Protection of significant flora and understorey species

Conservation Commission of Western Australia

Commission Function

Conservation Commission performance assessments are undertaken primarily to fulfil the functions described in S 19(g) of the Conservation and Land Management Act 1984. That is to "assess and audit the performance of the Department and the Forest Products Commission in carrying out and complying with the management plans". They will also help inform its policy development function and its responsibility to advise the Minister on conservation and management of biodiversity components throughout the State.

The use of Department of Environment and Conservation (DEC) data for the production of this report is acknowledged.

Approved at Conservation Commission meeting 12th December 2011

Conservation Commission of Western Australia

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Executive Summary

The purpose of this assessment is to report on the implementation of the Forest Management Plan 2004-2013 (FMP) in relation to the protection of significant flora and understorey species. Significant flora values are areas of high flora species richness, centres of endemic flora, centres of relictual flora, centres of disjunct flora, threatened ecological communities, and declared rare flora. A definition for 'understorey species' is not provided in the FMP.

In this assessment, the Conservation Commission has evaluated achievements in relation to the relevant FMP section objectives. Where necessary, extra analysis of the related actions, appendices and guidelines has taken place.

DEC has continued to maintain a database for the two significant flora values; threatened ecological communities and declared rare flora. The central repository of flora information in NatureMap is a major enhancement in the delivery of standardised information for operational activities which has taken place during the term of the FMP. From the information provided it appears that no declared rare flora species or threatened ecological communities have moved to a higher category of threat as a result of management activities.

However, there are findings in this report in relation to the management of the other four significant flora values; areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora (maps showing distribution of these values is shown in Appendix 2 and Appendix 3). At the operational level, the FMP requirements in relation to the protection of these four significant flora values have either been enacted recently (native forest pre-harvest checks 2010), or not at all (other disturbance activities in the FMP area). The lack of management review of tables and maps etc makes it difficult to determine whether some of the non-implementation (or relatively late implementation) of some other measures in the FMP (such as checklists) may have impacted upon the occurrences of the relevant species.

For particular aspects of significant flora management and for understorey protection it was determined that at the landscape level, and whole-of-forest level, there is currently a lack of outcome reporting available to determine whether the FMP objectives have been achieved.

Findings for this assessment have been listed under the relevant objective from the FMP. The FMP has adopted three scales of management: operational, landscape and whole of forest. Actions are set for each of the objectives, and where appropriate at each of the scales of management. A number of findings have been arrived at as summarised below:-

Finding 1

There is no evidence that the 23 endemic taxa and two disjunct taxa that are rare or priority taxa and have no document to guide their management, have had conservation statements prepared for them outside that detail which was available before the FMP was published.

Finding 2

There is no central custodian within DEC for maintaining and reviewing the four significant flora values of; areas of high flora species richness, centres of endemic flora, centres of relictual flora, and centres of disjunct flora.

Finding 3

The measures outlined in the FMP for the four significant flora values:- high flora species richness; centres of endemic flora; centres of relictual flora; and centres of disjunct flora, have only recently (July 2010) been introduced for disturbance activities associated with timber harvesting. There is no evidence of these requirements being accounted for in other DEC departmental operations which might cause disturbance.

Finding 4

There is procedural variation between the DEC regions on the approach for referral and endorsement for taking priority flora and for undertaking field searches ahead of disturbance activities.

Finding 5

The implementation of Appendix 13 measures (e) through to (i) have either not been undertaken to date or there is a lack of evidence to suggest that the undertaking of these measures has resulted in improved protection of areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora.

Finding 6

There are no guidelines for the development of area management plans for conservation reserves as they relate to the protection of areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora.

Finding 7

The available operational documentation does not provide clearly defined guidance in relation to the protection of understorey in the jarrah forest.

Finding 8

The document 'Goals for Understorey Structural Diversity' is still a work in progress and there is a lack of reporting available to assess the achievement of the FMP objectives in relation to the diversity of understorey vegetation structure.

Finding 9

There is a lack of outcome reporting currently available to assess the achievement of the FMP objectives in relation to 'Increasing knowledge' at the whole of forest scale.

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The objectives of the performance assessment

The purpose of this assessment is to report on the implementation of the Forest Management Plan 2004-2013 (FMP) in relation to the protection of significant flora and understorey species.

The scope of the assessment

The FMP applies within the geographic area of the Swan, South West and Warren Regions of the Department of Environment and Conservation (DEC), other than marine waters.

As detailed in the FMP, the following section objectives and their related actions/appendices/guidelines are relevant to this assessment:-

Section 4. Diversity in vegetation structure

Section 6. Operations and the conservation of flora

Section 8. Threatened and priority species and ecological communities

Section 9. Increasing knowledge

In 2003, Hearn et al.[1] reviewed the management of significant flora and recommended measures to be undertaken to enhance/protect significant flora values. These measures are outlined in Appendix 13 of the FMP (also included as Appendix 1 of this report). The plan predominantly covers lands vested in the Conservation Commission however Appendix 13 does refer to recommendations in relation to significant flora values on the conservation reserve estate and on areas not managed by the Department and these other areas have been referenced where required in the report.

When the assessment was conducted

This performance assessment was undertaken in 2011.

Definitions

Significant flora is defined in Appendix 13 of the FMP (see Appendix 1 of this report) as follows:-

> Significant flora values are areas of high flora species richness, centres of endemic flora, centres of relictual flora, centres of disjunct flora, threatened ecological communities, and declared rare flora. The occurrences of the first four of these values were identified through the Comprehensive Regional Assessment part of the RFA[2], and the Department maintains databases for the latter two values.

High Flora Species Richness –

[1] Management of Significant Flora Values in South-West Forests and Associated Ecosystems (Hearn, R., Stoneman, G.L., Keighery, G., Burrows, N., Yates, C., and Hopper, S. - June 2003)

[2] RFA – Regional Forest Agreement

Maps of areas of high species richness were generated for the CRA using a computer model (SpModel) that predicts, on a species by species basis, their general distribution. The model used a one kilometre grid. Maps of areas of high species richness reflect concentrations of taxa in high rainfall, lower summer evapotranspiration areas on diverse regolith.

Centres of Endemic Flora Species –

The South West has a large flora and about 75% of it is endemic. Within this flora a significant number of taxa have narrow ranges and restricted habitat requirements and can be considered to be "narrow" or "local" endemics. These narrow endemics are taxa that are most vulnerable to change (climatic, hydrological or disease induced) or catastrophic events (land clearing, fire or flood). A very large number of these taxa are listed as being Conservation Taxa (Rare or Priority) by CLM.

In the absence of detailed life syndrome/vital attribute data for most taxa in the South West, an assessment of real vulnerability of each taxon is not possible. Taxa with a distribution that ranges less than 150 kilometres are considered to be locally endemic. Based on the list of endemic flora taxa compiled during the CRA, 316 taxa are considered to be locally endemic.

Centres of Disjunct Flora Species –

Species with disjunct distributions have been very significant in the evolution of the south-west flora, particularly through the Quaternary. Breeding isolation (which requires consideration of breeding systems, pollen and seed dispersal mechanisms, and habitat requirements) over extended periods is the main element in consideration for inclusion in the list of disjunct taxa.

Centres of Relictual Flora Species –

Relictual taxa include several classes of taxa considered relictual or primitive. They include taxa with "primitive" reproductive systems (gymnosperms, ferns and fern allies), monotypic genera (often considered to be end of line taxa of almost extinct genera) and taxa considered to be primitive or basal within their clades (families / genera/sub genera). The relatively low number of taxa in these groups (particularly in WA) and their genetic distance from our dominant modern flora make them important within the total breadth of biodiversity, and hence for conservation.

Understorey species -

A definition for 'understorey species' is not provided in the FMP (and this aspect of the FMP requires clarification). There is further discussion of this topic in the body of the report however for the purposes of this assessment the following general definition will be applied:-

The vegetative layer between the forest canopy and the ground cover.

Declared Rare Flora –

> The Department of Environment and Conservation (DEC) maintains a list of taxa which are threatened with extinction (Declared Rare Flora) and taxa that may be rare or threatened but for which there are insufficient survey data to accurately determine their status, or are regarded as rare but are not currently threatened (Priority flora). The term Declared Rare Flora (DRF) is applied to flora that has been declared 'threatened' under relevant legislation. The *Wildlife Conservation Act 1950* is the primary wildlife conservation legislation in the State and the Minister for the Environment can declare taxa (species, subspecies or variety) as "Rare Flora" if they are considered to be in danger of extinction, rare or otherwise in need of special protection. A list is also maintained for threatened and priority ecological communities (TECs and PECs).

Priority flora –

> Priority flora are defined as follows by DEC: - Species that are known from only a few collections, or a few sites, but which have not been adequately surveyed. Such flora may be rare or threatened, but cannot be considered for declaration as rare flora until such survey has been undertaken. These flora are included on a supplementary conservation list called the Priority Flora List. There are three categories of priority flora covering these poorly known species. The categories are arranged to give an indication of the priority for undertaking further surveys based on the number of known sites, and the degree of threat to those populations. A fourth category of priority flora is included for those species that have been adequately surveyed and are considered to be rare but not currently threatened.

Assessment methodology

In this assessment, the Conservation Commission has evaluated management effectiveness in relation to the relevant FMP section objectives. Where necessary, extra analysis of the related actions, appendices and guidelines has taken place.

It is important to note the distinction between 'areas' and 'centres' of significant flora and the individual taxa that were determined to be endemic, disjunct or relictual taxa. Some of the measures in FMP Appendix 13 (a, b, c, f, i and j) refer to 'individual taxa' of the significant flora value categories, while other measures (d, e, g and h) reference the protection of 'areas' and 'centres' of significant flora.

The following extract from Hearn et al (2003) summarises the approach that was taken to review the management of significant flora which lead to the recommendations in the FMP and in particular Appendix 13:-

> For the values of centres of endemic, disjunct or relictual flora species, the approach taken in this assessment was to (i) identify where these values occur, (ii) assess how adequately the value is reserved at both a regional and local level, (iii) review the management of each of the taxa that were determined in the Comprehensive Regional Assessment (CRA) to be an endemic, disjunct or relictual taxa, and (iv) review the current and additional mechanisms proposed in the Draft Forest Management Plan that serve to protect these values.

For the values of high flora species richness, Threatened Ecological Communities and Declared Rare Flora, the approach taken in this assessment was to (i) identify where these values occur, (ii) assess how adequately the value is reserved at both a regional and, where appropriate, local level, and (iii) review the current and additional mechanisms proposed in the Draft Forest Management Plan that serve to protect these values.

At the regional level, significant flora values have adequate to high levels of representation in the proposed and existing formal and informal conservation reserve system, ranging from 57% reserved for centres of disjunct flora to 98% reserved for the national estate values of high flora species richness and centres of relictual flora.

The documentation reviewed

Forest Management Plan 2004-2013

Mid-term Audit of Performance for the Forest Management Plan 2004-2013 (2008) - and relevant supplementary information

Management of Significant Flora Values in South-West Forests and Associated Ecosystems (Hearn, R., Stoneman, G.L., Keighery, G., Burrows, N., Yates, C., and Hopper, S. - June 2003)

Goals for Understorey Structural Diversity (draft document)

DEC Regional Wildlife Management Programs (Flora)

Protocols for Measuring and Reporting on the Key Performance Indicators of the Forest Management Plan 2004-2013 SFM Manual No.2 (2007)

DEC audits of native forest harvesting coupe management and environmental protection

Silvicultural Practice in the Jarrah Forest SFM Guideline No.1 2004

Data collection, evaluation and evidence used to assess the criteria

Much of the information required to assess implementation of the relevant actions of the FMP is available through the DEC systems on the internet or DEC intranet for example timber harvesting 'Pre-operational planning disturbance checklists'.

A request was also made to DEC for Work Improvement Notices and Management Letters that relate to environmental incidents impacting significant flora. DEC indicated that the department had not issued any Work Improvement Notices or Management Letters for protecting significant flora values.

A request was also made to the Forest Products Commission for any Environmental Management Systems incident reports that might relate to significant flora values. One incident in relation to the protection of significant flora was recorded during the life of the FMP.

Findings

Findings for this assessment have been listed under the relevant objective from the FMP. The FMP has adopted three scales of management: operational[3], landscape[4] and whole of forest[5]. Actions are set for each of the objectives, and where appropriate at each of the scales of management.

The findings are ordered from 'Operational' scale to 'Landscape' scale to 'Whole of Forest' scale.

Operational scale - *Operations and the conservation of flora*

The extent to which the objective of FMP section 6 has been achieved will be discussed through a detailed analysis of the objective and relevant actions as reproduced below:-

Operations and the conservation of flora (FMP section 6)

> Objective
>
> The plan proposes the following Actions at the operational scale for the purpose of seeking to reduce the extent of the threat to the diversity and abundance of flora from silvicultural operations that are designed to reduce competition between understorey and commercial species:
>
> Action proposed
>
> 6.1 The Department will undertake the measures identified in Appendix 13 (which relate to the protection of significant flora values).

Significant flora is defined in Appendix 13 of the FMP as follows:-

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

Requirements of Appendix 13 – Management of significant flora values

The extent to which the objective of FMP section 6 has been achieved will be discussed through a detailed analysis of Appendix 13.

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

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

[5] *Whole of forest*: All land categories that are subject to the plan.

Appendix 13 (Part (a)) stipulates the following:-

> FMP Appendix 13 (a) The 23 endemic taxa and two disjunct taxa that are rare or priority taxa and have no document to guide their management:
>
> • will be managed according to the management principles outlined in flora management plans;
>
> • will have conservation statements prepared for them as a priority;
>
> • flora management plans prepared for administrative regions will address these taxa when these plans are prepared or reviewed; and
>
> • where disturbance activities may impact known populations of these taxa, advice will be sought from the Department's Regional Ecologist, Regional Nature Conservation Leader, Principal Botanist or another person with relevant expertise, so that the latest knowledge on the taxon and the impacts of disturbance activities are considered.

The dot points under FMP Appendix 13 (a) apply to the 23 endemic taxa and two disjunct taxa that are rare or priority taxa and have a document to guide their management. There is no evidence to suggest that these particular endemic and disjunct taxa have had conservation statements prepared for them outside the detail which was available before the FMP was published. Apart from the Warren region document, the flora management plans provided for this assessment pre-date the time of the FMP and therefore the conclusion is that these actions have not been enacted. No evidence of additions or supplements to the available flora management plans was available.

There does not appear to be a central 'custodian' for the four values (areas of high flora species richness, centres of endemic flora, centres of relictual flora, centres of disjunct flora) which were gathered during the RFA. This may to a degree explain why the systems have not been in place for the majority of the tenure of the FMP to manage specific requirements associated with these values (more specifically the taxa identified in Appendix 13 – see further discussion on requirements below).

Endemic and disjunct flora which are also declared rare or priority flora will be listed on the Threatened Flora Database which is maintained centrally by DEC. These taxa are discussed under the section below headed FMP Appendix 13 (c).

Finding 1

There is no evidence that the 23 endemic taxa and two disjunct taxa that are rare or priority taxa and have no document to guide their management, have had conservation statements prepared for them outside that detail which was available before the FMP was published.

Recommendation

That DEC undertake Action 6.1 of the FMP 2004-2013, namely:-

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

…….

<u>FMP Appendix 13</u> (a) The 23 endemic taxa and two disjunct taxa that are rare or priority taxa and have no document to guide their management:

• will have conservation statements prepared for them as a priority

Finding 2

There is no central custodian within DEC for maintaining and reviewing the four significant flora values of; areas of high flora species richness, centres of endemic flora, centres of relictual flora, and centres of disjunct flora.

Recommendation

Appendix 2 to this report shows areas of high flora species richness, centres of endemic flora, centres of relictual flora, and centres of disjunct flora (as shown in Hearn et al. (2003) - Map 2: Centres of endemic, disjunct and relictual flora as mapped through the Comprehensive Regional Assessment). DEC have advised that there has been no updating of these maps and databases to date. The digital information held by DEC on the geographical distributions of endemic, disjunct or relictual flora does not appear to be up to date. There is some variation between the extent of the areas of endemic, disjunct or relictual flora as shown in Appendix 2 of this report and the digital information held by DEC.

It is recommended that DEC undertake Action 6.1 of the FMP 2004-2013, namely:-

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

……

<u>FMP Appendix 13</u> (e) Maps of areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora and associated data-bases will be periodically updated at intervals of about 10 years to better reflect the status of current understanding of these values. Maps of centres of disjunct flora is the highest priority for updating.

Appendix 13 (Part (b)) stipulates the following:-

<u>FMP Appendix 13</u> (b) Planning checklists for disturbance activities will be revised to identify specifically the need to address the management requirements identified in Hearn et al. (2003) for known populations of endemic and disjunct taxa that occur in State forest areas that may be impacted by disturbance activities. Known populations of the 12 identified endemic taxa will be considered and managed as if Priority 4 taxon. Known populations of

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

The Conservation Commission interpretation of this section of the FMP is that 'disturbance activities' would include:-

- Timber harvesting activities;
- Fire management activities;
- Developments and re-developments of recreation facilities or;
- Any other departmental operations which might cause disturbance.

All flora data is available through the WA Herbarium and NatureMap data systems, which provide the capacity to map the distribution, or export the data to mapping systems. DEC's regional planners thus have access to location data for all flora species and thus have the capacity to get information on significant species. The central co-ordination of this flora information in NatureMap is a major enhancement in the delivery of standardised information which has taken place during the term of the FMP. Endemic and disjunct flora which are also declared rare or priority flora will be listed on the Threatened Flora Database which is maintained centrally by DEC. An area of concern is the situation where significant flora that are not Declared Rare or Priority Flora may not have registered as having specific management requirements. These species have specific management requirements under the FMP which have recently been addressed in the case of timber harvesting (checklist updated and implemented July 2010). It should be noted however, that the current list of approved and active timber harvest planning documents, does include numerous 'older style' planning checklists which have not been updated retrospectively to provide for the significant flora checks detailed in FMP Appendix 13.

Furthermore there is limited evidence (e.g. an updated checklist) of the requirements of Appendix 13 being accounted for in other departmental operations which might cause disturbance. The absence of a checklist item for these taxa brings into question whether the relevant management requirements have been taken into account during disturbance planning (e.g. checklists for other disturbance activities such as prescribed burning), and whether disturbance activities may have impacted the status of these values (also see comments under heading FMP Appendix 13 (f) below). This is a particular issue for the taxa that are considered to have disjunct distributions; that are not Declared Rare Flora or Priority Flora; that occur within State forest; and could be impacted by disturbance activities.

Finding 3

The measures outlined in the FMP for the four significant flora values:- areas of high flora species richness; centres of endemic flora; centres of relictual flora; and centres of disjunct flora, have only recently (July 2010) been introduced for disturbance activities associated with timber

harvesting. There is no evidence of these requirements being accounted for in other DEC departmental operations which might cause disturbance.

Recommendation

In the case of timber harvesting the updated checklist DECSFM019 was implemented in July 2010. There is limited evidence (e.g. an updated checklist) of the requirements of Appendix 13 being accounted for in other departmental operations which might cause disturbance.

It is recommended that DEC undertake Action 6.1 of the FMP 2004-2013, namely:-

> **6.1 The Department will undertake the measures identified in Appendix 13 (which relate to the protection of significant flora values).**
>
> **……**
>
> **<u>FMP Appendix 13</u> (b) Planning checklists for disturbance activities will be revised to identify specifically the need to address the management requirements identified in Hearn et al. (2003) for known populations of endemic and disjunct taxa that occur in State forest areas that may be impacted by disturbance activities.**

As discussed, the checklist for timber harvesting activities was updated in July 2010 to include the requirements of Appendix 13, so further discussion of the detailed requirements of the FMP will necessarily be limited to timber harvesting.

To assess this part of the FMP it was necessary to establish in practice what documentation would guide the statement 'that the identified taxa will be managed as if those taxa were listed as priority 3 taxa'. This referenced Appendix 13 detail is now also included on the updated checklist planning form for timber harvesting activities. A number of timber harvesting planning documents from each of the three DEC forest regions in the FMP were selected to verify whether the requirements of Appendix 13 had been implemented. The statement in relation to the way in which certain taxa will be managed, i.e., 'that the identified taxa will be managed as if those taxa were listed as priority 3 taxa', indicates that there should be some sort of policy/protocol in relation to management of priority species. However, there does not appear to be any management protocols in place to address this statement. This is further analysed in relation to the specific requirements of the 'Taking' of declared rare or priority flora.

Taking of Declared Rare and Priority Flora

To 'take' in relation to any flora includes 'to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means'. This includes not only direct destruction or injury by human hand or machine but also such activities as allowing grazing by stock, introducing pathogens, altering water tables so as to inundate or deprive the flora of adequate soil moisture, allowing air pollutants to harm foliage, and burning.

This all applies to declared rare and threatened species however, there is no definite policy statement on the taking of priority species. There is variation in the way in which DEC regions undertake the referral and endorsement process for seeking endorsement to take priority flora. An informal policy position developed by DEC Species and Communities Branch is that;

- proposals to take Priority 1 and Priority 2 species (eg in a prescribed burn) should be referred to Species and Communities Branch for endorsement;
- Priority 3 and Priority 4 species should be referred to the DEC District or Regional Manager for endorsement;

DEC have indicated that in practice, some regions refer all proposals to take Priority flora to DEC Species and Communities Branch for endorsement.

There also appears to be some regional variation in the way in which flora searches are undertaken. For example, the following detail applies to requirements for significant flora field verification in relation to FPC native forest roading activities. A check of the current checklists on the SFM intranet site indicated the following:-

- South-west forest region search provides a full species list of flora for new road construction only, and utilises it's own draft (or at least unendorsed) Threatened Flora Assessment Form;
- Swan and Warren Regions do not provide a species list but search for rare, priority or endangered species only and utilises the DEC corporate Rare Flora Search form;

Follow-up monitoring of disturbance activities is also a requirement FMP Appendix 13 (b) with the cost of monitoring (pre-disturbance and soon after the disturbance activity) of the population subject to the disturbance activity directed to the proponent of the activity. This requirement has not been included in the updated planning checklist for timber harvest planning, and no records of post-disturbance monitoring were available.

Finding 4

There is procedural variation between the DEC regions on the approach for referral and endorsement for taking priority flora and for undertaking field searches ahead of disturbance activities.

Recommendation

There are no specific recommendations in relation to this finding.

> FMP Appendix 13 (c) Planning checklists will be revised to include specific triggers and requirements to exclude the location of threatened ecological communities and declared rare flora from timber harvesting.

As mentioned, general flora location data is held by the Western Australian Herbarium and represented through the 'NatureMap' internet website which also provides links to DEC's native plant information site 'FloraBase'. This service is free and publicly available. DEC has continued to maintain a database for threatened ecological communities and declared rare flora (the 'Threatened Flora Database').

Before undertaking activities on the FMP area that results in the permanent destruction of native flora, field searches must be conducted to determine whether threatened flora is present. Located populations should be demarcated and protected from disturbance activities or an application to take is made if this is not possible. The WA Herbarium and NatureMap data systems provide the capacity to map flora distributions, or export the data to mapping systems. DEC Regional planners thus have access to location data for all flora species and thus have the capacity to get information

on significant species. Prior to field searches, an intersection with the Threatened Flora Database should also be undertaken.

In relation to timber harvesting activities, field searches are conducted along proposed road alignments, landing and gravel pit sites before harvesting operations commence. DEC has undertaken checks of this process through its own internal auditing of the systems for checking that threatened flora checks take place. Two DEC internal audits were reviewed and in one of these audits records of field searches for the presence of threatened flora populations were available for 11 out of the 13 coupes sampled. The DEC internal audit was unable to locate records for 2 coupes. In the other available DEC audit report, records of threatened flora records were available for all the coupes which were sampled.

DEC have advised that declared rare flora may have recovery plans prepared (especially if ranked critically endangered), and that all DRF are in the process of having conservation advice statements prepared. Priority flora do not have specific conservation statements per se, but DEC have advised that they are included in regional rare and priority flora management programs, and hence most should have brief conservation statements included in these plans. See further discussion of recovery plans under the 'Landscape scale' findings section of this report.

> FMP Appendix 13 (d) The protection of areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora will be included in guidelines for the development of area management plans for conservation reserves to be developed by the Conservation Commission.

This work is a responsibility of the Conservation Commission and is not yet complete. The document in question is still in draft. The distinction here is that FMP Appendix 13 (a) and (b) in particular refer to individual endemic and disjunct taxa rather than 'areas' or 'centres' and there is no clear guidance on how these locations are to be managed. A geographical representation of the areas of high flora species richness is shown in Appendix 3 of this report. Appendix 2 shows centres of endemic flora, disjunct flora or relictual flora as depicted in the Hearn et al. (2003) report.

It should be noted that a check of a recent plan (*Walpole Wilderness and adjacent parks and reserves management plan 2008)* did confirm the inclusion of reference to these values and mapping of the relevant locations. The *Walpole Wilderness and adjacent parks and reserves management plan 2008* states the following in relation to achieving protection objectives for these locations:- '*considering and analysing the impacts of disturbance on the centres for endemic, disjunct and relictual species and in areas of high flora species richness within the planning area through research, adaptive management experiments and monitoring;-*'.

> FMP Appendix 13 (e) Maps of areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora and associated data-bases will be periodically updated at intervals of about 10 years to better reflect the status of current understanding of these values. Maps of centres of disjunct flora is the highest priority for updating

The collection of the original data for these values is described in the document, *National Estate Identification and Assessment in the South West Region of Western Australia – A Regional Forest Agreement for Western Australia* (June 1998). In this document it states the following in relation to the identification of centres of endemism for example, '*It was therefore determined to focus the*

assessment of endemism on the identification of areas where concentrations of endemic taxa occur - Such areas are termed centres of endemism.' The Hearn et al. (2003) report provided advice to the Conservation Commission's Forest Management Plan Steering Committee at the time of the preparation of the FMP to assist in the preparation of appropriate guidelines. The report states, '*A review of the lists of endemic, disjunct or relictual flora species compiled during the RFA process has been undertaken, with taxa reviewed for their current distribution, conservation status and the community types in which they occur*.' Appendix 2 details the updated map as shown in Hearn et al. (2003). The Hearn et al. (2003) report found that '*There is currently no process for periodic updating of the information generated for the CRA*', and recommended as indicated above that the maps of the significant flora values '-*will be periodically updated at intervals of about 10 years*'.

DEC have advised that there has been no updating of these maps and databases to date. The digital information held by DEC on the geographical distributions of endemic, disjunct or relictual flora does not appear to be up to date. There is some variation between the extent of the areas of endemic, disjunct or relictual flora as shown in Appendix 2 of this report and the digital information held by DEC.

> FMP Appendix 13 (f) The tables included in the report of Hearn et al. (2003) will be reviewed to include information for each taxon on the occurrence/s of the value to which the taxon contributes.

DEC has advised that a review of these tables has not been undertaken. The lack of management review makes it difficult to determine whether some of the non-implementation (or relatively late implementation) of other measures in Appendix 13 (such as checklists) may have impacted upon the occurrences of the relevant species.

> FMP Appendix 13 (g) The Department will work to improve the protection of areas of high flora species richness, centres of endemic flora species, centres of disjunct flora species, and centres of relictual flora species, on lands not managed by the Department through land purchase, covenants, other cooperative arrangements and input to regional planning processes.

DEC does have covenants and other programs such as Land for Wildlife however no evidence was provided by DEC in relation to the extent to which the implementation of these programs has improved the protection of these values.

> FMP Appendix 13 (h) Analysis of the impacts of fire on areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora will be undertaken as part of the Department's fire and biodiversity project.

DEC have provided advice that there are a range of research projects which are relevant to this part of Appendix 13. However, there is no specific reporting outcome available in relation to the impacts of fire on these particular values.

> FMP Appendix 13 (i) Consideration will be given to a revision of the priority flora list to recognise the need for monitoring and ongoing conservation management of taxa with a very narrow range and/or disjunctions in distribution.

DEC have advised that the priority flora list is reviewed as new information becomes available. The DEC advice also indicates that precedence for monitoring is arranged according to the priority categories P1 to P4, that is Priority 1 flora is of the highest priority for monitoring, then Priority 2 flora etc... There is no clear indication from DEC that monitoring of taxa with a very narrow range and/or disjunct distributions has been considered in the revision of the priority flora list.

> FMP Appendix 13 (j) A number of locally endemic taxa and taxa with disjunct distributions that do not occur within State forest will be considered for addition to the list of threatened and priority taxa.

DEC have advised that the threatened species listing process, and the review of the priority flora list are ongoing processes which should account for this aspect of Appendix 13.

Finding 5

The implementation of Appendix 13 measures (e) through to (i) have either not been undertaken to date or there is a lack of evidence to suggest that the undertaking of these measures has resulted in improved protection of areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora.

Recommendations

It is recommended that DEC undertake Action 6.1 of the FMP 2004-2013, namely:-

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

In particular the following from FMP Appendix 13:-

> **FMP Appendix 13 (e) Maps of areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora and associated data-bases will be periodically updated at intervals of about 10 years to better reflect the status of current understanding of these values. Maps of centres of disjunct flora is the highest priority for updating**
>
> **FMP Appendix 13 (f) The tables included in the report of Hearn et al. (2003) will be reviewed to include information for each taxon on the occurrence/s of the value to which the taxon contributes.**
>
> **…..**
>
> **FMP Appendix 13 (h) Analysis of the impacts of fire on areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora will be undertaken as part of the Department's fire and biodiversity project.**
>
> **FMP Appendix 13 (i) Consideration will be given to a revision of the priority flora list to recognise the need for monitoring and ongoing conservation management of taxa with a very narrow range and/or disjunctions in distribution.**

Finding 6

There are no guidelines for the development of area management plans for conservation reserves as they relate to the protection of areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora.

Recommendations

It is recommended that the Conservation Commission finalise the draft document which relates to FMP Appendix 13 (d) as follows:-

> **<u>FMP Appendix 13</u> (d) The protection of areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora will be included in guidelines for the development of area management plans for conservation reserves to be developed by the Conservation Commission.**

The extent to which the objective of FMP section 6 (Operations and the conservation of flora) has been achieved is also analysed through discussion of the following actions:-

> The Forest Products Commission and its agents will conduct its silvicultural operations:

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

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

The FMP includes specifications in Appendix 5 for 'Reduced impact of silvicultural operations on flora diversity and abundance'. Included in FMP Appendix 5 are particular measures that relate to the understorey which were specified to be included in the revision of the jarrah silvicultual guidelines. The FMP does not indicate any particular additional requirements related to the protection of understorey in relation to the karri and wandoo silvicultural guidelines.

The silvicultural guideline review resulted in *Silvicultural Practice in the Jarrah Forest SFM Guideline No.1 2004* which refers to the Protection of Soil, Understorey and Mid-Storey Elements protection in section 5.4. This section of the guideline outlines the range of measures taken from the FMP and the Kingston study[6] area to reduce the impact of silvicultural operations on flora diversity and abundance. It is not clear whether these measures are to be applied only to shelterwood[7] areas or to

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

[7] Shelterwood system - FMP definition - A jarrah silvicultural system that involves a partial removal from the overstorey of some mature trees and action to establish regeneration under the remaining mature trees. When the regeneration is sufficiently established most of the remaining mature trees are removed to allow the regeneration to develop.

gap[8] areas as SFM Guideline No. 1 - Section 5.6 'Treatment of Gaps' infers; or just to operations that disturb the soil; or how the protection of understorey species will be undertaken in post-logging activities (such as thinning) over the same areas. Also unclear is how the understorey and other forest elements such as 'Mid-storey' are to be defined.

Understorey definition

As indicated, it is not clear from the available documentation what exactly constitutes the understorey. The DEC planning document Silvicultural Practice in the Jarrah Forest SFM Guideline No.1 2004 refers to 'secondary' storey species (e.g. sheoak) as distinct from the canopy and 'understorey'. A related section of the document is titled 'Protection of Soil, Understorey and Mid-Storey Elements', referencing a mid-storey as distinct from the understorey. Understorey divisions as defined in DEC - Native Vegetation Condition Assessment and Monitoring Manual for Western Australia 2009 are more complex again with upper understorey, mid understorey, lower understorey, groundcovers and herbs.

Finding 7

The available operational documentation does not provide clearly defined guidance in relation to the protection of understorey in the jarrah forest.

Recommendation

It is recommended that DEC better define the protection measures to be applied for understorey species in future planning documentation. This should include:-

- **how the understorey and other forest elements are to be defined;**
- **the operations to which the protection measures apply; and**
- **a clear outline of the range of measures to be undertaken to protect understorey species.**

The impact of *Phytophthora* on understorey species can be devastating. Substantial changes in plant abundance and floristic structure may be observed after dieback infestation. An important reporting component of the FMP, 'Key Performance Indicator 18 – The effectiveness of dieback hygiene', was not due for reporting during the mid-term audit of performance of the FMP but will potentially provide a gauge of understorey protection in relation to dieback management at the end-of–term performance report of the FMP. At the time of the 12 month review of this performance assessment, presuming it is available, the detail of reporting under FMP KPI 18 will be analysed further in relation to understorey protection.

Landscape scale - *Diversity in vegetation structure & Threatened and priority species and ecological communities*

Diversity in vegetation structure (FMP section 4)

The extent to which the objective of FMP section 4 (Diversity in vegetation structure) has been achieved is analysed through discussion of the objective and related actions as reproduced below:-

[8] Gap - FMP definition - A discrete opening in the overstorey canopy created to reduce competition to allow seedlings to become established and or develop.

Objective

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

Actions proposed

4.1 The Department will conduct its operations in a manner that has regard to Goals for Understorey Structural Diversity, which are to be:

4.1.1 prepared by the Department with public consultation; and

4.1.2 submitted to the Conservation Commission for advice and approved by the Minister for the Environment by 31 December 2005, when they will take effect.

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

There is little other background detail on the Goals for Understorey Structural diversity provided in this particular section of the FMP but other references in the FMP and supplementary information suggests that an aspect of these proposed actions was to trial and report on regeneration techniques for jarrah and marri that do not cause significant changes to the understorey composition. The Kingston research project found mechanical disturbance after commercial timber harvesting reduced the species richness and abundance of understorey plants compared to undisturbed areas in the short term (Burrows *et al.* 2002).

A draft document titled 'Goals for Understorey Structural Diversity' is referred to in the mid-term audit of the FMP under this action of the plan. A review of this draft document indicates the following:-

- No reference to the use of fire in the regeneration process for those parts of the FMP area which are subject to timber harvesting;
- no evidence of any public consultation or advice sought from the Conservation Commission;
- no evidence of public reporting of the results of monitoring for the proposed goals.

Finding 8

The document 'Goals for Understorey Structural Diversity' is still a work in progress and there is a lack of reporting available to assess the achievement of the FMP objectives in relation to the diversity of understorey vegetation structure.

Recommendation

It is recommended that DEC undertake Actions 4.1 and 4.2 of the FMP 2004-2013, namely:-

4.1 The Department will conduct its operations in a manner that has regard to Goals for Understorey Structural Diversity, which are to be:

4.1.1 prepared by the Department with public consultation; and

4.1.2 submitted to the Conservation Commission for advice and approved by the Minister for the Environment by 31 December 2005, when they will take effect.

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

The extent to which the objective of FMP section 8 (Threatened and priority species and ecological communities) has been achieved is analysed through discussion of the objective and related actions as reproduced below:-

Threatened and priority species and ecological communities (FMP section 8)

Objective

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

Actions proposed

8.1 The Department will maintain a list identifying threatened and priority species of flora and fauna and threatened ecological communities. (Threatened species and communities are those under risk of extinction. Priority species and communities are those that may be threatened but for which there are insufficient survey data, and those that are rare but not threatened).

8.2 The Department and the Forest Products Commission will conduct their operations having regard to the Department's Conservation of Endangered and Specially Protected Fauna in the Wild policy and Conservation of Threatened Flora in the Wild policy.

8.3 The Department and Forest Products Commission will revise planning checklists to identify actions to be taken in specified circumstances in which declared rare flora species, threatened ecological communities, and other significant flora identified in Appendix 13 may be disturbed by their operations.

8.5 (Plantations): The Forest Products Commission will advise the Department of its harvesting and management activities within plantations:

8.5.1 where those activities may impact on threatened species and threatened ecological communities, agreed protection measures will be implemented.

8.6 The Department will develop and implement recovery plans for selected threatened species and ecological communities -

DEC has continued to maintain a database for threatened ecological communities and declared rare flora. At the time of the mid-term audit of the FMP (2008) DEC provided a list of threatened flora which were elevated to a higher category of threat during the term of the FMP. As reported in the

mid-term audit report, '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.' From the same report in relation to 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'.

For the purposes of this assessment, DEC provided three tables which are reproduced in Appendix 4 of this report, and which detail the following:-

Table 1. Individual declared rare flora species threat status and status of recovery plans

Table 2. Threatened ecological communities threat status and status of recovery plans

Table 3. Flora identified through Forest Management Plan 2004-2013 Key Performance Indicator 2 raised to a higher threat category (since mid-term audit of performance of the FMP, December 2008)

Since the mid-term audit report, DEC have indicated that no TEC's have been raised to a higher threat category. However, as detailed in Table 3, DEC have advised that a number of flora species have been raised to a higher category of threat since the reporting undertaken for the mid-term audit of the FMP. From the information provided it appears that no declared rare flora species has move to a higher category of threat as a result of management activities.

Under 8.6 the Department will 'Develop and implement recovery plans for selected threatened species and ecological communities'. DEC provided information in Tables 1 and 2 (Appendix 4) which indicates that Interim Recovery Plans have been or are being prepared for the majority of threatened taxa and ecological communities that are ranked as 'Critically Endangered'. Interim Recovery Plans have also been prepared for some other threatened taxa with a lower ranking, i.e. Endangered or Vulnerable. DEC have indicated that recovery plans for endangered and vulnerable taxa are developed on an as needs basis and as resources permit.

Whole of Forest scale - *Increasing knowledge*

The extent to which the objective of FMP section 9 (Increasing knowledge) has been achieved is analysed through discussion of the objective and related actions as reproduced below:-

Increasing knowledge (FMP section 9)

Objective

The plan proposes the following Actions at the whole of forest scale for the purpose of seeking to develop an improved understanding of the biodiversity of forest regions and the response of forest ecosystems to natural and human induced disturbance, with a view to improving forest management practices:

Actions proposed

9.1 The Department will undertake biological surveys, which will be:

9.1.1 of priority areas determined in consultation with the Conservation Commission; and

9.1.2 used, where appropriate, to assist in evaluating the extent to which biodiversity is being conserved and the need for any review of the reserve system.

9.2 The Department will:

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

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

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

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

In 2009 DEC formally provided detail to the Conservation Commission of an intent to address FMP action 9.1 in two stages using the methodology and staff resources currently deployed for Forestcheck. It is understood that a biological survey project to address FMP Action 9.1 is underway and the initial intent was to have information available at the end of 2011. However, outcome reporting is not currently available.

The following detail is provided on the DEC website in relation to Forestcheck:-

> Preliminary results from FORESTCHECK suggest that logging in the jarrah forest has not had a major impact on the number of species present. Analysis shows that different species inhabit the logged and regenerating sites compared to sites that have not been logged. The importance of this change in species composition will be the focus of future analysis. Data from the first five years of monitoring are currently being analysed and will be externally reviewed prior to publication in the near future.
>
> Please note that fieldwork on the FORESTCHECK monitoring program was suspended in 2006-07 to allow a comprehensive analysis and write-up of the first five years of data to be undertaken. The results from five years of data collected from 2001-2006 will be submitted in 2011 to a peer reviewed journal for publication.

Therefore, for the purposes of this report, there is a lack of outcome reporting currently available to assess the achievement of the FMP objectives in relation to improved understanding of the biodiversity of forest regions and the response of forest ecosystems to natural and human induced disturbance.

Finding 9

There is a lack of outcome reporting currently available to assess the achievement of the FMP objectives in relation to 'Increasing knowledge' at the whole of forest scale.

Recommendation

It is recommended that DEC report to the Conservation Commission on progress in addressing FMP action 9.1.

In relation to Action 9.2.2 (FORESTCHECK implementation), the Conservation Commission notes the following disclaimer from the annual FORESTCHECK reports:-

'*This and previous FORESTCHECK Annual Reports should not be quoted or used as final results for the FORESTCHECK program. Publications based on detailed analyses using comprehensive statistical methods are published on a 5-year basis.'*

It is recommended that the first FORESTCHECK five-year report be presented to the Conservation Commission as soon as possible for consideration.

Conclusion

DEC has continued to maintain a database for the two significant flora values; threatened ecological communities and declared rare flora. The central repository of flora information in NatureMap is a major enhancement in the delivery of standardised information for operational activities which has taken place during the term of the FMP. From the information provided it appears that no declared rare flora species or threatened ecological communities have moved to a higher category of threat as a result of management activities.

However, the findings in this report relate mainly to the management of the other four significant flora values; areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora. At the operational level, the FMP Appendix 13 requirements in relation to the protection of these four significant flora values have either been enacted recently (native forest pre-harvest checks 2010), or not at all (other disturbance activities in the FMP area).

The lack of management review of tables and maps etc makes it difficult to determine whether some of the non-implementation (or relatively late implementation) of other measures in Appendix 13 (such as checklists) may have impacted upon the occurrences of the relevant species. At the landscape level, and whole-of-forest levels, there is currently a lack of outcome reporting available to determine whether the FMP objectives in relation to significant flora and understorey species have been achieved.

APPENDIX 1 - FMP extract of Appendix 13

Management of significant flora values

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

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

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

Implementation of plan action

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

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

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

(b) Planning checklists for disturbance activities will be revised to identify specifically the need to address the management requirements identified in Hearn et al. (2003) for known populations of endemic and disjunct taxa that occur in State forest areas that may be impacted by disturbance activities. Known populations of the 12 identified endemic taxa will be considered and managed as if Priority 4 taxon. Known populations of the eight identified disjunct taxa will be considered and managed as if those taxa were listed as Priority 3 taxon.

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

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

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

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

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

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

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

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

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

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

APPENDIX 2 – Map showing Endemic, Disjunct and Relictual Flora

(as shown in Hearn et al. (2003) - Map 2: Centres of endemic, disjunct and relictual flora as mapped through the Comprehensive Regional Assessment.)

APPENDIX 3 – Map showing Areas of High Species Richness

(as shown in Hearn et al. (2003) - Map 1: Flora species richness within the area of the Regional Forest Agreement)

Accompanying enclosure
Conservation Commission of Western Australia
Forest Management Plan Performance Assessment
Protecting Significant Flora and Understorey Species
Our ref: CEO1287/10, February 2011

Table 1: Flora threat status and status of recovery plans

Taxon	Threat status	Status of recovery plan (including Interim Recovery Plans)
Banksia nivea subsp. uliginosa (= Dryandra nivea subsp. uliginosa)	Endangered	Covered by EPBC TEC recovery plan
Banksia squarrosa subsp. argillacea (= Dryandra squarrosa subsp. argillacea)	Vulnerable	Recovery plan
Boronia exilis	Endangered	Recovery plan
Brachyscias verecundus	Critically Endangered	Recovery plan
Caladenia bryceana subsp. bryceana	Endangered	Recovery plan
Caladenia busselliana	Critically Endangered	Recovery plan
Caladenia huegelii	Critically Endangered	Recovery plan
Caladenia procera	Critically Endangered	Recovery plan
Caladenia viridescens	Critically Endangered	Recovery plan
Caladenia winfieldii	Endangered	Recovery plan
Chamelaucium roycei ms *	Vulnerable	Covered by EPBC TEC recovery plan
Conospermum undulatum	Vulnerable	Recovery plan
Conostylis misera	Vulnerable	Recovery plan
Cryptandra congesta	Vulnerable	Recovery plan
Darwinia apiculata *	Endangered	Recovery plan
Darwinia ferricola *	Endangered	Recovery plan
Drakaea confluens	Critically Endangered	Recovery plan
Drakaea elastica	Critically Endangered	Recovery plan
Gastrolobium modestum (= Brachysema modestum)	Vulnerable	Covered by EPBC TEC recovery plan
Grevillea althoferorum	Critically Endangered	Recovery plan
Grevillea brachystylis subsp. Busselton (GJ Keighery s.n. 28/8/1985)	Critically Endangered	Recovery plan
Grevillea curviloba subsp. curviloba	Critically Endangered	Recovery plan
Grevillea fuscolutea	Vulnerable	Recovery plan
Grevillea rara	Endangered	Recovery plan
Lambertia orbifolia subsp. orbifolia ms	Critically Endangered	Recovery plan
Lambertia orbifolia subsp. Scott River plains	Endangered	Covered by EPBC TEC recovery plan
Lasiopetalum pterocarpum	Critically Endangered	Recovery plan
Rulingia sp. Trigwell Bridge	Critically Endangered	Recovery plan
Sphenotoma drummondii	Endangered	Recovery plan

Taxon	Threat status	Status of recovery plan (including Interim Recovery Plans)
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	Critically Endangered	Recovery plan
Thelymitra dedmaniarum	Critically Endangered	Recovery plan
Verticordia fimbrilepis subsp. fimbrilepis	Vulnerable	Recovery plan
Verticordia plumosa var. ananeotes	Critically Endangered	Recovery plan
Verticordia plumosa var. pleiobotrya	Vulnerable	Recovery plan
Andersonia annelsii	Critically Endangered	Recovery plan in preparation
Caladenia lodgeana	Critically Endangered	Recovery plan in preparation
Eremophila glabra subsp. chlorella	Critically Endangered	Recovery plan in preparation
Grevillea acropogon	Critically Endangered	Recovery plan in preparation
Laxmannia grandiflora subsp. brendae	Vulnerable	Recovery plan in preparation
Stylidium semaphorum	Critically Endangered	Recovery plan in preparation
Verticordia apecta	Critically Endangered	Recovery plan in preparation
Acacia anomala *	Vulnerable	Recovery plan not being prepared
Acacia aphylla *	Vulnerable	Recovery plan not being prepared
Acacia brachypoda	Vulnerable	Recovery plan not being prepared
Acacia chapmanii subsp. australis	Endangered	Recovery plan not being prepared
Anthocercis gracilis *	Vulnerable	Recovery plan not being prepared
Asplenium obtusatum subsp. northlandicum	Vulnerable	Recovery plan not being prepared
Asterolasia nivea *	Vulnerable	Recovery plan not being prepared
Banksia aurantia (= Dryandra aurantia)	Vulnerable	Recovery plan not being prepared
Banksia goodii	Vulnerable	Recovery plan not being prepared
Banksia mimica (= Dryandra mimica) *	Vulnerable	Recovery plan not being prepared
Banksia verticillata *	Vulnerable	Recovery plan not being prepared
Caladenia christineae *	Endangered	Recovery plan not being prepared
Caladenia dorrienii *	Endangered	Recovery plan not being prepared
Caladenia excelsa *	Endangered	Recovery plan not being prepared
Caladenia harringtoniae *	Vulnerable	Recovery plan not being prepared
Darwinia acerosa *	Endangered	Recovery plan not being prepared
Daviesia elongata subsp. elongata	Vulnerable	Recovery plan not being prepared
Diplolaena andrewsii	Vulnerable	Recovery plan not being prepared
Diuris drummondii	Vulnerable	Recovery plan not being prepared
Diuris micrantha	Vulnerable	Recovery plan not being prepared
Diuris purdiei	Endangered	Recovery plan not being prepared
Drakaea micrantha	Endangered	Recovery plan not being prepared
Eleocharis keigheryi	Vulnerable	Recovery plan not being prepared
Goodenia arthrotricha	Endangered	Recovery plan not being prepared
Grevillea brachystylis subsp. australis	Endangered	Recovery plan not being prepared
Grevillea bracteosa subsp. bracteosa	Endangered	Recovery plan not being prepared

Taxon	Threat status	Status of recovery plan (including Interim Recovery Plans)
Grevillea christineae	Endangered	Recovery plan not being prepared
Grevillea corrugata	Vulnerable	Recovery plan not being prepared
Grevillea flexuosa *	Vulnerable	Recovery plan not being prepared
Jacksonia velveta (= Jacksonia sp. Collie)	Endangered	Recovery plan not being prepared
Kennedia glabrata *	Vulnerable	Recovery plan not being prepared
Kennedia lateritia (= Kennedia macrophylla) *	Endangered	Recovery plan not being prepared
Lechenaultia laricina *	Vulnerable	Recovery plan not being prepared
Meziella trifida *	Vulnerable	Recovery plan not being prepared
Microtis globula *	Vulnerable	Recovery plan not being prepared
Pultenaea pauciflora *	Vulnerable	Recovery plan not being prepared
Reedia spathacea	Endangered	Recovery plan not being prepared
Spirogardnera rubescens *	Endangered	Recovery plan not being prepared
Tetraria australiensis *	Vulnerable	Recovery plan not being prepared
Thelymitra stellata *	Endangered	Recovery plan not being prepared
Tribonanthes purpurea	Vulnerable	Recovery plan not being prepared
Trithuria occidentalis (= Hydatella dioica)	Critically Endangered	Recovery plan not being prepared
Verticordia carinata	Vulnerable	Recovery plan not being prepared
Verticordia densiflora var. pedunculata	Endangered	Recovery plan not being prepared
Verticordia fimbrilepis subsp. australis *	Endangered	Recovery plan not being prepared
Verticordia plumosa var. vassensis	Endangered	Recovery plan not being prepared
Aponogeton hexatepalus	Priority 4	Recovery plan not being prepared
Asterolasia grandiflora *	Priority 4	Recovery plan not being prepared
Centrolepis caespitosa	Priority 4	Recovery plan
Eucalyptus goniantha subsp. goniantha	Priority 4	Recovery plan not being prepared
Hydrocotyle lemnoides	Priority 4	Recovery plan not being prepared
Laxmannia jamesii *	Priority 4	Recovery plan not being prepared
Schoenus natans	Priority 4	Recovery plan not being prepared
Trithuria australis (= Hydatella leptogyne)	Priority 4	Recovery plan not being prepared

EPBC: *Environment Protection and Biodiversity Conservation Act 1999*
TEC: Threatened Ecological Community

Table 2. Threatened ecological communities threat status and status of recovery plan

Threatened ecological community name	Threat status	Status of recovery plan (including Interim Recovery Plans)
Aquatic Root Mat Community Number 1 of Caves of the Leeuwin Naturaliste Ridge	Critically Endangered	Interim recovery plan
Aquatic Root Mat Community Number 2 of Caves of the Leeuwin Naturaliste Ridge	Critically Endangered	Interim recovery plan
Aquatic Root Mat Community Number 3 of Caves of the Leeuwin Naturaliste Ridge	Critically Endangered	Interim recovery plan
Aquatic Root Mat Community Number 4 of Caves of the Leeuwin Naturaliste Ridge	Critically Endangered	Interim recovery plan
Eucalyptus calophylla - Xanthorrhoea preissii woodlands and shrublands, Swan Coastal Plain	Critically Endangered	Interim recovery plan
Shrublands and woodlands of the eastern side of the Swan Coastal Plain	Critically Endangered	Interim recovery plan
Shrublands on southern Swan Coastal Plain Ironstones (Busselton area)	Critically Endangered	Interim recovery plan
Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain	Endangered	Interim recovery plan in preparation
Banksia attenuata woodland over species rich dense shrublands	Endangered	Interim recovery plan in preparation
Dense shrublands on clay flats	Endangered	Interim recovery plan in preparation
Mount Lindesay - Little Lindesay Vegetation Complex	Endangered	Interim recovery plan in preparation
Rimstone Pools and Cave Structures Formed by Microbial Activity on Marine Shorelines	Endangered	Interim recovery plan not being prepared
Scott River Ironstone Association	Endangered	Interim recovery plan
Shrublands and woodlands on Muchea Limestone	Endangered	Interim recovery plan
Shrublands on dry clay flats	Endangered	Interim recovery plan in preparation
Southern wet shrublands, Swan Coastal Plain	Endangered	Interim recovery plan planned for preparation
Eucalyptus calophylla - Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain	Vulnerable	Interim recovery plan not being prepared
Eucalyptus calophylla woodlands on heavy soils of the southern Swan Coastal Plain	Vulnerable	Interim recovery plan not being prepared
Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain	Vulnerable	Interim recovery plan not being prepared
Herb rich saline shrublands in clay pans	Vulnerable	Interim recovery plan not being prepared
Herb rich shrublands in clay pans	Vulnerable	Interim recovery plan not being prepared

Table 3. Flora identified through Forest Management Plan 2004-2013 *Key Performance Indicator 2 raised to a higher threat category (since mid-term audit of performance of the FMP, December 2008)*

2010 Flora (listed in Feb 2010)			
Caladenia lodgeana	New addition	Critically Endangered	The species has been searched for by competent persons for the past 5 years and it is believed, on the basis of limited numbers of plants, significant threats through mining, housing development and lack of adequate reservation that the species is in imminent threat of decline and possible extinction without formal protection as rare flora.
Diplolaena andrewsii	New addition	Vulnerable	Only known from two locations which are severely fragmented, consisting of approximately 596 plants. The extent of occurrence is approximately 17km^2, and the area of occupancy 0.04km^2. The extent and quality of available habitat reported to be in decline where *D. andrewsii* occurs.
Grevillea corrugata	New addition	Vulnerable	*G. corrugata* is only known from three locations which are severely fragmented, consisting of approximately 327 plants. The area of occupancy is likely to be less than 1km^2. Only one sub-population of *G. corrugata* occurs on conservation estate, the other sub-populations are on road verges, State forest and private property, of which area, extent and quality of available habitat reported to be in decline.
Trithuria occidentalis *(previously listed as Hydatella dioica)*	Vulnerable	Critically Endangered	A recent taxonomic revision of the family Hydatellaceae has resulted in *Hydatella dioica* (Vulnerable) being recognised as a taxonomic synonym of *Trithuria occidentalis*. As a result of the revision this species now meets Critically Endangered (CR) B1ab(iii)+2ab(iii) based on an extent of occurrence being less than 100km^2, the species being known from a single locality and there being a continuing decline in the quality of its habitat.
Grevillea maccutcheonii	Critically Endangered	Critically Endangered	This species was not previously recorded within the boundaries of the FMP. A recovery population (translocation) was established for this species within the FMP.
Synaphea stenoloba	Critically Endangered	Critically Endangered	This species was not previously recorded within the boundaries of the FMP. A new population was found which occurs within the FMP.
Verticordia plumosa var. pleiobotrya	Vulnerable	Vulnerable	This species was not previously recorded within the boundaries of the FMP. A new population was found which occurs within the FMP.

Government of **Western Australia**
Department of **Environment and Conservation**

FOREST MANAGEMENT PLAN PERFORMANCE ASSESSMENT - PROTECTION OF SIGNIFICANT FLORA AND UNDERSTOREY SPECIES

Thank you for your letter dated 7 September 2011 providing me with the Conservation Commission's draft report on its performance assessment of the protection of significant flora and understorey species within the *Forest Management Plan 2004-2013* (FMP).

I recognise the important role that the Conservation Commission has in assessing the department's progress in implementing the FMP. However, the findings of this performance assessment are somewhat disappointing given the measures the department has in place across the state to protect and manage threatened flora. Further to my letters of 4 March and 19 July 2011 which provided background information for this performance assessment, the department performs its flora conservation functions on a statewide basis and applies its resources on the basis of needs and priorities.

The following comments and responses are provided in regard to the individual findings:

Key finding 1: There is no evidence that the 23 endemic taxa and two disjunct taxa that are rare or priority taxa and have no document to guide their management, have had conservation statements prepared for them outside that detail which was available before the FMP was published.

The department notes this finding. While conservation statements have not been prepared for the identified taxa in Appendix 13 of the FMP, the measures identified in Appendix 13 have been included on the *Planning checklist for disturbance activities* (DECSFM019).

Regional wildlife management programs (flora) are in place across the area of the FMP.

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Finding 2: There is no central custodian for maintaining and reviewing the four significant flora values of; areas of high flora species richness, centres of endemic flora, centres of relictual flora, and centres of disjunct flora.

The department's Nature Conservation Division is the primary custodian of flora information and maintains registers of threatened (as defined by the *Wildlife Conservation Act 1950*) and priority flora, including their occurrence across the landscape.

Finding 3: The measures outlined in the FMP for the four significant flora values:- high flora species richness; centres of endemic flora; centres of relictual flora; and centres of disjunct flora, have only recently (July 2010) been introduced for disturbance activities associated with timber harvesting. There is no evidence of these requirements being accounted for in other DEC departmental operations which might cause disturbance.

The department notes this finding and that DECSFM019 is applied to all disturbance activities across State forest and timber reserves other than mining operations and for fire planning.

Finding 4: There is procedural variation between the DEC regions on the approach for referral and endorsement for taking priority flora and for undertaking field searches ahead of disturbance activities.

DECSFM019 provides a consistent procedure for use by the relevant DEC regions.

The following instructions are extracted from the checklist:

Has a desktop check and field survey indicated that the area may contain or adjoin any of the following values:

a) Threatened Flora (Declared Rare Flora) DECGIS plus District/Region advice.
b) Priority Flora
c) Endemic (23 species) and Disjunct flora taxa (2) that are rare or priority taxa *Summary list of species*
d) Endemic (12) and Disjunct (8) on State forest *Summary list of species*
e) Threatened ecological communities (TEC) DECGIS http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl
f) High floristic diversity e.g. Whicher Scarp Regional/District Nature Conservation
g) Conservation Category Wetland, RAMSAR or wetland of national significance within 200m. DECGIS (topography/hydrology)

If yes, are seasonal requirements appropriate for field survey? Flora Survey Report must be attached for proposed permanent disturbance activities e.g. roads, BRM pits. Include details of the corridor width used along the road alignments. The desktop review is essential but not all activities require detailed survey information. DEC District Manager will specify whether additional survey work is required.

Obtain advice from Regional Manager on whether a field survey is required to establish the boundaries of TEC or wetlands?

For:
a) and e) exclude from timber harvesting;
c) and d) obtain advice from the Departments Regional Ecologist, Regional Nature Conservation Leader or Principal Botanist DEC on activities that may impact.
d) Endemic managed as Priority 4 taxon, disjunct flora managed as Priority 3 taxon.
a)-g) ensure all required demarcation is completed.
Advice must be documented and attached to Checklist.
http://florabase.calm.wa.gov.au/conservationtaxa

Notwithstanding this consistent procedure, there is some variation across regions in the detailed application of the procedure. Whilst a move towards more consistency is desirable, work on this is influenced by other higher priority work and resourcing.

Finding 5: The implementation of Appendix 13 measures (e) through to (i) have either not been undertaken to date or there is lack of evidence to suggest that the undertaking of these measures has resulted in improved protection of areas of high flora species richness, centres of endemic flora, centres of relictual flora and centres of disjunct flora.

The department has undertaken a range of the measures identified in Appendix 13 and I refer you to the information provided on 19 July 2011 in this regard.

While Appendix 13 requires the department to work to improve the protection of significant flora values by implementing a range of measures, including on areas not managed by the department, it does not quantify any targets. As such, information provided to the Conservation Commission in July 2011 outlined the departmental programs which seek to improve the protection of biodiversity values, including threatened flora, off conservation reserves. It is feasible to provided quantified information, for example the area and number of properties with Conservation Covenants and certified *Land for Wildlife*, however this information was not requested.

Finding 6: There are no guidelines for the development of area management plans for conservation reserves as they relate to the protection of areas of high flora species richness, centres of endemic flora, disjunct flora or relictual flora.

The department notes this finding.

Finding 7: The available operational documentation does not provide clearly defined guidance in relation to the protection of understorey in the jarrah forest.

The department's view is that the guidance is clear and consistent with the requirements of the FMP. The guideline does not infer that the requirements only apply to areas cut to gap.

Finding 8: The document* 'Goals for Understorey Structural Diversity' *is still a work in progress and there is a lack of reporting available to assess the achievement of the FMP objectives in relation to the diversity of understorey vegetation structure.

The department notes this finding. The *Goals for Understorey Structural Diversity* will be developed dependent on the priorities of the Fire Management Services Branch.

Finding 9: There is a lack of outcome reporting currently available to assess the achievement of the FMP objectives relating to 'Increasing knowledge' at the whole of forest scale.

The department is of the view that the evidence does not support this finding. The department undertakes significant outcome reporting that assesses the extent to which the FMP objectives relating to the measures to improve understanding of biodiversity are being achieved. For example:

- Department annual reports and or Yearbooks provide a summary of significant research activities and findings relevant to FMP objectives, and list of scientific publications;
- Since 2002, the department has provided the Conservation Commission with a detailed annual progress report for the ForestCheck monitoring project. These reports are also available to the public and can be viewed online on the department's website;
- Since 2004, the department has published research activity reports on an annual basis. These reports provide information at a project level in regard to context, aims, annual progress, management implications and future directions. Projects are categorised according to the department's administrative regions, the Interim Biogeographic Regionalisation for Australia and natural resource management regions. Reports also contain a comprehensive list of publications relating to the work of the department. A copy of this report is provided to the Conservation Commission each year; and
- In 2008, reporting against a range FMP key performance indicators was undertaken as part of the mid-term audit of performance report for the FMP.

Should you require any further comment or clarification relating to the department's responses, please contact Dr Geoff Stoneman, Director Sustainable Forest Management, on 9442 0335.

Yours sincerely

21 November 2011