DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT

SILVICULTURE SPECIFICATION 1/92

KARRI THINNING

This specification supersedes Silviculture Specification 2/90

PREAMBLE

Substantial areas of even aged karri regrowth are progressively coming due for first thinning. This specification is particularly directed at those average and above-average quality stands that were regenerated after 1965, but it is also applicable to older stands up to 55 m in Top Height. The specification also indicates thinning intensities that are appropriate to second and subsequent thinnings. This specification will be amended to incorporate lower quality stands as the need arises and as further data becomes available.

SILVICULTURAL OBJECTIVE

1. Maintain stands unthinned until the maximum possible bole length to a 3.5 cm branch diameter has been achieved.
2. Thin to intensities that will maintain volume increment per hectare consistent with maximising value increment.
3. Provide an economic thinning yield.
4. Rethin at intervals that will maintain stand volume increment and provide economic thinning yields.
5. Maintain species and visual diversity.
6. Maintain wildlife habitat.

STRATEGY

1. Delay first thinning until stands have acquired a Top Height of 30 metres. This will allow for the maximum possible 18 m clean bole to develop. Thinning may occur sooner where the branch size on all crop trees has already exceeded 3.5 cm.
2. Thin to the minimum density which will maintain stand basal area increment. This is reflected in the schedule given in Table 1.
3. Thin more conservatively in a second thinning in order to maintain stand basal area increment.
4. Rethin before the stand has reached the maximum basal area appropriate to its Top Height but after it is possible to obtain an economic thinning.
5. Thin to favour the long term production of high value products.
6. Maintain the productive potential of the site by minimising soil damage and delaying prescribed burning for three years after thinning to give sufficient time for the breakdown of leaves in the thinning tops.

THINNING OPERATION

Selection of Areas

Areas of even aged regrowth will be surveyed by Inventory Branch. Top Height class maps will be produced from which stands taller than 30 m Top Height and of sufficient stocking will be selected for thinning. The date when shorter stands will reach 30 m will also be predicted and programmed for future operations. Field inspection will be required for confirmation and for the preparation of detailed logging plans.

Tree marking

In unburnt stands due for first thinnings, high scrub density makes initial marking by a tree marker impractical. The falling machine operator will select trees to be retained (under the supervision of the forester) according to the following criteria. Where the stand is older and thinning is being done by manual felling, the forester will carry out the tree marking.

Crop trees should have the following characteristics:

- Vigorous trees in the dominant and codominant class.
- Trees with small branches.
- Trees free of gum exudation.

Preference for retention:

- Select with regard to spacing.
- Where a choice exists retain a smaller codominant tree in preference to a larger limby 'wolf' tree if the codominant has at least a 10 m bole to 3.5 cm branch diameter and is greater than two thirds of the diameter of the 'wolf' tree.
- Where a 'wolf' tree has less than a 5 m bole to a 3.5 cm branch then retain any alternative codominant tree with a bole length greater than 10 m, regardless of relative size.
- Retain all trees where the density does not meet the minimum specification.
- Trees adjacent to large logs may be retained provided that the retention of other trees is such that they may be removed at the next thinning.

Table 1 provides a guide to expected thinning intensity. Intensity is based on the retention of a density equivalent to dominants and codominants.

TABLE 1

THINNING INTENSITY FOR HIGH QUALITY KARRI REGROWTH STANDS

	Retained Crop Tree Density		
	After 1st Thinning		After 2nd Thinning
Top Height*	m^2/ha	Spacing guide for Machines	m^2/ha
30 m	16	5 m	N/A
35 m	17.5	6 m	21
40 m	19		22
45 m	20		24
50 m	21		25
55 m	22		26

* For this purpose Top Height is defined as the mean of the height of the two tallest crop trees within a radius of 16 m.

Maintenance of Diversity

Retain all groups and where practicable, individuals of *Allocasuarina*. Retain wildlife habitat trees. In mixed stands, retain marri to ensure that a mixture is maintained. Up to 10% of the retained trees may be 'non-crop tree' marri in addition to other species which provide visual diversity or habitat.

Within the first 50 m of roadsides in VRM Zones A & B, deliberately vary the spacing between trees and retain a variety of tree sizes to create more visual diversity (retain the target stand density overall).

Maintenance of Thinning Intensity Standards

Regular stand sampling is essential to maintain standards and provide feedback for the refinement of silvicultural specifications. The importance of maintaining thinning intensity standards should not be underestimated. At full production, one day's thinning resulting in a density which is 20% below specification will cost $2000 in lost growth which cannot be recovered. It is preferable to retain a crop tree of minimum standard (5 m of potential sawlog) than to thin below specification.

The sampling procedure to be followed is given in Appendix 1.

Protection of Crop Trees

Damage to crop trees must be kept to a minimum during the logging operations. Limits of acceptability and the assessment method are given in the Manual of Logging Specifications. Tops and debris from the current operation which are larger than 75 mm must be moved more than 1 m from the base of all crop trees.

Protection of Soil

Frequent and repeated logging operations present a risk of accumulated soil damage. It is therefore imperative that the impact of each operation be kept to a minimum. All relevant techniques should be applied. i.e. maximising summer logging, careful selection of sites, the use of tops and scrub to reduce ground pressures and the selection and repeated use of major snig tracks. The limits and assessment method is given in the Manual of Logging Specifications. Except in areas of strategic importance, tops should not be burnt for at least three years after thinning, in order to allow time for the leaching of nutrients from the leaf component of the tops.

Subsequent Thinnings

Figure 1 gives the proposed density limits of first and subsequent thinnings at different Top Heights. It is based on the presumption of more conservative second and subsequent thinnings to maintain maximum basal area increment and maximum sawlog increment.

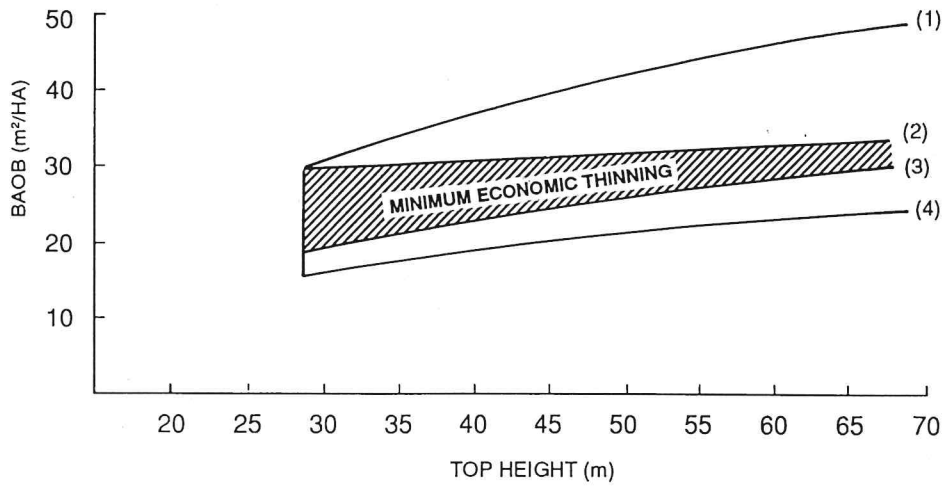


Figure 1 THINNING LIMITS FOR ABOVE-AVERAGE QUALITY KARRI REGROWTH

(1) = MAXIMUM STAND DENSITY
(2) = MINIMUM DENSITY BEFORE THINNING
(3) = RETAINED DENSITY AFTER 2ND THINNING
(4) = RETAINED DENSITY AFTER 1ST THINNING

Following first thinning to the appropriate density (4), the stand is allowed to grow on until its density exceeds that required for an economic thinning (2) but before it reaches maximum density (1). It is then re-thinned to the more conservative second thinning limit (3) and the process repeated. The minimum time between thinnings on this basis is about 15 years in high quality stands.

Variation to Standard Practice

Variation to these standard specifications may be required from time to time to meet particular yield requirements. When this appears to be necessary, consult the Manager, Silviculture Branch before departing from these standards.

F.J. BRADSHAW
Manager, Silviculture Branch.

APPENDIX 1

PROCEDURE FOR MONITORING THE APPLICATION OF THINNING SPECIFICATIONS

1. **Frequency of sampling** - at the completion of each two hectares of thinning.

2. **Number of samples** - ten sample points per two hectares.

3. **Selection of sample points** - on each two hectares, select:-

   3.1 One point at the edge of the 2 ha thinning patch.

   3.2 Define a straight line which traverses the longest axis of the patch.

   3.3 Establish a sample point every 15 m along this transect.

4. **Measurements to be taken at each sample point.**

   4.1 Take a basal area sweep of crop trees using a two factor prism. Where a veteran tree exists, take a 'half' sweep away from the veteran and double the result. Also do a 'half' sweep for any plot falling within 20 m of an unthinned edge.

   4.2 At the first and last point, determine Top Height by averaging the height of the two tallest crop trees within 16 m of the point. For stands over 40 m Top Height it is only necessary to measure this average at one point.

5. **Recording of Results**

   Record the results on the Post Thinning Stand Density Report form. Record with a '+' those plots within which no thinning of codominants has occurred because of low initial stocking. Plot each point for which thinning was done (i.e. omit '+'s) on the Thinning Standards Report Form. Thinning standard is acceptable where 75% of these points occur within ± 2 m²/ha of the target density. Use these results to adjust future thinning intensity.

6. **Reporting of Results**

   Forward a copy of Thinning Standards Report to the Regional Silviculture Officer at the end of each month. Forward a copy of both reports to the Inventory Office at the completion of each compartment or at the end of each year for final analysis of results and inclusion in CIMCIS records.

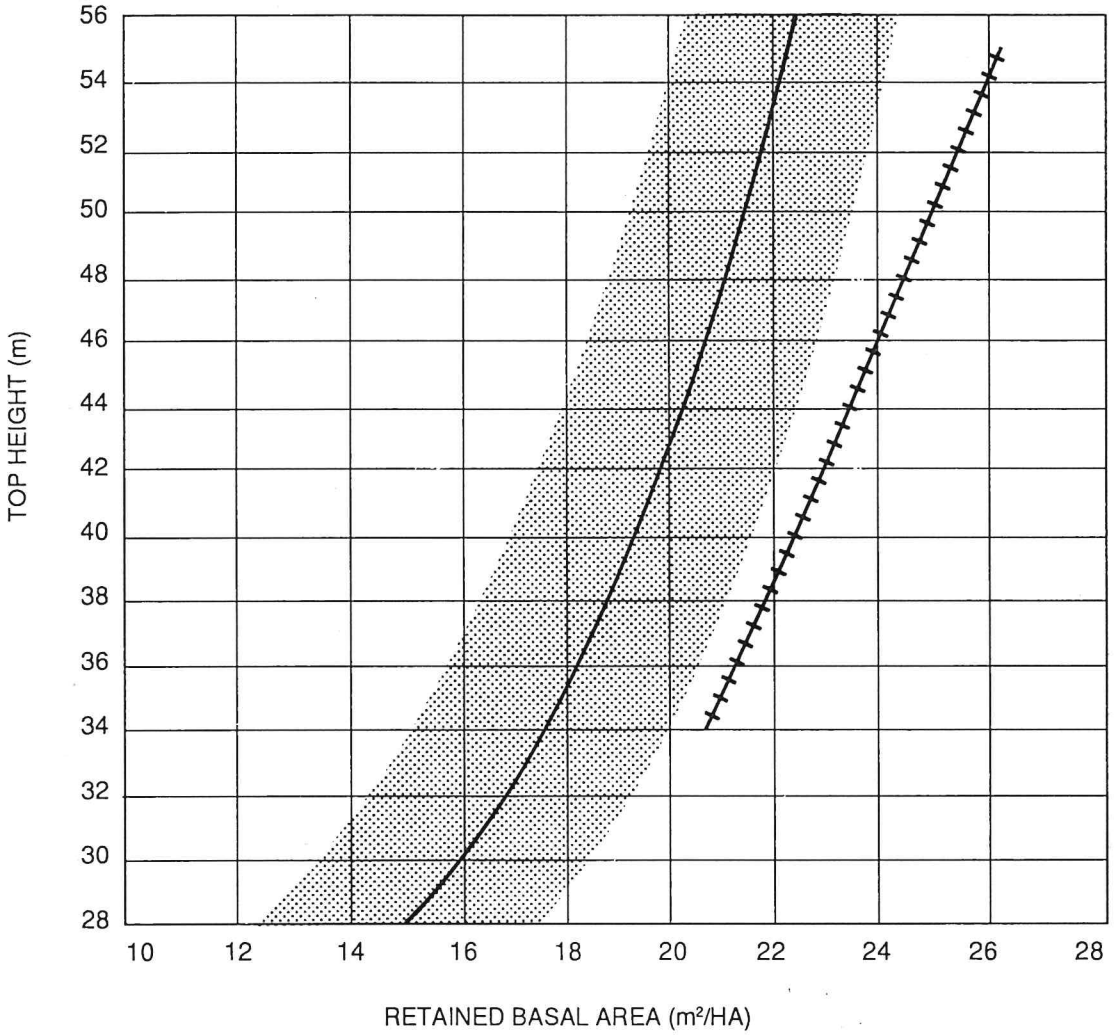
POST THINNING STAND DENSITY REPORT

Block _____ Cmpt _____ 1st/2nd Thinning

Date of Meast.	Sample Point	Top Ht. (m)	BAOB m²/HA			Not Thinned '+'	Supervisor
			Karri	Other	Total		
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
RESULT ACCEPTABLE TO 75% LIMIT._____ YES / NO							
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
RESULT ACCEPTABLE TO 75% LIMIT. _____ YES / NO							

THINNING STANDARDS REPORT FOR STANDS 28-55 M TOP HEIGHT

BASAL AREA OF CROP TREES



1st Thinning target

Acceptable result for 1st thinning

2nd Thinning target

1/92