



PROCEDURE 47

Identification, assessment, and demarcation of Type 2 old-growth karri forest



1. PURPOSE / OBJECTIVES

The purpose of this procedure is to describe the process to be used to identify, assess and demarcate in the field areas of 'Type 2' old-growth karri forest within areas available for harvesting by the Forest Products Commission (FPC).

The requirement to set aside areas of 'Type 2' old-growth karri forest from disturbance operations (such as roading and timber harvesting) arises from the Forest Stewardship Council's® (FSC®) Controlled Wood Standard (FSC-STD-30-010) and the associated FSC Australia's High Conservation Values (HCVs) evaluation framework. The FSC Controlled Wood standard requires the FPC to protect all old-growth forests, which are defined as follows:

"Old-growth forest is ecologically mature forest where the effects of disturbances are now negligible.

Old-growth and late successional stands and forests include:

- Type 1 old-growth - stands that have never been logged and that display late successional/old growth characteristics.
- Type 2 old-growth – stands that have been logged, but which retain significant late-successional/old-growth structure and functions."

Source: High Conservation Values (HCV's) Evaluation Framework, FSC Australia (2013).

2. BACKGROUND

The occurrence of 'Type 1' old-growth karri forest was mapped during the preparation of the Regional Forest Agreement and since the year 2000 all areas have been protected from harvesting and associated disturbance. This continues under the Forest Management Plan 2014-2023 (FMP 2014). Pre-disturbance checks for any unmapped 'Type 1' old-growth forest are conducted prior to approval being issued for any harvest operations. However, 'Type 2' old-growth karri forest is not recognised in the FMP 2014 and the FPC therefore requires a separate process to identify and assess areas of potential 'Type 2' old-growth karri forest to ensure they are excluded from harvesting operations.

During 2014 the FPC extended the mapping work undertaken during the development of the Regional Forest Agreement to identify patches of 'Type 2' old-growth karri forest in those areas with a record of previous harvesting. This process identified a total of 84 hectares of 'Type 2' old-growth karri forest that has been set aside from timber harvesting. This process is described in the Forest Products Commission's Karri forest HCV assessment.

This procedure therefore focusses on the process and steps necessary to ensure that any remaining unmapped Type 2 old-growth karri forest is progressively identified and protected from disturbance operations.

3. TYPE 2 OLD-GROWTH

FSC Australia's (2013) HCVs evaluation framework defines Type 2 old-growth forest as: '*stands that have been logged, but which retain significant late-successional/old-growth structure and functions*'. In accordance with this definition of Type 2 old-growth, within karri forest areas that have been logged/harvested before, the FPC has used percentage senescence (old trees with crowns in decline being the closest characteristic in karri forest representing late successional as per definition) to identify areas of Type 2 old-growth. The threshold used by the FPC is 25% crown cover of senescent trees in the stand. The basis of this threshold level of overstorey crown cover is that it represents the level at which this cohort dominates the stand. i.e. all the younger cohorts in the stand will be subjected to some degree of suppression by the older trees. For further information refer to papers by Bradshaw and Rayner (1997a; 1997b). Consequently, Type 2 old-growth karri forest within pure karri¹, and karri/jarrah² forests will be identified by:

- having a record or evidence of having been previously harvested;
- possessing a two-tiered structure, dominated by a senescent component occupying more than 25% of the canopy; and
- comprising a contiguous, minimum patch size of two hectares. This minimum patch size will form a consolidated, contiguous area.

The sampling and assessment unit for Type 2 old-growth karri forest status will be the raster cells maintained in the Forest Management Information System (FMIS) maintained by the Parks and Wildlife Service within the Department of Biodiversity, Conservation and Attractions. This will ensure consistency of approach and boundary demarcation with the corporate datasets that inform the harvest planning and approvals processes, and which form the basis for the mapping and review of Type 1 old-growth karri forest.

This approach to the identification and mapping of Type 2 old-growth karri forest incorporates both the structural and functional components of the late successional/old-growth stands. The following excerpt from Bradshaw and Rayner (1997, p. 187) highlights the structural elements (and hence the suite of habitat and other functions) sought in these stands:

'In contrast with some forests, karri has no tolerant climax species waiting to eventually replace it in the absence of disturbance. Furthermore, life-long absence of disturbance from fire is inconceivable in this climate (Underwood 1978). This model is based on the presumption that fire at least of an intensity to create seed bed conditions will occur several times during the natural life span of karri. In the final phase of development there is therefore no late seral phase of alternate species but simply old karri forest which given even modest fire disturbance at that stage will be replaced by a new generation of karri forest.'

Consequently, in defining Type 2 old-growth karri forest as that stage where old, senescent karri trees still dominate the site, the structural requirement of FSC Australia's definition is included. Concurrently, these stands will have a high probability of containing significant hollows for hollow-dependent fauna; a

¹ Pure karri forest is defined as containing over eight mature karri stems or stumps per hectare, and comprises a consolidated, contiguous, minimum patch size of two hectares.

² Mixed karri forest is defined as containing two to eight mature karri stems or stumps per hectare in a minimum patch size of two hectares.



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component of regrowth diversity as well as dead woody biomass (both standing and on the ground) as substrate and habitat for a wide range of flora and fauna.

Carbon storage within these Type 2 old-growth karri forests will fluctuate over time as the relative composition of regrowth, mature and senescing stems varies on the site. In many stands, the carbon storage in these Type 2 old-growth karri forests will have peaked and begun to decline until losses from rot, decay and reduced growth rates on old senescing trees are offset by the growth of a vigorous new regeneration cohort arising, which in time will dominate the stand.

4. SCOPE AND PROCESS

All areas of mature karri forest scheduled for timber harvesting or other disturbance operations will be examined for the presence of unmapped Type 2 old-growth karri forest prior to disturbance operations.

The annual indicative timber harvest plan will be used to generate a list of all coupes containing mature karri forest. Each coupe will be individually assessed for the presence of unmapped Type 2 old-growth karri forest using the steps described below.

4.1 ASSESSMENT STEP 1 – Identifying areas requiring no further assessment

The intent of this procedure is to ensure that areas of Type 2 old-growth karri forest are set aside from timber harvesting or associated disturbance. Areas within (or adjacent to) coupes that are not available for timber harvesting due to tenure or other constraints, or have been recorded as highly disturbed from other activities can therefore be excluded from further assessment.

4.1.1 Tenure and reserve status

Timber harvesting is excluded from all formal and informal reserves.

In Step 1 of the assessment process, all boundaries of formal and informal reserves within the area being assessed will be depicted on the coupe or operation base map. A check of outstanding Informal Reserve Amendment Requests should be made to confirm that there are no proposed variations to the reserve boundaries within the coupe. There is no need to physically check these boundaries where no changes are proposed.

If the area subject to assessment is wholly contained within formal or informal reserves, no further analysis is usually required. If the reserves cover only part of the area being assessed, all contiguous 0.5 hectare cells are to be assessed for Type 2 old-growth karri forest. This provides for areas that are less than the minimum 2 hectare patch size to be identified in the area otherwise available for harvesting when connected to patches within adjacent reserves.

4.1.2 Previous harvesting

By definition, patches of Type 2 old-growth karri forest are areas that have been previously harvested. The historical record of harvest extent can vary in reliability, as such the situation could potentially arise where an area has been recorded as harvested, but little or no evidence of harvesting can be observed in the field. The FPC undertakes field reconnaissance of all harvest coupes containing mature karri forest and where there is evidence that an area might meet the definition of Type 1 old-growth karri forest, an assessment by the Parks and Wildlife Service for Type 1 old-growth karri forest (as defined in the FMP 2014-2023) will be requested by the FPC. If as a result of this assessment the area is found not to meet the definition of Type 1 old-growth karri forest the area must also be assessed for the presence of Type 2 old-growth karri forest under this procedure.

4.1.3 Other disturbance

Evidence of extensive historical disturbance arising from grazing, mining and previous farming that has resulted in significant alterations to the forest structure may exclude an area from further analysis.

4.2 ASSESSMENT STEP 2 – Aerial photo interpretation

After excluding areas from assessment for Type 2 old-growth karri forest in accordance with [Step 1](#), high resolution digital imagery will be interpreted for all remaining areas to determine potential patches of Type 2 old-growth karri forest. The crown structure and crown cover percentages will be assessed to determine the relative proportion of senescence in the canopy. Senescent trees for this purpose will include all completely dead crowns as well as those displaying significant dead branches with a retracting 'green' crown. When calculating crown cover percentages, the original extent of the crown (pre-senescence) will be used, and the percentage of senescent crowns will be compared to the entire forest canopy. All major tree species forming the canopy (karri, marri and jarrah) will be included in the assessment. The Whitford scale (see Figure 1) will be used to assess tree crown decline, with crown classes 4 to 8 qualifying as senescent. [Appendix 1](#) provides an example of the Whitford crown decline class 4 from both side and top elevations.

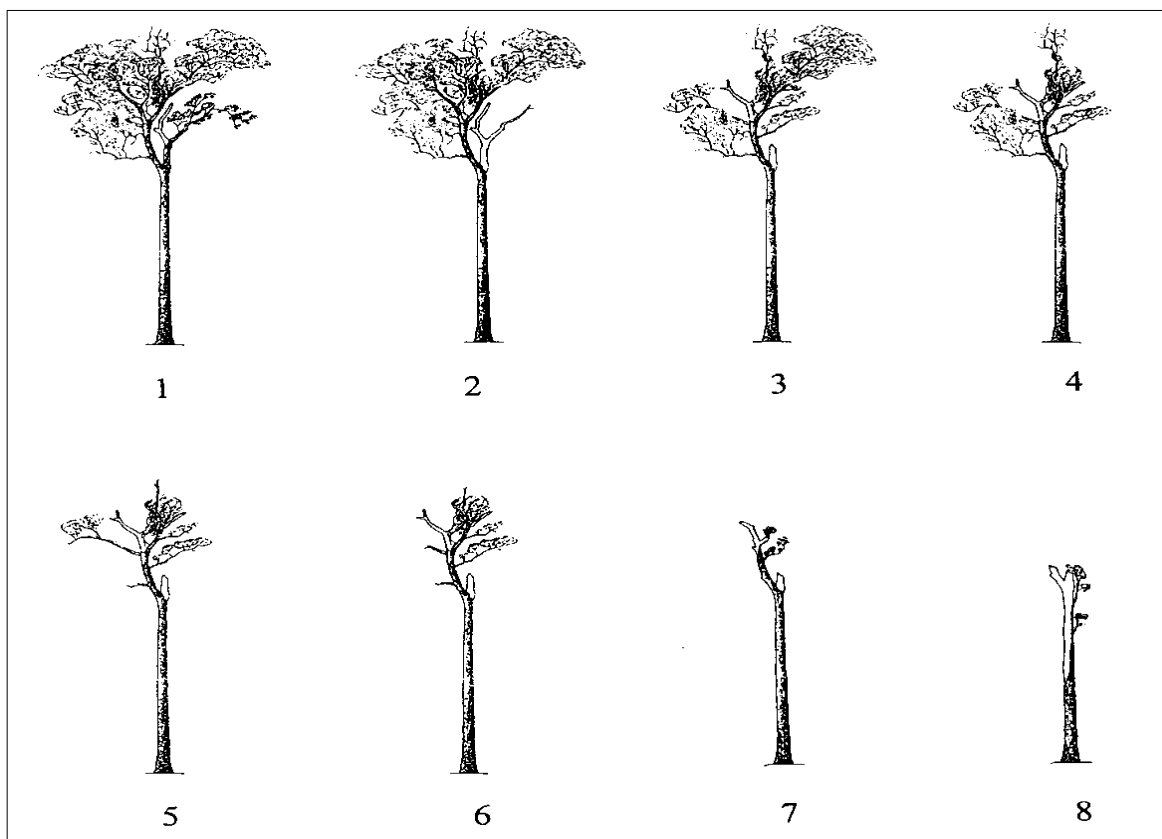


Figure 1: The Whitford scale used for assessing crown decline

The minimum patch size for Type 2 old-growth karri forest is 2 hectares, with each 2 hectares comprising four 0.5 hectare Forest Management Information System (FMIS) grid cells. Each 0.5 hectare cell will be categorised as either meeting (>25% senescent crowns in the canopy) or not meeting (<25% senescent crowns in the canopy) the selection criteria. To identify potential 2 hectare patches of Type 2 old-growth



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karri forest, each 0.5 hectare cell will be compared to its three neighbouring cells to ascertain if any consolidated 2 hectare cell within the FMIS grid meets the selection criteria.

If the photo interpretation process does identify patches of potential Type 2 old-growth karri forest of 2 hectares or greater extent, then assessment Step 3 (field reconnaissance) will be required. In addition, in the absence of suitable aerial photography, or where the evidence on the aerial photos is not conclusive, assessment Step 3 is also to be implemented. The remaining areas are deemed to not meet the criteria for Type 2 old-growth karri forest, and are therefore excluded from further assessment.



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4.3 ASSESSMENT STEP 3 – Field reconnaissance (as required)

A field inspection will be required in all cases where a potential 2 hectare patch of Type 2 old-growth forest has been identified from the photo interpretation. All field inspections should be focused on:

- 1) verifying the amount of senescent trees and whether they are dominating the canopy (senescent karri trees will typically be >1.5 m DBHOB and have a Whitford crown class of 4 to 8);
- 2) verifying that any crowns that appear dead or dying from the photo interpretation are actually senescing crowns, and not trees dead or dying from other causes (e.g. drought, disease); and
- 3) the spatial distribution of the senescent trees to confirm the boundary of the Type 2 old-growth karri forest, should one exist.

The final boundary for Type 2 old-growth karri forest will be as depicted by the standard 2 hectare pixel within the FMIS corporate data system.

5. REPORTING

Each area assessed for Type 2 old-growth karri forest will have a brief report completed which records the details of the assessment process. The report template is attached in [Appendix 2](#).

6. DATA MANAGEMENT

Changes to corporate datasets as a result of the assessment process will be updated through the routine Parks and Wildlife Service's data maintenance process. This may involve updates to forest type boundaries, karri growth development stages and old-growth forest boundaries.

The Parks and Wildlife Service will also maintain a Type 2 old-growth karri forest data layer on behalf of the FPC.

The relevant harvest coupe base print will be amended as required to depict any Type 2 old-growth karri forest that has been identified and is to be excluded from timber harvesting disturbance.

The results and recommendations above will be made available to stakeholders on request.

Over time, the canopy structure and relative proportion of senescent crowns within areas mapped as Type 2 old-growth karri forest may change due to natural events such as progressive ageing, storm degradation or intense bushfire. If a later reassessment of an area of Type 2 old-growth karri forest indicates that there is no longer at least 25 per cent senescent crowns, the area will no longer be classified as Type 2 old-growth karri forest and will be available for timber harvesting. A later reassessment may be required if a major disturbance event occurred or when surrounding areas are reconsidered for harvesting.



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7. FIELD DEMARCATION

The boundaries of patches of Type 2 old-growth karri forest will be demarcated in the field prior to any proposed disturbance activity taking place. Demarcation will be undertaken using a differential GPS to plot the final boundary from co-ordinates arising from assessment Step 3, field reconnaissance. The boundary will be a 'smoothed' version of the FMIS boundary, and will be indicated in the field using standard paint markings. Once demarcated, FPC staff will not be required to undertake any further verification.

8. RESPONSIBILITY

The Manager Forest Management is responsible for ensuring this procedure is followed and implemented.

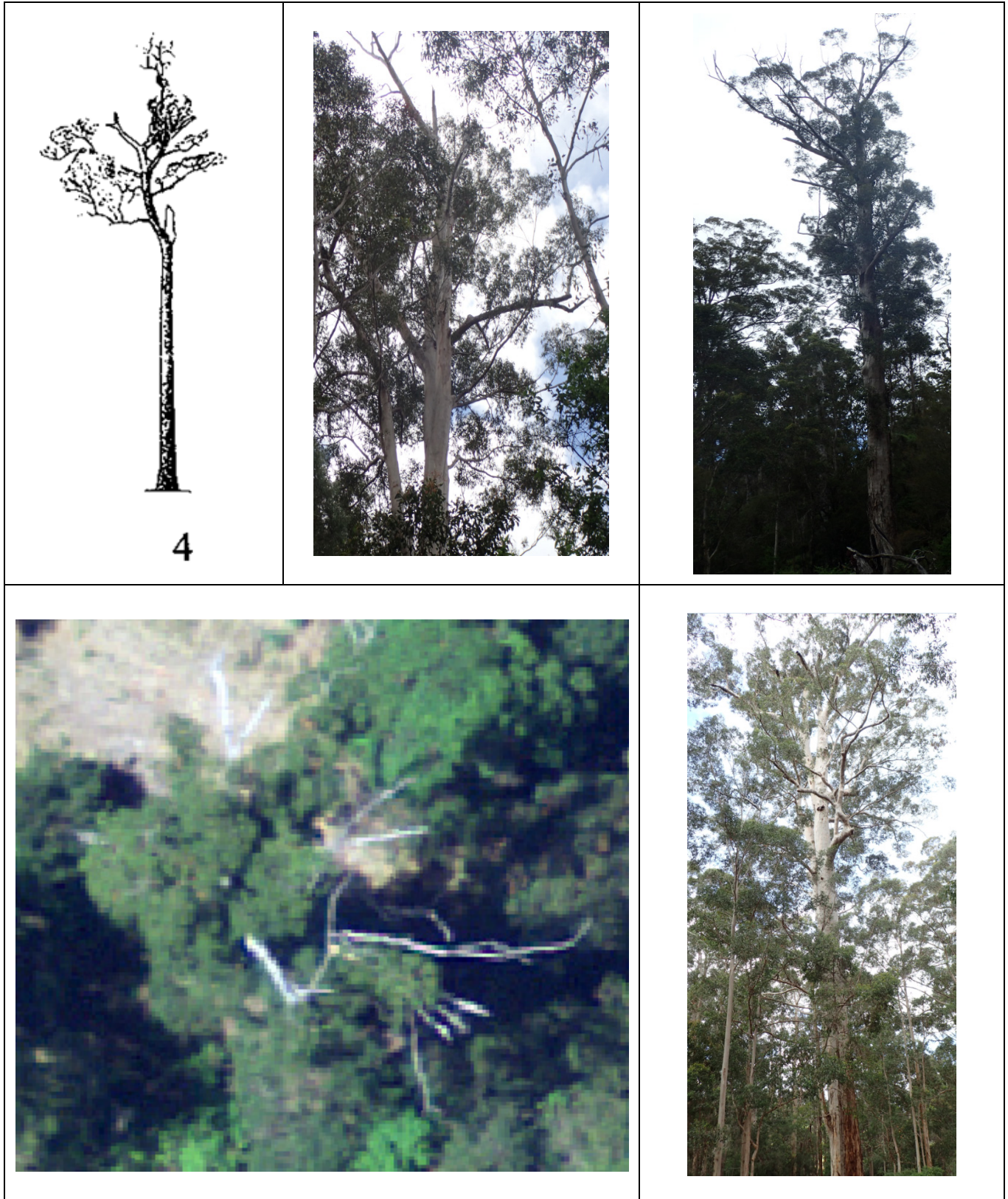
9. REFERENCES

- Forest Management Plan 2014-2023
- Western Australian Regional Forest Agreement
- FSC Controlled Wood Standard (FSC-STD-30-010)
- FSC Australia's HCVs evaluation framework
- Bradshaw, F & Rayner, M 1997, 'Age structure of the karri forest: 1. Defining and mapping structural development stages', *Australian Forestry*, Vol. 60, no. 3, pp. 178-187.

10. APPENDICES

- Appendix 1 – Example of the Whitford Scale for a tree exhibiting crown decline class 4 (images are from the side and top elevations)
- Appendix 2 – Example of report for an assessment of Type 2 old growth karri forest

Appendix 1: Example of the Whitford Scale for a tree exhibiting crown decline class 4 (images are from the side and top elevations)





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Appendix 2: Example of report for an assessment of Type 2 old growth karri forest

Type 2 old-growth karri forest assessment FPC93

Coupe:	Collins 0615
District:	Donnelly
Region:	Warren
Date of request:	9 December 2014
Requester:	Forest Products Commission (FPC)
Location:	Approximately 6.5 km south-east of Pemberton. Situated south of Burma Road and east of Collins Road.
Area (ha):	26
Imagery assessed:	2013 SW Forestry Imagery: 1319_139_130202_015114 .
No. 0.5 ha cells with >25% senescent crowns:	None
Is a field survey required? (reason):	No
Field survey findings (attach map):	N/A
FSC Type 2 old-growth forest present?:	No
Total area of FSC Type 2 old-growth forest (attach map):	0
Officer performing assessment:	<i>Name of officer, title, location</i> 23 February 2015