objectives of the performance assessments were to: analysed the Master Burn Planning process; assess the planning and implementation of a sample of individual proscribed burns.	Further action
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issues relate to the field identification of old-growth forest. The FPC response indicates that	not that records are
planning amendments are being implemented to ensure that the FMP requirements for old-	kept. It was then
growth identification are being incorporated into the planning process and referred the	requested that all
Conservation Commission to DEC for a response on the field identification of old-growth. DEC	parties maintain records
indicated that a field procedure had been developed but had not provided the details of this to	to demonstrate their
the Conservation Commission at the time of the mid-term audit.	commitment to
	protecting old-growth
	and enable third-party
	assessments to take
	place. This audit also
	identified two breaches
	of informal reserve
	boundaries which were
	not identified by the
	current monitoring
	procedures. The FMP
	stipulates that
	guidelines for monitoring
	will be developed but
	there has been no
	action.

Appendix C

Guidelines to be prepared by the Department by 31 July 2009

Guidelines to Protect the Values of Informal Reserves and Fauna Habitat Zones

Guidelines for the Selection of Fauna Habitat Zones

Soil and Water Conservation Guidelines