Final Report RPP 9/88

TRIAL MAPPING OF COMMUNITY TYPES IN REGENERATING KARRI (*Eucalyptus diversicolor* F.Muell.) FORESTS

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INTRODUCTION

Karri (*Eucalyptus diversicolor*) is endemic to the south west of Western Australia, south of a line drawn from Nannup in the north-west to Frankland River in the south-east. An Eastward extension occurs at Denmark, Torbay and Albany (Bradshaw and lush 1981). Some 152,000 ha of karri exists on lands administered by the Department of Conservation and Land Management, some 80,500 ha managed on a multiple use objectives, of which 31,000 ha is even aged regrowth forests (Inions 1990).

Effective land management practice of the karri forest should be based on a definitive land classification system. Previous land classification systems, index curves or "site index class" and height intercepts as used by Cambell et al (1985), Havel (1968) require the stands to have reached a reference age to be allocated a site index class, whereas height intercepts are only useful in species with nodal growth. Two systems in broad use include, 'API' forest type classification (Rayner et al, 1984) and a Vegetation Survey of Western Australia (Smith 1972, Beard 1979). These systems evaluate stand structure and density and allocate the community type codes or structural class for height class, they also provide composition and density of principle species. These systems have limited application in the karri forest particularly when stand structure has been modified by logging or other activities and frequently are too subjective to be useful in a multiple land-use environment.

An alterative land classification system was developed for the karri forest (Inions et al, 1990), which allocated thirteen land units based on floristic composition. This system has some advantages over previous systems described; firstly, stand structure can be changed without effecting the result provided community floristics are present (Inions et al, 1990). Secondly, the system discriminates forest communities on the homogeneous edaphic, climatic, floristic and productive attributes. In 1988 ten karri logging coupes were selected to operationally field test and evaluate the Karri community site typing over the

geographical range of the karri forest. It is important that a degree of homogeneity exist in site types within the logging coupes to enable any useful management strategies to be implemented. In testing the Karri community land units typing several distinct objectives were highlighted:

1. To determine whether large forest areas are able to be mapped to produce plans of homogeneous land units or community types.

2. To establish the best method of community type mapping

3. To provide a cost comparison of the methods used to enable evaluation of their effectiveness.

METHOD

Ten areas were selected within the karri forest for field testing forest community site typing (Figure 1), comprising nine regeneration coupes and one mature forest recently burnt. Three criteria were used in selection of the study sites

1. AGE:
It was reasoned that all regeneration areas should be two or three years old. This age would afford accessibility through coupes, while allowing species recognition. Access would be prohibitive in older stands greatly increasing survey costs and species identification would be compromised in very young stands.

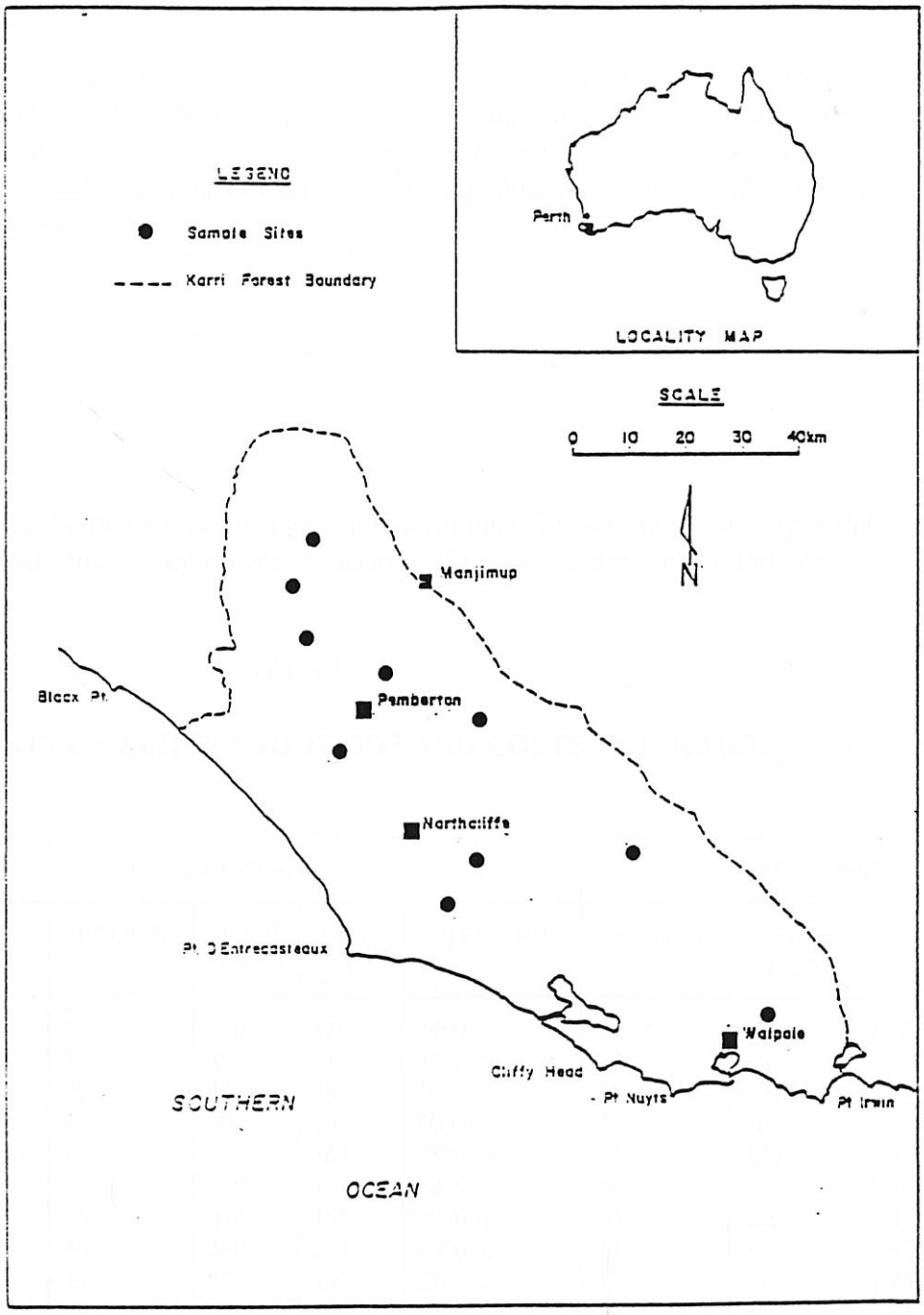
2. GEOGRAPHICAL DISTRIBUTION:
The ten areas were selected to cover the geographical range of the karri forest community including areas of differing climatic, productive and edaphic characteristics.

3. SIZE:
Coupe size was selected in the vicinity of 50 - 80 hectares. This would permit easy coverage of the survey area and ensure a reasonable number of survey points in each area.

Community site typing was conducted using two assessment methods; a grid or transect assessment and road verge assessment.

Grid assessment - In each coupe, transect lines were established through the coupes spaced 200 meters apart with assessment points 100 meters along lines. The transects were placed across the coupes to ensure that they assessed the range of topography present, valley floors, upper slopes, creeks, and ridges.

FIGURE 1: Karri Community Site Type Distribution Map



Location of study area and position of sample points.

Road verge assessment - Points were established on road verges (approximately 10-20 meters from road edge), using vehicle trip meters to space points 100 meters apart on roads and tracks through the coupes.

At each individual survey point floristics were recorded from a list of 70 site specific species for presence or absence. The coupe, point, and species identification number were recorded onto hand held data capture devices (Husky Hunters). Site type data on the Husky Hunters was linked to a computer for final down loading and computation into plant community types.

RESULTS

Comparison of the two survey methods in determining forest community types (table 1) contrasts the various survey efforts of distance of transects, time taken and costs.

TABLE 1

COMPARISON OF SURVEY METHODS AND COSTS FOR KARRI COMMUNITY TYPING.

GRID TRANSECT					ROAD VERGE		
COUPE	POINTS	TIME RQD *	COST $	DISTANCE	POINTS	TIME RQD *	COST $
NELSON 9	20	240	189	2600 m	27	180	105
GRAY 3	39	400	211	4100 m	28	180	112
BEAVIS 4	25	270	155	3000 m	26	130	85
BROCKMAN 2	9	90	60	900 m	7	60	46
DOMBAKUP 13	22	300	169	2500 m	19	120	85
SUTTON 3	17	220	121	2000 m	20	130	80
LOCHART 2	26	270	157	2900 m	20	120	87
BOORARA 10	46	380	255	4800 m	19	120	87
GARDNER 4	25	225	137	2700 m	19	110	86
GIANTS BLK	24	270	165	2700 m	10	80	81

Time rqd - time taken (minutes)

The road verge surveys took less time to complete than coupe transects and consequently was the cheaper system to implement. This equates to $6.40 / point with coupe transect and $ 4.38 using the road verge technique

TABLE 2

PERCENTAGE OF COMMUNITY TYPES WITHIN EACH FOREST COUPE USING GRID TRANSECTS.

COUPE	PERCENTAGE OF COMMUNITY TYPES												
	1	2	3	4	5	6	7	8	9	10	11	12	13
NELSON 9	20		5			5	40		10	5		15	
GRAY 3	10					**55**	20	5	3			5	2
BEAVIS 4	8							40	12	40			
BROCKMAN 2								12			**88**		
DOMBAKUP 13	8							29	17		17	29	
SUTTON 3							6	6	**88**				
LOCHART 2				**74**	18					4	4		
BOORARA 10		5		5		26		11	17	26	6	4	
GARDNER 4	15			5			**81**						
GIANTS BLK	4			4		**92**							

The grid transects of the ten coupes illustrate a degree of variability in homogeniety of community types. Six coupes had more than 50 percent of points of the same community type, while others had several areas of more than one community type (Table 2).

TABLE 3.

PERCENTAGE OF COMMUNITY TYPES OF FOREST COUPES USING ROAD VERGE ASSESSMENT.

COUPE	PERCENTAGE COMMUNITY TYPE												
	1	2	3	4	5	6	7	8	9	10	11	12	13
NELSON 9	22		4			4	**52**		7			7	4
GRAY 3	17					17	28	17	7	7		4	10
BEAVIS 4	7							19	35	27		12	
BROCKMAN 2				5						14		**71**	
DOMBAKUP 13									42	5	5	32	
SUTTON 3	14							5	**62**			19	
LOCHART 2	15		5	**75**								5	
BOORARA 10						37		16	21	5		21	
GARDNER 4	17		5				**78**						
GIANTS BLK.					8	**92**							

The road verge transects also showed a degree of variability (Table 3). Simularly, six coupes had more than 50 percent of survey points of one community type. The other coupes demonstrated a diverse array of community types, (Grey 3 with 8 community types).

DISCUSSION

Karri community site typing of large forest areas can effectively be achieved using the floristic composition classification or community site typing. It is essential that vegetation is sufficiently advanced to enable easy recognition of the seventy species identified as indicator species, and assessment during the flowering period is a distinct advantage in species recognition. Several of the species are subject to early senescence and the longevity of each species will determine to some degree the best time to complete these community vegetation surveys. Furthermore the high density of the vegetation, a characteristic of the karri community is a deterrent, impeding site access and a factor leading to greater cost in completing karri site typing surveys. Generally it is considered that between two and three years is the optimum period.

Line transects across the coupes was the preferred method to be applied as only this method managed to cover the whole survey area. Road verge transects were identified to have several short comings, firstly that not all coupes had internal acess roads and only the perimeters in these coupes could be surveyed using coupe boundary tracks. Secondly, often tracks are constructed low in the landscape, (a forest hygiene strategy), and therefore are quite different in species composition to sites higher in the landscape. Furthermore of more concern is tracks and roads transpose outside the karri community into mixed forests of Marri (*Eucalyptus calophylla)* and Jarrah (*Eucalyptus marginata)*, outside the range of models developed for the karri community site typing project. Yet another concern is that some degree of site compaction or disturbance can occur close to the road verge which will impact on the results obtain during community typing.

There is a degree of variability in community site types within the coupes as highlighted in table 2 and table 3 which is indicative of the variable nature of coupes. Much of the more homogeneous landforms have been harvested for production earlier and the areas now being selected for logging lie in areas where the mixtures of different types of forests occur within small areas of pure karri forests. Often the zones between forest types are indistinct which has resulted in coupe boundaries going across into other forests types when demarcating karri harvesting coupes. This is identified as a source of variability in the results, together with the degree of change in the topography in particular, streams, area of inundation, slopes, rock outcrops and ridge tops. It may be necessary to increase the number of points where results show a high variability to determine a more reliable map of community distributions where streams, areas of inundation and other topographic features exist.

While mapping of community types derived by Inions *et al.* (1990). is feasable, it is both expensive and time consuming. It is considered that a more thorough biographical survey which encompasses community types in karri as well as surrounding communities would be a more affordable use of resourses for community mapping than large scale mapping using indicator species. Schemes devised by Rayner (1991,1992) may be more useful for stand productivity measures for forest production purposes. If remote sensed imagery can be related to on ground quadrat based data, it may be more appropriate to derive landscape models of vegetation communities.

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