VEGETATION COMPLEXES OF THE DARLING SYSTEM WESTERN AUSTRALIA

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INTRODUCTION

Although the boundaries of the Darling System are somewhat arbitrary, in biological terms they approximate the Darling District of the South-West Botanical Province as recognised by Diels (1906) and later developed by Gardner (1942). Several distinctive features of this area are well recognised and include the predominance of sclerophyllous shrubs, the unique floristic diversity of these shrub communities, the paucity of herbaceous plants and the high degree of endemism.

Previous workers have stressed the significance of the landforms, soils and climate in determining the distribution of plant communities in this area (Diels 1906; Williams 1932, 1942; Speck 1952, 1958; Lange 1960; Churchill 1961, 1968; Smith 1974 and Havel 1968, 1975a and b). The object of this section is to describe the vegetation of the Darling System and how it relates to the landforms, soils and climatic conditions. A series of vegetation complexes is defined for the five geomorphological provinces and the distribution of the mapping units is shown on the accompanying maps (Perth, Pinjarra and Collie 1:250 000 sheets).

In vegetation mapping it is necessary to delineate the plant communities into abstract "groups" or "classes'.' The distinctive characteristics that these groups or classes share might include such features as growth-form dominance, species dominance, stratal structure and species composition. In the Darling System a range of groups has been delineated by Havel (1968, 1975a and b) and Smith (1974). Smith mapped the vegetation of Collie 1:250 000 sheet by adopting the broad-scale approach of structural formations, defined on the basis of life form and height of the tallest stratum and projection foliage cover of the tallest stratum (Table 3.1). This delineated the two main plant communities of the Darling Plateau as the open-forest of jarrah-marri *(Eucalyptus marginata-E. calophylla)* and the woodland of wandoo *(E. wandoo)*. Havel (1968, 1975a and b) delineated a series of site-vegetation types for the northern Swan Coastal Plain and the northern

TABLE 3.1: SUMMARY OF STRUCTURAL FORMATIONS IN THE DARLING SYSTEM (SPECHT 1970)

LIFE FORM AND HEIGHT OF TALLEST STRATUM	PROJECTION FOLIAGE COVER OF TALLEST STRATUM			
	DENSE (70-100%)	MID-DENSE (30-70%)	SPARSE (10-30%)	VERY SPARSE (<10%)
TREES <30 m	–	Tall open-forest	Tall woodland	–
TREES 10-30 m	–	Open-forest	Woodland	Open-woodland
TREES 5-10 m	Low closed-forest	Low open-forest	Low woodland	Low open-woodland
SHRUBS 2-8 m	Closed-scrub	Open-scrub	–	–
SHRUBS 0-2 m	Closed-heath	Open-heath	Low shrubland	–
HERBS	–	Herbland (a) Herbfield (b) Sedgeland	–	–

Darling Ranges by principal component analysis. This level of classification achieved a greater incorporation of the floristic composition of the plant communities than had previously been achieved by other workers in this area (Table 3.2). By adopting "vegetation complex" as a basic mapping unit in this study it was possible to achieve a compromise between the different levels of classification, and to incorporate the recognised variation in the floristic composition of the communities. These complexes have affinities with the land system classification used by CSIRO (Christian and Stewart 1953).

Another unique feature of the vegetation recognised by earlier workers is the distinctive variation in distribution patterns of the species (Diels 1906; Williams 1932, 1942; Speck 1952, 1958; Churchill 1961, 1968; Havel 1968, 1975a). In essence the vegetation consists of a continuum, with both individual species and groups of species having dissimilar distribution patterns. The series of tables which summarises the complexes for the various regions further illustrates the complexity of distribution of plant communities both at the structural and floristic level.

METHODOLOGY

The mapping units were delineated on the basis of data collected from the literature, ground surveys (both plots and transects on small-scale areas), road traverses and aerial photographs, and from previous interpretations of the vegetation including the Aerial Photo Interpretations (A.P.I.) series of the Forests Department (W.A.), and the maps of Smith (1974) and of Havel (1968, 1975b).

As part of the object of the study was to summarise the existing knowledge of the native plant communities, the maps attempt to depict the original native vegetation as it existed before European settlement. The original vegetation was reconstructed in cleared areas by comparison with roadside verges and other pockets of remnant vegetation.

The vegetation complexes are defined in relation to the landform-soil units, as determined by Churchward and McArthur, and, where relevant, to the average annual rainfall recordings. These rainfall recordings are based on mean annual rainfall records to December 1976, provided by the Bureau of Meteorology and the Public Works Department, Western Australia, and are depicted on the map, with the interpolation of the isohyets, by the Department of Lands and Surveys, Western Australia. Three broad rainfall regions (low, medium and high) have been delineated within the Darling System. They have never been precisely defined and are referred to in general terms in the text when the rainfall is considered significant in the determination of the complexes. The derivation of the names of the complexes also relates to the landform-soil units. In many cases where the main determinants of the vegetation are the landform and soils, the names and boundaries coincide. For example, the shallow soils and rocky outcrops of the **Cooke** and **Darling Scarp** units determine similar sharp boundaries in the vegetation.

In other complexes where the climatic conditions are the main determinants, the resultant variation in floristic composition necessitates a splitting or grouping of names to define the complex. For instance, the **Helena** unit is split into two vegetation complexes as a result of the influence of climatic conditions reflected in the replacement of jarrah-marri open-forest in the cooler, moister south with the wandoo woodlands in the warmer, drier north. Similarly, where the main determinant is some localised feature such as a stream or river, it was found necessary to combine names (for example, the **Williams-Avon-Brockman-Mumballup** complex). In some cases the vegetation changes so rapidly that a mosaic is formed consisting of elements of vegetation from adjacent complexes. This is particularly evident on the Swan Coastal Plain. Obviously on a larger scale many of these rapid changes would be easily mapped into their individual elements.

In selecting the colours of the units an attempt was made to reflect the underlying climatic conditions, with warmer colours (yellow, brown) in the north and east, and cooler colours (green, blue) in the centre and south. This was possible on the Darling Plateau, but not in other areas due to necessary limitations in the printing process.

DESCRIPTION OF THE MAPPING UNITS

Darling Plateau

The Darling Plateau is subdivided into 28 vegetation complexes. The details of these complexes are summarised in Tables 3.3 and 3.4 in relation to the structural formation and site-vegetation types (Havel 1975a and b). The inclusion of Havel's floristic details enabled the subdivision of the dominant jarrah-marri forest and the wandoo woodland into a series of complexes.

Several features become particularly evident from the mapping and definition of complexes for the Darling Plateau:

1. The importance of landform and soils, already stressed by earlier workers, as determinants of the distribution of plant communities.
2. The marked north-south and east-west trends in both structural

TABLE 3.2: DEFINITION OF SITE-VEGETATION TYPES IN THE NORTHERN JARRAH FORREST OF THE DARLING PLATEAU (HAVEL 1975A AND B)

PLANT SPECIES	SITE-VEGETATION TYPES																			
	A	B	C	D	E	F	H	J	L	M	O	P	Q	R	S	T	U	W	Y	Z
Acacia alata	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Acacia extensa	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–	–	–	○	–	–
Acacia browniana	–	–	–	–	–	–	○	–	–	–	–	●	–	–	●	–	–	–	–	○
Acacia urophylla	–	–	–	–	–	–	–	–	–	–	○	–	○	–	○	○	–	–	–	–
Adenanthos barbigerus	–	–	–	–	–	–	–	○	–	–	–	●	–	○	●	–	–	–	–	–
Adenanthos obovatus	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Agonis linearifolia	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Astartea fascicularis	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Baeckea camphorosmae	–	–	–	○	●	–	○	○	–	○	–	–	–	–	–	–	–	–	●	–
Banksia attenuata	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–
Banksia grandis	–	–	–	–	–	–	–	–	–	–	●	●	–	–	○	○	–	–	–	–
Banksia littoralis	●	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Bossiaea aquifolium	–	–	–	–	–	–	–	–	–	–	○	–	○	–	○	○	–	–	–	–
Casuarina fraserana	–	–	–	–	–	–	–	○	–	–	○	●	–	–	○	–	–	–	–	–
Casuarina humilis	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–	–	–
Caustis dioica	–	○	–	–	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chorizema ilicifolium	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	○	○	–	–	–
Clematis pubescens	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	○	–	–	–
Conospermum stoechadis	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Dampiera alata	–	–	○	●	●	–	–	–	–	○	–	–	–	–	–	–	–	○	●	–
Dasypogon bromeliaefolius	○	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Daviesia pectinata	–	○	–	–	○	–	●	●	–	–	–	○	–	–	○	–	–	–	–	–
Diplolaena drummondii	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Dillwynia cinerascens	–	–	–	–	○	–	–	–	–	○	–	–	○	–	–	–	–	–	–	–
Eucalyptus calophylla	○	●	–	●	○	–	–	○	–	○	●	○	●	●	○	●	●	●	–	○
Eucalyptus marginata	–	●	–	○	●	●	●	●	–	○	●	●	○	●	●	●	–	○	–	●
Eucalyptus megacarpa	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Eucalyptus patens	●	–	○	○	–	–	–	–	○	○	–	–	●	–	–	○	●	●	–	–
Eucalyptus wandoo	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	●	–
Gastrolobium calycinum	–	–	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	○	○
Grevillea diversifolia	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Grevillea wilsonii	–	–	–	–	○	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–
Hakea cyclocarpa	–	–	–	–	–	–	○	○	–	–	–	–	–	–	○	–	–	–	–	–
Hakea ceratophylla	●	–	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hakea lissocarpa	–	–	–	○	○	–	–	–	●	●	–	–	●	●	○	○	○	●	●	●
Hakea ruscifolia	–	–	–	–	○	–	○	●	–	–	–	○	–	–	–	–	–	–	–	–
Hakea varia	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hibbertia lineata	–	–	–	–	–	–	–	–	●	–	–	–	○	–	–	–	–	–	●	–
Hibbertia polystachya	–	●	–	–	–	○	–	●	–	–	–	–	–	–	–	–	–	–	○	–
Hovea chorizemifolia	–	–	–	–	–	–	–	–	–	–	○	●	○	–	●	●	–	–	–	–
Hypocalymma angustifolium	●	○	○	●	●	–	○	–	●	○	–	–	●	○	–	–	–	●	●	–
Isopogon dubius	–	–	–	–	–	–	○	○	–	–	–	–	–	–	–	–	–	–	–	–
Kennedia coccinea	–	–	–	–	–	–	–	–	–	–	○	–	○	–	–	○	–	–	–	–
Kingia australis	–	–	–	○	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Lasiopetalum floribundum	–	–	–	–	–	–	○	–	–	–	–	○	–	–	●	●	–	–	–	○
Lepidosperma angustatum	○	●	●	●	●	–	●	○	–	–	●	●	○	○	○	–	–	●	○	○
Lepidosperma tetraquetrum	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Leptocarpus scariosus	●	●	●	●	●	○	–	○	–	–	–	–	–	–	–	–	–	○	○	–
Leptomeria cunninghamii	–	–	–	–	–	–	–	–	–	○	–	○	–	○	●	○	–	–	–	○
Leptospermum ellipticum	●	–	–	●	○	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–
Leucopogon capitellatus	–	–	–	–	–	–	–	–	–	–	–	–	○	●	●	○	–	–	–	●
Leucopogon oxycedrus	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–
Leucopogon cordatus	–	●	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Leucopogon propinquus	–	–	–	–	–	–	–	–	–	–	○	–	○	●	○	○	–	–	–	●
Leucopogon verticillatus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	●	–	–	–	–
Lyginia tenax	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Macrozamia riedlei	–	–	–	–	–	–	–	–	○	●	–	–	●	●	●	●	●	–	–	●
Melaleuca preissiana	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mesomelaena tetragona	●	●	●	●	●	○	●	●	–	–	–	–	–	–	–	–	–	●	○	–
Nuytsia floribunda	–	–	–	–	–	○	–	○	–	–	–	–	–	–	–	–	–	–	–	–
Patersonia occidentalis	–	●	–	–	○	○	–	–	–	–	–	–	–	–	–	–	–	–	○	–
Patersonia rudis	–	–	–	–	○	–	●	○	–	○	–	●	–	○	○	–	–	–	–	●
Persoonia longifolia	–	–	–	–	–	–	–	–	–	–	–	●	–	–	○	–	–	–	–	–
Phyllanthus calycinus	–	–	–	–	–	–	–	–	–	○	–	–	●	●	●	○	–	–	–	○
Pteridium esculentum	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	●	●	–	–	–
Sphaerolobium medium	–	○	–	–	○	–	○	○	–	–	–	–	–	–	–	–	–	–	–	–
Stirlingia latifolia	–	–	–	–	–	●	○	○	–	–	–	–	–	–	–	–	–	–	–	–
Styphelia tenuiflora	–	–	–	–	–	–	●	○	–	–	–	●	–	○	○	–	–	–	–	●
Synaphea petiolaris	○	○	–	○	●	–	○	–	–	–	–	–	–	–	–	–	–	●	–	–
Trymalium ledifolium	–	–	–	–	–	–	○	–	–	–	–	○	–	●	–	–	–	–	–	○
Trymalium spathulatum	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–

● Species should be present
○ Species should be present, but absence not critical
– Species generally absent.

TYPE G was defined subsequently. It has a variable and unique set of indicator species which are characteristic of granite outcrops and their surroundings in low to medium rainfall zone, such as lichens, *Borya nitida, Grevillea bipinnatifida, Hakea elliptica, Hakea undulata, Eucalyptus laeliae, E. wandoo* and *Casuarina huegeliana.*

and floristic composition of the vegetation determined by climatic gradients.

3. The individuality of tree species distribution. This is also true for the shrub species, but as they are grouped on the maps this individuality of distribution is not reflected.
4. The continuity of undisturbed communities along uninterrupted environmental gradients, i.e. the existence of the continuum.

Table 3.2 and Table A on the accompanying maps include the list of indicator species found in the site-vegetation types A to Z as defined by Havel (1975a and b). Details of the occurrence of these individual species in the complexes will be summarised in the following text by reference to the types A to Z.

1. **Dwellingup and Hester Complex in High Rainfall-Central and South** supports an open-forest of jarrah-marri. Localised patches of tall open-forest are found but are restricted in occurrence. This vegetation complex is characteristic of the high rainfall zone, receiving more than 1100 mm average annual rainfall. In the north it is restricted to the western section of the Darling Plateau. In the southern areas where cooler conditions prevail its distribution extends east of Bridgetown into lower rainfall areas. The dominant site-vegetation types are S and T; less consistently O, P and R (Table 3.4). This complex covers a large area of the uplands of the Darling Plateau and the floristic composition of the understorey reflects the moister conditions.
2. **Dwellingup Complex in Medium to High Rainfall** is also dominated by an open-forest of jarrah-marri on the uplands (Table 3.3). The significant difference from the previous complex is that it is restricted to medium-high rainfall areas (receiving 900-1100 mm average annual rainfall) with a resultant change in the floristic composition of the understorey. It extends from the Avon River in the north, along most of the eastern fringes of the **Dwellingup and Hester** complex to the northern limits of the Collie Basin in the south. The dominant site-vegetation types are P and S; less consistently H, O, R and Z (Table 3.4).
3. **Dwellingup and Yalanbee Complex in Low to Medium Rainfall** is restricted in occurrence to the ridges surrounding the Avon River Valley, and has marked structural and floristic similarities with the **Dwellingup** complex and the **Dwellingup, Yalanbee and Hester** complex. It appears to be a transitional complex with a mosaic of understorey species from adjacent complexes. Further, the shallow soils support site-vegetation type G which is restricted in adjacent complexes. The dominant site-vegetation types are H, P and Z; less consistently G and R (Table 3.4).
4. **Dwellingup, Yalanbee and Hester Complex in Low to Medium Rainfall** is similar to previous complexes on the uplands in that it supports an open-forest of jarrah-marri; however the floristic composition of the understorey species reflects the lower rainfall (700-900 mm) and warmer conditions in the northern and eastern sections of the jarrah forest (Tables 3.3 and 3.4). This complex extends from Lower Chittering in the north, along the full length of the eastern section of the Darling Plateau to the series of ridges just south of Boyup Brook. The dominant site-vegetation types are H and Z; less consistently P (Table 3.4).
5. **Yalanbee and Dwellingup Complex in Low Rainfall** consists of a mixture of an open-forest of jarrah-marri and a woodland of wandoo-marri. It is restricted to the low rainfall areas (600-850 mm) and so provides the approximate upper limit in annual rainfall for wandoo distribution on the uplands of the Darling Plateau. The dominant site-vegetation types are H, M and Z; less consistently G (Table 3.4). Type G is restricted in occurrence to localised patches, which are unmappable at this scale; it consists mainly of a low open-forest of rock sheoak (*Casuarina huegeliana*) and herblands on the shallow soils overlying granitic rocks.

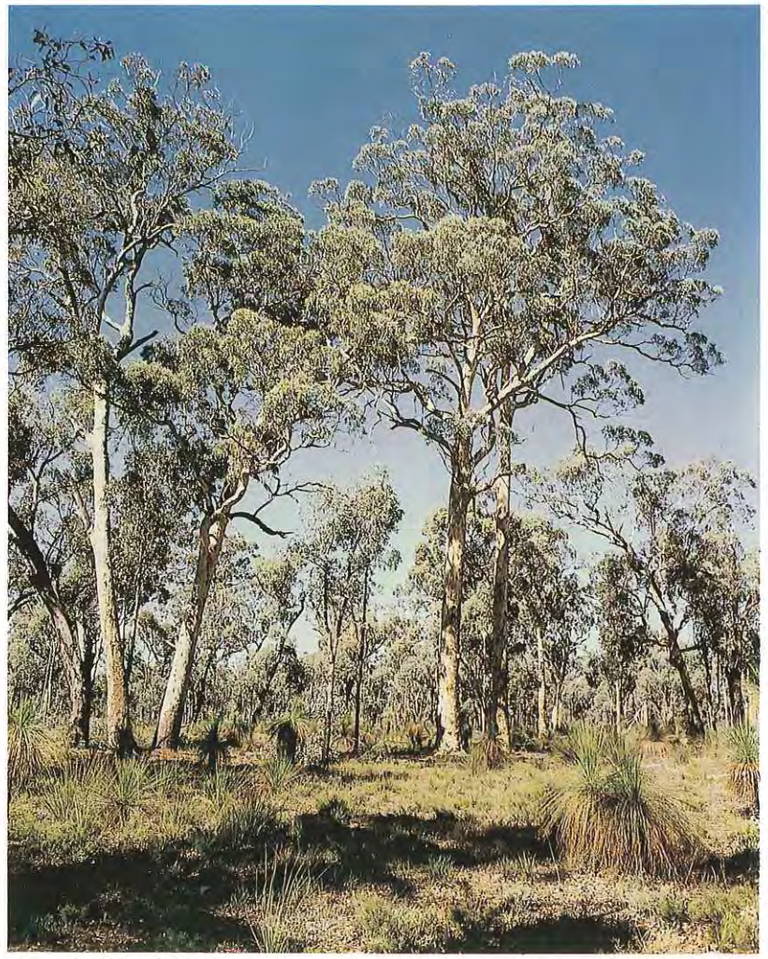

Plate 3.1: Yalanbee complex (6) Wandoo-powderbark wandoo woodlands and jarrah-marri open-forest on the uplands in the eastern rainfall region of the Darling Plateau (site-vegetation types M in the foreground and H in the background).

TABLE 3.3: SUMMARY OF VEGETATION COMPLEXES OF THE DARLING PLATEAU IN RELATION TO THE STRUCTURAL FORMATIONS

Mapping Unit No.	Vegetation Complexes	TALL OPEN-FOREST			OPEN-FOREST			WOODLAND					OPEN-WOODLAND		LOW OPEN-FOREST					LOW OPEN-WOODLAND				OPEN-SCRUB	HEATH		HERBLANDS	SEDGELANDS
			E. diversicolor	*E. marginata-E. calophylla*		*E. marginata-E. calophylla*	*E. marginata-E. calophylla-E. patens*		*E. wandoo-E. calophylla*	*E. wandoo*	*E. wandoo-E. accedens*	*E. loxophleba*	*E. rudis-M. rhaphiophylla*	*E. wandoo*		*C. huegeliana*	*M. preissiana*	*C. obesa*	*Agonis flexuosa*	*E. rudis-M. rhaphiophylla*	*E. wandoo-E. calophylla*	*B. attenuata-B. menziesii*	*M. preissiana-B. littoralis*	*C. obesa-Acacia* spp.-*Melaleuca* spp.		Closed	Open		
1	Dwellingup-Hester		–	●		●	–		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
2	Dwellingup		–	○		●	–		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
3	Dwellingup-Yalanbee		–	–		●	–		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
4	Dwellingup-Yalanbee-Hester		–	–		●	–		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
5	Yalanbee-Dwellingup		–	–		●	–		●	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
6	Yalanbee		–	–		○	–		○	–	●	–	–	–		○	–	–	–	–	–	–	–	–		–	–	–	–
7	Cooke **		–	–		○	–		○	–	–	–	–	–		○	–	–	–	–	–	–	–	–		●	●	●	–
8	Goonaping		–	–		○	–		–	–	–	–	–	–		–	○	–	–	–	–	●	○	–		–	–	–	–
9	Wilga		–	–		●	–		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
10	Yarragil (Min. Swamps)		–	○		●[6]	●[6]		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
11	Yarragil (Max. Swamps)		–	○		●	○		–	–	–	–	–	–		–	–	–	–	–	–	–	○	–		–	–	–	–
12	Swamp		–	–		–	–		–	–	–	–	–	–		–	–	–	–	–	–	–	●	–		–	–	–	○
13	Pindalup-Yarragil		–	–		●	–		○[+]	–	–	–	–	●		–	–	–	–	–	–	–	–	–		–	–	–	–
14	Coolakin		–	–		–	–		○[+]	●	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
15	Catterick		–	○		●	●		–	–	–	–	○	–		–	–	–	–	–	–	–	–	–		–	–	–	–
16a	Yarragil-Catterick		●	●		●	–		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
16b	Balingup		●	●		●	–		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		–	–	–	–
17	Helena **		–	–		○	○		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–		○	○	○	–
18	Helena **		–	–		○	○		–	–	–	–	–	●		–	–	–	–	–	–	–	–	–		○	○	○	–
19	Bridgetown **		–	○		●	○		–	–	–	–	–	–		–	–	–	–	○	–	–	–	–		○	○	○	–
20	Murray		–	○		●	●		–	–	–	–	○	–		–	–	–	–	–	–	–	–	–		–	–	–	–
21	Murray-Bindoon		–	–		●	○		–	●	–	–	○	–		–	–	–	–	–	–	–	–	–		–	–	–	–
22	Balingup		–	○		●	○		–	–	–	–	○	–		–	–	–	–	–	–	–	–	–		–	–	–	–
23	Williams-Avon-Brockman-Mumballup		–	–		–	–		–	–	–	–	●	–		–	–	–	–	–	–	–	–	–		–	–	–	–
24	Nooning		–	–		–	–		–	–	–	–	○	–		–	–	●	–	–	–	–	–	○		–	–	–	–
25	Lowdon		–	–		●	–		–	–	–	–	●	–		–	–	–	○	–	–	–	–	–		–	–	–	–
26	Bindoon		–	–		–	–		–	○	–	●	–	–		○	–	–	–	–	–	–	–	–		–	–	–	–
27	Michibin		–	–		–	–		–	●	–	○	–	–		○	–	–	–	–	–	–	–	–		–	–	–	–
28	Darling Scarp * **		–	–		–	–		–	–	–	–	–	–		○	–	–	–	–	●	–	–	–		○	○	○	–

STRUCTURAL FORMATIONS

[6] Local admixtures of *E. megacarpa*
** Lithic complex associated with granitic rocks
[+] Local admixtures of *E. patens*
* Local admixtures of *E. laeliae* and *E. haematoxylon*
● Structural Formation should be present
○ Structural Formation should be present, but absence not critical
– Structural Formation generally absent.

TABLE 3.4: SUMMARY OF VEGETATION COMPLEXES OF THE DARLING PLATEAU IN RELATION TO THE SITE-VEGETATION TYPES AS DEFINED BY HAVEL (1975A AND B)

Mapping Unit No.	Vegetation Complexes	SITE-VEGETATION TYPES (*) A	B	C	D	E	F	G	H	J	L	M	O	P	Q	R	S	T	U	W	Y	Z
1	Dwellingup-Hester	–	–	–	–	–	–	–	–	–	–	–	○	○	–	○	●	●	–	–	–	–
2	Dwellingup	–	–	–	–	–	–	–	○	–	–	–	○	●	–	○	●	–	–	–	–	○
3	Dwellingup-Yalanbee	–	–	–	–	–	–	○	●	–	–	–	–	●	–	○	–	–	–	–	–	●
4	Dwellingup-Yalanbee-Hester	–	–	–	–	–	–	–	●	–	–	–	–	○	–	–	–	–	–	–	–	●
5	Yalanbee-Dwellingup	–	–	–	–	–	–	○	●	–	–	●	–	–	–	–	–	–	–	–	–	●
6	Yalanbee	–	–	–	–	–	–	○	○	–	–	●	–	–	–	–	–	–	–	–	–	○
7	Cooke	–	–	–	–	–	–	●	–	–	–	○	–	○	–	●	○	–	–	–	–	○
8	Goonaping	○	○	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
9	Wilga	–	–	–	–	○	–	–	●	–	–	–	–	–	–	●	–	–	–	●	–	–
10	Yarragil (Min. Swamps)	–	–	●	●	–	–	–	–	–	–	–	–	–	○	–	–	○	○	●	–	–
11	Yarragil (Max. Swamps)	○	○	–	●	●	○	–	–	○	–	–	–	○	–	–	–	–	–	●	–	–
12	Swamp	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
13	Pindalup-Yarragil	○	–	–	–	○	–	–	●	–	○	●	–	–	–	–	–	–	–	–	●	○
14	Coolakin	–	–	–	–	–	–	○	○	–	○	●	–	–	–	–	–	–	–	–	●	○
15	Catterick	–	–	●	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	–
17	Helena	–	–	○	–	–	–	●	–	–	–	–	–	–	○	●	–	○	–	–	–	–
18	Helena	–	–	○	–	–	–	●	–	–	–	–	–	–	○	●	–	–	–	–	○	–
19	Bridgetown	–	–	●	–	–	–	○	–	–	–	–	–	–	●	○	–	●	○	–	–	–
20	Murray	–	–	●	○	–	–	–	–	–	–	–	○	–	●	○	–	●	●	○	–	–
21	Murray-Bindoon	○	–	○	–	–	–	●	○	–	○	○	–	–	○	●	–	–	–	○	●	–
22	Balingup	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	○	○	–	●	–	–
28	Darling Scarp	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–

● Site-vegetation type should be present
○ Site-vegetation type should be present, but absence not critical
– Site-vegetation type generally absent
* Site-vegetation types as defined by Havel (1975a and b)

6. **Yalanbee Complex in Low Rainfall** is restricted to the uplands in the low rainfall areas in the north and east of the Darling Plateau. This complex is unique in that it supports in the main a woodland of wandoo-powderbark wandoo *(E. wandoo-E. accedens)* (Plate 3.1) and overlaps with adjacent complexes by the minor occurrences of woodland of wandoo-marri and open-forest of jarrah-marri (Table 3.3). The dominant site-vegetation types are M and less consistently G, Z and H (Table 3.4).
7. **Cooke Complex** is associated with the **Cooke** unit. The site-vegetation types of the Mt. Cooke area have been studied in detail and mapped (Havel 1975b). As this complex occurs over such a wide area with a large variation in depth of soil, the vegetation associated with it is very varied. Type G (Plate 3.2), which is a localised variant of type R, is itself a mosaic of vegetation ranging from lithic complex (granite rocks) through *Borya nitida* herb-fields; through heath of *Grevillea bipinnatifida, Hakea elliptica, H. undulata, H. trifurcata, H. lissocarpha* and several species of *Acacia, Melaleuca* and *Verticordia;* through the rare occurrence of a low open-woodland of *E. laeliae* (Mt. Cooke); through a low open-forest of rock sheoak on shallow soils in the low rainfall areas to the woodland of wandoo-marri and open-forest of jarrah-marri on the deeper soils as at Bannister Hill (Table 3.3). All or some of these variations in vegetation can be concentrated in localised areas, where separation is not possible at the scale 1:250 000. The dominant site-vegetation types are G, R and less consistently M, P, S and Z (Table 3.4).
8. **Goonaping Complex** occurs on the shallow depressions in association with the **Goonaping** unit. It consists of a variety of structural formations, and in the localised moist low-lying areas there are similarities with the **Swamp** complex. The vegetation ranges from open-forest of jarrah-marri through low open-woodland of *Banksia attenuata-B. menziesii* to low open-forest of *Melaleuca preissiana* and low open-woodland of *M. preissiana-B. littoralis* on the moister soils (Table 3.3). *B. menziesii* is restricted to the northern occurrences of **Goonaping** complex. At Lake Nalyerin and southwards *B. attenuata* dominates the overstorey. The dominant site-vegetation types are F and J; less consistently A and B (Table 3.4).
9. **Wilga Complex in Low to Medium Rainfall** occurs on the **Wilga** unit. On the basis of structural formations this complex is an open-forest of jarrah-marri (Table 3.3). Floristically it is distinct, its dominant site-vegetation types being H, R, W and less consistently E (Table 3.4). It falls within a low-medium rainfall area (700-950 mm).

Plate 3.2: Cooke complex (7) Herblands and lithic complex associated with granitic outcrops on Mount Dale (site-vegetation type G).

10. **Yarragil Complex (Minimum Development of Swamps) in Medium to High Rainfall** (Plate 3.3), consists predominantly of a mixture of open-forest of jarrah-marri with admixtures of yarri *(E. patens)* and bullich *(E. megacarpa)* (Table 3.3). Bullich is restricted to these upper gullies of the high rainfall areas on the western fringes of the Darling Plateau, receiving an average annual rainfall of more than 1100 mm. Its distribution pattern is patchy between Perth, Albany and Yallingup. Yarri, on the other hand is relatively widespread, extending further east in the centre and north, near Wandering and Wundowie. The dominant site-vegetation types are C, D and W; less consistently Q, T and U (Table 3.4).
11. **Yarragil Complex (Maximum Development of Swamps) in Medium to High Rainfall** has affinities with the previous complex but differs in the large areas of swamps, which are often too small to be mapped separately at this scale. It is restricted to the upper reaches of rivers receiving an annual average rainfall greater than 850 mm. Most of this complex consists predominantly of an open-forest of jarrah-marri with some admixture of yarri (Table 3.3). On sandier soils a well-defined second storey of *Banksia* spp. is distinguishable, but on the moist valley floors the open-forest is

Plate 3.3: Yarragil complex (10) Bullich open-forest on the valley floor south of Dwellingup in the western higher rainfall region of the Darling Plateau (site-vegetation type C).

replaced by a low open-woodland of *M. preissiana-B. littoralis*. The dominant site-vegetation types are D (Plate 3.4), E and W; less consistently P, F, J, A and B (Table 3.4). Site-vegetation type E is particularly important here as it is restricted in occurrence outside this complex.

12. **Swamp Complex** is associated with the swampy valley floors of the **Yarragil** and **Pindalup** units and small areas of the **Goonaping** unit. The vegetation is varied due to the wide distribution of this complex from high rainfall areas in the west to low rainfall areas in the east of the Darling Plateau. Maximum development of the swamps occurs in the upper reaches of the Darkin (Darkin

Plate 3.4: Yarragil complex (11) A stand of Kingia australis with a background of jarrah-marri open-forest in the upper valleys, off Ashendon Road south of Brookton Highway in the medium to high rainfall region of the Darling Plateau (site-vegetation type D).

Swamp), Bingham, Harris and Collie Rivers and the Beraking Brook. The vegetation ranges from a low open-woodland of *M. preissiana-B. littoralis* to sedgelands on the wetter soils (Table 3.3). Distinctive features of the swamps are the variety of species of *Melaleuca,* which include *M. cymbifolia, M. incana, M. subtrigona, M. uncinata, M. viminea* and *M. lateritia.* Other species include *Actinostrobus pyramidalis, Hakea varia* and species of *Verticordia* including *V. acerosa, V. densiflora, V. grandiflora. A. pyramidalis* is restricted in numbers on the Darling Plateau but does occur in several vegetation complexes on the Swan Coastal Plain. The dominant site-vegetation type is A (Table 3.4).

13. **Pindalup and Yarragil Complex in Low to Medium Rainfall** defines the distribution of the most westerly extension of wandoo in the shallow upper valleys, although in the north the wandoo woodlands extend through the deeply dissected **Murray** and **Bindoon** units and **Helena** unit westwards to link up with those on the shallow soils of the Darling Scarp. Generally this complex is confined to the eastern and northern areas receiving an annual average rainfall of less than 900 mm. The vegetation complex consists predominantly of an open-woodland of wandoo with

some admixture of marri, yarri and jarrah and an open-forest of jarrah-marri (Table 3.3). As the valleys carrying wandoo-yarri woodlands occupy more fertile sites, most have been cleared for agricultural purposes. The dominant site-vegetation types are H, M and Y; less consistently A, L, Z and E (Table 3.4).

14. **Coolakin Complex in Low Rainfall** is dominated by a woodland of wandoo with a mixture of jarrah, marri and yarri (Table 3.3). It has affinities with the **Pindalup and Yarragil** complex in that it occurs in the lower rainfall areas and both support woodlands of wandoo and include site-vegetation types M, Y, H, Z and L (Table 3.4). Noteworthy differences are the lack of site-vegetation type A and the occurrence of G.

15. **Catterick Complex in Medium to High Rainfall** is the equivalent of **Yarragil** complex (minimum development of swamps) in that it occurs in the upper valleys in the medium to high rainfall areas (750-1050 mm) but differs from it in the absence of bullich (Table 3.3) and in some site-vegetation types (Table 3.4). It is restricted to the southern section of the Darling System in the upper reaches of the Preston and Blackwood Rivers, and Balingup and Thomson Brooks. The structural formations in this complex are predominantly an open-forest of jarrah-marri and to a lesser extent an open-forest of jarrah-marri-yarri and a fringing woodland of *E. rudis-M. rhaphiophylla* with stands of *B. littoralis* on the valley floors (Table 3.3). The dominant site-vegetation types are C, D, Q, and W (Table 3.4).

16a. **Yarragil and Catterick Complex in High Rainfall** and 16b. **Balingup Complex in High Rainfall-South.** The separation of these complexes is in the legend only; as far as the vegetation is concerned they are equivalent. Both complexes include the northern extension of the tall open-forest of karri *(E. diversicolor)* with some forest of jarrah-marri. Although the karri forest has not been quantitatively analysed the understorey in this northern stand has close affinities with the types further north. The main distinguishing feature is therefore the occurrence of karri in the upper layers (Table 3.3).

17. **Helena Complex in Medium to High Rainfall** is restricted to the southern medium to high rainfall areas (greater than 1100 mm annual average rainfall) on the western fringes of the Darling Plateau. The most northerly occurrence of this complex is on the lower deeply incised, narrow valleys of the Munday Brook; it occurs in the lower reaches of all water courses along the western fringes of the Darling Plateau to Logue Brook in the south. The vegetation is variable depending on the depth of soil, and ranges from an open-forest of jarrah-marri on the lower slopes and valley floors to the heaths on shallow soils on the upper slopes, to herblands and lithic complex on the granitic rocks (Table 3.3). It has affinities with both adjacent complexes: the **Murray** (medium to high rainfall) and the **Darling Scarp.** The dominant site-vegetation types are G and R; less consistently C, Q and T (Table 3.4).

18. **Helena Complex in Low to Medium Rainfall** is restricted to the northern low to medium rainfall areas (650-1100 mm) on the

western fringes of the Darling Plateau. It reaches maximum development along the Avon River but extends southwards to the deeply dissected steep narrow valleys of the Helena River. The vegetation is variable, depending on the depth of soil and ranges from open-forest to lichens (Table 3.3). The distinctive feature of this northern **Helena** complex is an open-woodland of wandoo on the valley slopes and floors which provides the east-west link between wandoo in the eastern valleys and on the scarp. The dominant site-vegetation types are G and R; less consistently C, Y and Q (Table 3.4).

19. **Bridgetown Complex in Medium to High Rainfall** is dominated by an open-forest of jarrah-marri with some admixture of yarri on the lower slopes. Along the river beds, the vegetation consists of a low open-forest of *E. rudis-M. rhaphiophylla* (Table 3.3). The dominant site-vegetation types are C, Q and T; less consistently R, U and G (Table 3.4).

20. **Murray Complex in Medium to High Rainfall** occurs on the moderately incised valleys of the **Murray** unit in the medium to high rainfall area on the western fringes of the Darling Plateau. As a result of damming it has been largely flooded, so except for the Murray River all the major areas of this complex are now inundated with water. The vegetation is dominated by an open-forest of jarrah-marri on the valley slopes and by an open-forest of jarrah-marri-yarri on the lower slopes. Along the streams is a fringing woodland of *E. rudis-M. rhaphiophylla* (Table 3.3). The dominant site-vegetation types are C, Q, U and T; less consistently D, O, R and W (Table 3.4).

21. **Murray and Bindoon Complex in Low to Medium Rainfall** occurs in the moderately incised valleys of the **Murray** and **Bindoon** units in the low to medium rainfall area (less than 1100 mm annual average rainfall) in the eastern and northern areas of the Darling Plateau. Except for the Helena Reservoir the major areas of this complex are not flooded. There are minor occurrences on the Collie East and Murray Rivers, but maximum development occurs on the Darkin and Helena Rivers and northwards. The distinctive vegetation feature is the wandoo woodland on the valley slopes, intermixed with some open-forest of jarrah-marri-yarri and a woodland of *E. rudis-M. rhaphiophylla* on the fringes of the water courses (Table 3.3). The dominant site-vegetation types are G, R and Y; less consistently A, C, H, L, M, Q and W (Table 3.4).

22. **Balingup Complex in Medium to High Rainfall** is mainly located to the south of the Preston River, in the southern section of the Darling Plateau, on the **Balingup** unit. The rainfall is medium to high (more than 850 mm average annual rainfall). The dominant vegetation consists of an open-forest of jarrah-marri with some yarri while along the water course there is a fringing woodland of *E. rudis-M. rhaphiophylla* (Table 3.3). It has certain affinities with the **Yarragil** (minimum development of swamps), **Murray** (medium to high rainfall) and **Catterick** complexes. The

dominant site-vegetation types of **Balingup** are C, D and W; less consistently S and T (Table 3.4).

23. **Williams-Avon-Brockman-Mumballup Complex** occurs on the valley floors of the Williams, Avon, Brockman and Preston Rivers. Despite the large variation in rainfall the vegetation in these valleys is similar, consisting of a fringing woodland of *E. rudis-M. rhaphiophylla*. On the fringes of this woodland the vegetation relates to the adjacent complexes. For instance, the occurrence of *Agonis flexuosa* along parts of the Preston River reflects the adjacent **Lowdon** complex.

24. **Nooning Complex** is restricted in occurrence to the upper valley floors of the Brockman River which are subject to inundation. It is located north of Chittering in the drier, warmer northern section of the Darling Plateau. The distinctive feature of this complex is the occurrence of low open-forest of *Casuarina obesa* and the open-scrub of *C. obesa-Acacia* spp.-*Melaleuca* spp. Along the streams there are localised patches of a woodland of *E. rudis-M. rhaphiophylla* (Table 3.3). Elsewhere *C. obesa* is restricted mainly to several complexes on the Swan Coastal Plain and on the Dandaragan Plateau (Tables 3.5 and 3.6).

25. **Lowdon Complex** consists of a mixture of an open-forest of jarrah-marri, a low open-forest of peppermint *(Agonis flexuosa)* on the lower valley slopes, a woodland of *E. rudis-M. rhaphiophylla* along water courses, and a wandoo woodland on the slopes. The wandoo woodlands are extensions from the adjacent **Darling Scarp** (Table 3.3).

26. **Bindoon Complex** coincides in the main with the **Bindoon** unit except for sections in the Chittering Valley. The vegetation is unique in the Darling System in that it consists predominantly of a woodland of York gum *(E. loxophleba)* which is flanked by a woodland of wandoo on the upper slopes. The occurrence of *C. huegeliana* is associated with the rock outcrops. This complex reaches its maximum development within the Darling System in the valleys near Bindoon and Toodyay.

27. **Michibin Complex** coincides with the **Michibin** unit in the low rainfall area, along the eastern and northern fringes of the Darling Plateau. The distinctive feature of **Michibin** is the dominance of a woodland of wandoo; York gum is located only in small patches and mixed with wandoo. *Acacia acuminata, Casuarina huegeliana* and *A. microbotrya* dominate the understorey, with *C. huegeliana* restricted to the rock outcrops on the steep slopes. The **Bindoon** and **Michibin** complexes represent the western extension of the wheatbelt vegetation.

28. **Darling Scarp Complex** includes a large variety of flora on a unique geological feature. Although this vegetation complex, which coincides with the **Darling Scarp** unit, has not been subdivided, several features are evident. These include the dominance of wandoo along the entire length of the Darling Scarp; the admixture of marri; the occurrence of the rare butter gum *(E. laeliae)* on the northern areas; the occurrence of mountain

gum *(E. haematoxylon)* on the southern areas; the intermingling of all these species and the rare *E. lane-poolei* (which is normally restricted in the Darling System to the Pinjarra Plain) on the Darling Scarp near Keysbrook; and the variety of both the floristic and structural composition of the vegetation (Tables 3.3 and 3.4). *E. lane-poolei* has also been noted above the waterfall on the Ellen Brook (pers. comm. A.S. George 1977). The vegetation ranges from a low open-woodland of wandoo with admixtures of marri, butter gum and mountain gum, through low open-forest of *C. huegeliana*, through heath, through herblands of *Borya nitida* to lithic complex (on the granite rocks). Site-vegetation types are G and R. Shrub species include *Thomasia glutinosa, Verticordia acerosa, Hakea incrassata, H. stenocarpa, Grevillea bipinnatifida, Hovea pungens, Goodenia fasciculata, Petrophile biloba, Conospermum huegelii* and *Grevillea endlicherana.*

Swan Coastal Plain

The Swan Coastal Plain supports 29 vegetation complexes. The structural formations in these complexes are summarised in Table 3.5. Several features become evident for the vegetation on the Coastal Plain:

1. The importance of landforms and soils as determinants of the vegetation.
2. The importance of climate as a controlling influence on the vegetation. This is particularly evident northwards with a reduction in both height and percentage foliage cover of the tallest stratum. This trend is further accentuated by distinct changes in floristic composition from south to north.
3. The unique floristics of this region as distinct from the other four regions.
4. The observations support the individuality of species distribution and the continuity of distribution of some plant species with adjacent regions.

29. **Forrestfield Complex** is dominated by an open-forest of marri-wandoo-jarrah on the heavier gravelly soils and of jarrah-marri-sheoak on the sandier soils. The complex is dissected by a series of streams which support a fringing woodland of *E. rudis-M. rhaphiophylla* (Table 3.5). The open-forest of marri-wandoo-jarrah now approximates a woodland as a result of logging and clearing since European settlement. Remnant plant species on these gravelly soils include *Banksia grandis, Xylomelum occidentale, Dryandra sessilis, Macrozamia riedlei, Xanthorrhoea preissii* and species of *Hibbertia*. On the sandier soils there are remnant pockets of the jarrah-marri-sheoak open-forest with common species including *B. attenuata, B. grandis, Stirlingia latifolia, Mesomelaena tetragona* and *Nuytsia floribunda.*

30. **Abba Complex** is dominated by an open-forest of marri-jarrah-banksia and a woodland of marri (Table 3.5). **Abba** is similar to **Forrestfield** and **Guildford** but differs in the absence of wandoo and the presence of the occasional mountain gum near the Abba

River. Common plant species include *Nuytsia floribunda, Kingia australis, Persoonia longifolia* and *Banksia grandis*. The low-lying areas along the creeks and on the flood plains support a woodland of *E. rudis-Melaleuca* spp., with common species including *M. preissiana, M. rhaphiophylla, Regelia ciliata, Beaufortia sparsa, Leptospermum ellipticum, Hakea varia, Acacia saligna, Astartea fascicularis, Viminaria juncea* and *Agonis juniperinum.*

31. **Coonambidgee Complex** consists of vegetation ranging from a low open-forest and low woodland of pricklybark-banksia *(E. todtiana-B. attenuata-B. menziesii-B. ilicifolia)* with local admixtures of *B. prionotes*, to an open-woodland of marri-banksia (Table 3.5). The former reflects the drier conditions found on the sands in the north. The floristic composition of the understorey of this complex has affinities with the **Reagan** complex of the Dandaragan Plateau. On the moister low-lying soils marri appears as an emergent among the *Banksia* spp. to form an open-woodland. Common plant species in the understorey include *Persoonia comata, Stirlingia latifolia, Nuytsia floribunda, Mesomelaena stygia, Casuarina humilis, Calothamnus sanguineus, Hibbertia hypericoides* and species of *Conospermum* and *Petrophile.*

32. **Guildford Complex** is dominated by a mixture of an open-forest, in sections a tall open-forest, of marri-wandoo-jarrah and a woodland of wandoo, with minor components including the fringing woodland of *E. rudis-M. rhaphiophylla* along the streams and the rare *E. lane-poolei* (Table 3.5). Most of this area has been subject to logging and clearing since European settlement. *E. lane-poolei* is restricted in the main to the **Guildford** unit between Keysbrook and Cardup in the Darling System. Beyond the boundaries of the Darling System this rare species is known to occur near Jurien Bay. The other remnant plant species in this complex include *Banksia grandis, Kingia australis, Xanthorrhoea preissii* and species of *Hardenbergia* and *Hibbertia.*

33. **Swan Complex** is dominated by a woodland of *E. rudis-M. rhaphiophylla*, with localised occurrences of low open-forest of *C. obesa* and *M. cuticularis* (Table 3.5). This vegetation was subject to early disturbances associated with the settlement of the south-western corner of Western Australia, therefore there are only a few remnant undisturbed areas. Other plants present include species of *Leptocarpus, Juncus, Cyperus, Schoenus* and *Scirpus.*

34. **Dardanup Complex** is a mosaic of vegetation from the adjacent complexes of **Serpentine River, Southern River** and **Guildford** (Table 3.5). The vegetation on the uplands ranges from an open-forest of marri-wandoo-jarrah to an open-woodland of marri-jarrah-banksia. There is a variety of vegetation in the depressions depending on the drainage patterns. Along the creeks it is dominated by a fringing woodland of *E. rudis-M. rhaphiophylla*, while on the flats subject to inundation a closed-scrub of *Melaleuca* spp. grows, with such species as *M. lateritia, M. hamulosa, Hakea varia, H. prostrata, Viminaria juncea* and *Regelia ciliata.*

TABLE 3.5: SUMMARY OF VEGETATION COMPLEXES OF THE SWAN COASTAL PLAIN IN RELATION TO THE STRUCTURAL FORMATIONS

STRUCTURAL FORMATIONS

Mapping Unit No.	Vegetation Complexes	TALL OPEN-FOREST	TALL WOODLAND	OPEN-FOREST					WOODLAND									OPEN-WOODLAND				LOW CLOSED-FOREST	LOW OPEN-FOREST					LOW WOODLAND				CLOSED-SCRUB			CLOSED-HEATH	SEDGELANDS
		E. calophylla-E. wandoo-E. marginata	*E. gomphocephala*	*E. calophylla-E. wandoo-E. marginata*	*E. calophylla-E. marginata-Banksia* spp.	*E. marginata-E. calophylla-C. fraserana*	*E. gomphocephala*	*E. gomphocephala-E. marginata-E. calophylla*	*E. rudis-M. rhaphiophylla*	*E. rudis-M. preissiana*	*E. rudis-Melaleuca* spp.	*E. calophylla*	*E. wandoo*	*E. gomphocephala*	*E. marginata-C. fraserana-Banksia* spp.	*E. marginata-E. calophylla*	*E. marginata-Banksia* spp.	*E. calophylla-E. wandoo-E. marginata*	*E. calophylla-E. decipiens*	*E. calophylla-Banksia* spp.	*E. calophylla-E. marginata-Banksia* spp.	*M. lanceolata-C. preissii*	*B. attenuata-B. menziesii-B. ilicifolia-E. todtiana*	*B. attenuata-B. menziesii-E. todtiana*	*Banksia* spp.*-E. todtiana*	*C. obesa*	*C. obesa-M. cuticularis*	*Melaleuca* spp.	*B. attenuata-B. menziesii-B. ilicifolia-E. todtiana*	*B. attenuata-B. menziesii-E. todtiana*	*Banksia* spp.*-E. todtiana*	*Melaleuca* spp.	*Melaleuca* spp.*-Casuarina* spp.	*Acacia rostellifera*		
29	Forrestfield	–	–	●	●	●	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
30	Abba	–	–	–	●	●	–	–	–	–	○	●+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
31	Coonambidgee	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	●	–	–	–	●	–	●	–	–	–	–	–
32	Guildford	○	–	●	●	–	–	–	○	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
33	Swan	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–
34	Dardanup	○	–	○	○	–	–	–	○	–	–	–	○	–	–	–	○	–	–	–	○	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–
35	Serpentine River	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	○	–	–	–	○	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–
36	Beermullah	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	●	–	–	–	–	–	○	–	–	–	–
37	Bootine	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	○	–	–	–	–	–	–	–	–	–	–	○
38	Yanga	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–	–	○	–	–	○	–	○	●	–	○	○	–	○	●	–	–	–	○
39	Mungala	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	○	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–
40	Cannington	–	–	–	–	–	–	○	○	–	○	–	–	–	○	–	○	–	–	–	○	–	–	–	–	–	–	○	–	–	–	○	–	–	–	○
41	Moore	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
42	Southern River	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
43	Bassendean-North	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	○	●	–	●	–	–	–	–	○
44	Bassendean-Central and South	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	○	–	○	–	–	○	–	–	–	–	–	–	–	○
45	Bassendean-North-Transition	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	●	–	●	–	–	–	–	–
46	Bassendean-Central and South-Transition	–	–	–	–	–	–	–	–	–	–	–	–	–	○	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–
47	Karrakatta-North	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	●	–	–	–	–	–
48	Karrakatta-North-Transition	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	●	–	●	–	–	–	–	–
49	Karrakatta-Central and South	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
50	Caladenia	–	–	–	–	–	○	–	○	–	–	–	–	–	–	–	–	–	–	○	–	–	○	–	○	–	–	○	○	–	○	–	–	–	–	○
51	Cottesloe-North	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	●	–	–	–	–	●	–
52	Cottesloe-Central and South	–	–	–	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
53	Herdsman	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
54	Pinjar	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
55	Quindalup*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–	–	–	○	–	–
56	Yoongarillup	–	●	–	–	–	–	○	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
57	Vasse	–	–	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–

\+ Localised admixture of *E. haematoxylon*

* Quindalup–Coastal complex associated with sand dunes

● Structural Formation should be present

○ Structural Formation should be present, but absence not critical

– Structural Formation generally absent

35. **Serpentine River Complex** is dominated by a closed-scrub of *Melaleuca* spp. on the low-lying flats, with a fringing woodland of *E. rudis-M. rhaphiophylla* along the streams (Table 3.5). Common species include *M. uncinata, M. viminea, M. lateritia, M. hamulosa, M. parviflora* and *M. preissiana.* Other plants in the area include *Leptospermum ellipticum, Regelia ciliata, Hakea varia, Viminaria juncea, Acacia saligna* and *Actinostrobus pyramidalis.* The uplands support woodlands of marri-jarrah-banksia and jarrah-banksia. In this respect this complex has affinities with the adjacent complexes.

36. **Beermullah Complex** is distinctive in that it includes extensive stands of swamp sheoak *(Casuarina obesa)* on the moister flats. Elsewhere on the Swan Coastal Plain smaller stands and isolated plants of swamp sheoak are found on **Yanga** and **Swan** complexes. Despite agricultural clearing, remnant understorey species still include *Hakea varia, H. prostrata, Hypocalymma angustifolium, Leptospermum ellipticum, Beaufortia squarrosa, Regelia ciliata* and *Viminaria juncea.* These species, unlike *C. obesa* are widespread and occur in the moister low-lying areas of a large section of the Darling System. This community of swamp sheoak has previously been described by Speck (1952) and Seddon (1972). Minor components on the wetter areas include a closed-scrub of *Melaleuca* spp., and occasional *Actinostrobus pyramidalis* (Table 3.5), and on the small rises an open-woodland of marri-wandoo-jarrah.

37. **Bootine Complex** consists of a mixture of low open-forest of banksia-pricklybark *(B. attenuata-B. menziesii-B. ilicifolia-E. todtiana)* on the drier sands, and a woodland of *E. rudis-M. rhaphiophylla* and sedgelands on the fringes of the lakes (Table 3.5). The sedgelands include species of *Baumea, Juncus, Schoenus* and *Leptocarpus.* Floristically the low open-forest of *Banksia* spp.-*E. todtiana* has strong affinities with the adjacent **Coonambidgee** complex.

38. **Yanga Complex** is similar to **Beermullah** on the low-lying flats, where a low open-forest of swamp sheoak *(C. obesa)* occurs, with patches of *Actinostrobus pyramidalis* and *Melaleuca* spp. (including *M. lateritia* and *M. hamulosa).* On the drier sites of **Yanga** the vegetation reflects the adjacent **Coonambidgee** and **Bassendean** complexes, with the resulting mixture of a low open-forest of banksia-pricklybark and an open-woodland of marri-banksia (Table 3.5), the latter being on the moister low-lying areas.

39. **Mungala Complex** supports vegetation ranging from an open-woodland of *E. calophylla-E. decipiens* to a closed-scrub of *Melaleuca* spp.-*Casuarina* spp. (Table 3.5). The latter is restricted to the low-lying seasonally flooded depressions.

40. **Cannington Complex** is a mosaic of vegetation from the adjacent complexes of **Bassendean-Central and South, Karrakatta-Central and South, Southern River and Vasse.** Essentially, the uplands support a woodland of jarrah-banksia with varying understorey depending on the characteristics of the soils (Table 3.5). One

distinctive feature is the pockets of tuart *(E. gomphocephala)* associated with the mounds of spring limestone. The low-lying areas support vegetation ranging from woodland of *E. rudis-M. rhaphiophylla* along the streams, to a closed-scrub of *Melaleuca* spp. on the less well-drained depressions. One distinctive feature of the streams south of Mandurah is the occurrence of peppermint *(Agonis flexuosa)* associated with the flooded gums and paperbark.

41. **Moore Complex** consists of the fringing vegetation of the Moore River with its woodland of *E. rudis-M. rhaphiophylla* (Table 3.5) and corresponds to the **Williams-Avon-Brockman-Mumballup** complex on the Darling Plateau, and to the *E. rudis* association as defined by Speck (1958). Flooded gum is like its closely related species the river red gum *(E. camaldulensis)* in that it is a widely, though selectively, distributed species.

42. **Southern River Complex** consists of an open-woodland of marri-jarrah-banksia on the elevated areas and a fringing woodland of *E. rudis-M. rhaphiophylla* along the streams (Table 3.5). South of the Murray River *Agonis flexuosa* occurs in association with the flooded gum and swamp paperbark *(M. rhaphiophylla).*

43. **Bassendean Complex-North** consists of a range of vegetation from low open-forest and low woodland of banksia-pricklybark to a low woodland of *Melaleuca* spp., and sedgelands which occupy the moister sites (Table 3.5). Speck (1958) recognised the reduction in both height and percentage foliage cover which is associated with the drier conditions on the northern Swan Coastal Plain. Differences in the floristic composition are also seen in this northern area, with such noted absences as jarrah, marri and sheoak *(Casuarina fraserana).* Havel (1968) divided the continuum found on these sands into a series of coastal site-vegetation types. Understorey species typical of the Bassendean sands, although not restricted to this northern area, include *Melaleuca seriata, Adenanthos obovatus, Dasypogon bromeliaefolius, Hypocalymma angustifolium, Boronia purdieana* and *Scholtzia involucrata.* One species of note which is restricted to this northern area is *Banksia laricina* (pers. comm. A.S. George).

44. **Bassendean Complex-Central and South** ranges from woodland of jarrah-sheoak-banksia on the sand dunes, to a low woodland of *Melaleuca* spp., and sedgelands on the low-lying depressions and swamps (Table 3.5). It includes the transition area of jarrah and pricklybark in the vicinity of Perth. *B. attenuata, B. grandis* and *B. menziesii* are common on the upper slopes; with *B. menziesii* decreasing southwards as it reaches the southern limit of its range near Mandurah. *B. ilicifolia, B. littoralis* and *M. preissiana* are common on the low-lying moister soils, where marri replaces jarrah in dominance. Other plant species include *Kunzea vestita, Hypocalymma angustifolium, Adenanthos obovatus* and *Verticordia* spp.

45. **Bassendean Complex-North-Transition Vegetation Complex** consists of low open-forest and a low woodland of banksia-pricklybark (Table 3.5) and is structurally similar to **Bassendean-**

North, **Karrakatta-North-Transition** and **Karrakatta-North**, but differs in the floristic composition of the understorey (Havel 1968). The understorey species reflect this transition area which consists of soils varying from deep pale grey sands, through deep pale yellow sands with a strongly leached surface, to deep yellow sands. The first two sand types dominate the area and support a range of species including *Boronia purdieana, Scholtzia involucrata, Leucopogon conostephioides, Calectasia cyanea, Conospermum stoechadis* and *Jacksonia floribunda*. The localised patches of yellow sand are indicated by the presence of species such as *Mesomelaena stygia* and *Synaphea polymorpha*.

46. **Bassendean Complex-Central and South-Transition Vegetation Complex** consists of a pocket of woodland of jarrah-marri on a moist depression surrounded by a series of high dunes north-east of Lake Pinjar. This area includes the most northerly extension of jarrah on the Bassendean Dune System, marri being present further north on the moist low-lying areas near Gingin Brook. This woodland of jarrah-marri has a well-defined second storey of *C. fraserana* and *B. grandis* on the deeper soils. On the low-lying depression the vegetation consists of a closed-scrub of such species as *Regelia ciliata, Adenanthos obovatus* and *Kunzea vestita* (Table 3.5). The understorey species reflect the influence of the surrounding transition complexes.

47. **Karrakatta Complex-North** is predominantly a low open-forest and low woodland of banksia-pricklybark, with minor occurrences of tuart-pricklybark-banksia (Table 3.5). One of the distinctive features of this northern complex is the lack of jarrah. Tuart is mainly restricted to the south, but does occur in pockets in the north near Moore River. *B. attenuata* and *B. menziesii* are prominent, with the occasional *B. ilicifolia* on the lower slopes. Common understorey species include *Conospermum triplinervium, Hakea trifurcata, Mesomelaena stygia, Eremaea pauciflora, E. fimbriata, Jacksonia sternbergiana, Stirlingia latifolia* and *Calothamnus sanguineus* (Havel 1968).

48. **Karrakatta Complex-North-Transition Vegetation Complex** has affinities with the **Bassendean-North, Bassendean-North-Transition** and **Karrakatta-North** as they all support a low open-forest and low woodland of banksia-pricklybark (Table 3.5). Floristically, this complex differs from the others in the dominance of the understorey species which reflect the presence of yellow sand at various depths. Common understorey species on these yellow sands include *Mesomelaena stygia, Synaphea polymorpha, Calothamnus sanguineus, Eremaea pauciflora, E. fimbriata, Jacksonia floribunda, Conospermum stoechadis* and *Acacia sphacelata* (Havel 1968). In addition there are small pockets of grey sand which support species such as *Leucopogon conostephioides, Scholtzia involucrata* and *Boronia purdieana*.

49. **Karrakatta Complex-Central and South** reflects the cooler, moister conditions in the southern section, with the vegetation consisting predominantly of an open-forest of tuart-jarrah-marri (Table 3.5). Seddon (1972) refers to the mixed nature of the

vegetation in the region, and he classifies the tuart-jarrah-marri as a marginally tall open-forest. However there are insufficient tall tuarts in this area, so "open-forest" was adopted. In the deeper sands on the eastern fringes the tuart is replaced by jarrah, with marri on localised moister sites. Common species in the tuart-jarrah-marri open-forest include *B. attenuata, B. menziesii* (north of Mandurah), *B. grandis, C. fraserana* and to a lesser extent peppermint *(Agonis flexuosa)*. Peppermint occurs in larger numbers in the **Yoongarillup** complex. Shrub species include *Jacksonia sternbergiana, J. furcellata, Acacia cyclopis, A. saligna, Hibbertia* spp., *Casuarina humilis, Calothamnus quadrifidus* and *Grevillea thelemanniana*. On the deeper sands of the jarrah woodland, the understorey species show changes and include *Hibbertia hypericoides, Conospermum stoechadis, Hovea trisperma* and *Bossiaea eriocarpa*.

50. **Caladenia Complex** is a mosaic of vegetation from the adjacent complexes of **Karrakatta-North, Yanga** and **Bassendean-North** (Table 3.5). The vegetation present in a localised area depends on the sand (yellow, grey or layered) and the moisture regime (upper dune, slope, depressions or swamps). Essentially the upper dunes support a low open-forest of banksia-pricklybark with *B. attenuata* and *B. menziesii* being dominant. The understorey species reflect the presence of yellow sands **(Karrakatta-North)** or grey sands **(Bassendean-North)**. The swamps and depressions support a low woodland of *M. preissiana* and sedgelands *(Baumea juncea, B. articulata, Juncus* spp., *Leptocarpus* spp.). Where the flats are subject to seasonal inundation these wetland species are replaced by stands of *Casuarina obesa* and *Melaleuca* spp., including *M. lateritia, M. hamulosa* and *M. rhaphiophylla*.

51. **Cottesloe Complex-North** is dominated by a closed-heath on the limestone outcrops with a mixture of a low open-forest and a low woodland of *Banksia attenuata-B. menziesii-E. todtiana* on the deeper sands (Table 3.5). The differences in the percentage foliage cover of the tree stratum reflect the variety of conditions in the area. Characteristic understorey species associated with the limestone outcrops include *Melaleuca huegelii, M. cardiophylla, Acacia heteroclita, Trymalium ledifolium, Grevillea thelemanniana, G. vestita, Jacksonia hakeoides* and *Conospermum triplinervium* var. *linearis* (Havel 1968).

52. **Cottesloe Complex-Central and South** supports heaths on the limestone outcrops which resemble those in the north. The deeper sands support a mosaic of a woodland of tuart and an open-forest of tuart-jarrah-marri (Table 3.5). Although many of the understorey species described in **Cottesloe-North** are found in both areas, the distinctive dominance of tuart distinguishes the southern section.

53. **Herdsman Complex** is dominated by sedgelands and a woodland of *E. rudis-Melaleuca* spp., with the species of *Melaleuca* depending on the local drainage and adjacent soils (Table 3.5). This vegetation is associated with the series of swamps and small lakes on the Swan Coastal Plain. Other plants include species of

Typha, Baumea, Juncus, Leptocarpus and *Scirpus*. The vegetation on elevated areas of **Herdsman** is mainly associated with that of the adjacent **Karrakatta** and **Cottesloe** units.

54. **Pinjar Complex** has strong affinities with **Bassendean** in that it ranges from a woodland of jarrah-banksia on the upper dune slope to a woodland of *E. rudis-M. preissiana* and sedgelands in the depressions (Table 3.5). The area differs in the degree of development of swamp vegetation associated with semi-permanent and permanent lakes. Other plants common in these depressions include *Regelia ciliata, Hakea varia, Leptospermum ellipticum, Hypocalymma angustifolium* and species of *Baumea, Juncus, Scirpus* and *Leptocarpus*.

55. **Quindalup Complex** is restricted to the coastal dunes and can be subdivided mainly into two alliances. The strand and fore dune alliance contains *Angianthus cunninghamii, Anthericium divaricatum, Arctotheca nivea, Atriplex isatidea, Cakile maritima, Calocephalus brownii, Carpobrotus virescens, Pelargonium capitatum, Senecio lautus, Sonchus megalocarpus. Spinifex longifolius, Tetragonia implexicoma, T. zeyheri.* The mobile and stable dune alliance contains *Acacia cyclopis, Anthocercis littorea, Lepidosperma gladiatum, Myoporum insulare, Nitraria schoberi, Olearia axillaris, Scaevola crassifolia, S. nitida, Spyridium globulosum, Westringia rigida* and *Wilsonia backhousei*. The vegetation differs in its physiognomy and species composition from one place to another because of the variations in the dune environment caused by edaphic and topographical factors and the degree of shelter from salt-laden winds (McArthur 1957; Smith 1957). The low closed-forest of *Melaleuca lanceolata-Callitris preissii* is restricted to small localised pockets (Table 3.5). This formation was once more widespread along the coast (Baird 1958; Seddon 1972). Other local variations include the remnant occurrences of *E. foecunda, Pittosporum phillyraeoides, Santalum acuminatum, Exocarpus spartea* and *Acacia rostellifera* (Seddon 1972).

56. **Yoongarillup Complex** is dominated by the only extensive woodland of tuart in the Darling System. A characteristic feature of these woodlands is the large numbers of peppermint *(Agonis flexuosa)* in the second storey. On more restricted patches, this tuart woodland is replaced by an open-forest of tuart-jarrah-marri which has strong affinities with the **Karrakatta-Central** and **South** complex (Table 3.5). Understorey species include *Banksia attenuata, Hibbertia hypericoides, Macrozamia riedlei, Hypocalymma robustum* and *Jacksonia floribunda*.

57. **Vasse Complex** is dominated by a mixture of closed-scrub of *Melaleuca* spp., fringing woodland of *E. rudis-Melaleuca* spp., and open-forest of tuart-jarrah-marri (Table 3.5). The actual location of the various components appears to be determined on the basis of drainage, periods of flooding and depth of sand. Other species include *Melaleuca rhaphiophylla, M. preissiana, M. cuticularis, Casuarina obesa, M. lateritia* and *Acacia saligna*. In areas subject to periodic inundation like the flat areas around the opening of the

Peel Inlet near Mandurah, samphire *(Arthrocnemum* and *Salicornia* spp.*)* grows extensively.

Dandaragan Plateau

The Dandaragan Plateau supports 9 complexes. Definitions of these complexes are based mainly on structural formations (Table 3.6). Several features become evident for the vegetation on the Dandaragan Plateau:

1. The importance of landforms and soils as determinants of the vegetation.
2. The importance of the climate as a determinant. A northward trend similar to that seen on the Swan Coastal Plain, is reflected in the floristics and structure of the vegetation.
3. The unique floristics of this region include the most southerly extension of the northern heaths.
4. The observations also support the concepts of individuality of species distribution and the continuity of distribution of some plant species with adjacent regions.

58. **Mogumber Complex-North** is dominated by open and closed-heaths (Table 3.6). These heaths are the southerly extension of the northern heathlands. The marked absence of jarrah and marri in this drier northern section distinguishes it from the southern section. The open and closed-heath of *Casuarina humilis, Banksia sphaerocarpa,* several unnamed species of *Banksia, Xanthorrhoea preissii* and many other species, in particular of the families Myrtaceae, Proteaceae, Papilionaceae and Epacridaceae, occur on the low rises. The plant species of this heath include *Dryandra carlinoides, Dryandra kippistiana, D. shuttleworthii, Conospermum incurvum, C. stoechadis, C. acerosum, Mesomelaena stygia, M. tetragona* and species of *Eremaea, Calothamnus, Verticordia, Calytrix, Daviesia, Oxylobium* and *Andersonia*. Several rare species have been recorded and include *Stachystemon axillaris, Cryptandra humilis* and an unnamed prostrate species of *Banksia* (pers. comm. A.S. George). The low rises are surrounded by swales and shallow valleys which support a low open-forest to low open-woodland of banksia on the valley floors. Associated with *Banksia attenuata, B. menziesii* and *B. prionotes* are *B. burdettii*, the pricklybark *(E. todtiana)* and an occasional marri. These patches of *B. attenuata, B. menziesii* and *B. prionotes* are outliers of the main occurrences further south in the **Cullala, Mogumber-South** and **Moondah** complexes of the Dandaragan Plateau, while this is the southernmost known outlier of *B. burdettii* (pers. comm. A.S. George).

59. **Mogumber Complex-South** is dominated by an open-woodland of marri with a well-defined second storey of pricklybark-banksia *(E. todtiana-B. attenuata-B. menziesii-B. ilicifolia* (Table 3.6)). The same pattern of marri extending further north than jarrah, seen on the northern Swan Coastal Plain, is repeated in this area. Although localised patches of jarrah are to be found they are restricted in size and number. As one goes from the higher rainfall

TABLE 3.6: SUMMARY OF VEGETATION COMPLEXES OF THE DANDARAGAN PLATEAU IN RELATION TO THE STRUCTURAL FORMATIONS

Mapping Unit No.	Vegetation Complexes	OPEN-FOREST		WOODLAND		OPEN-WOODLAND				LOW CLOSED-FOREST	LOW OPEN-FOREST		LOW OPEN-WOODLAND		HEATH		LOW SHRUBLAND	SEDGELANDS
		E. marginata-E. calophylla		*E. rudis-M. rhaphiophylla*		*E. calophylla-E. marginata*	*E. calophylla-E. todtiana-Banksia* spp.	*E. calophylla-Banksia* spp.	*E. calophylla*	*Banksia* spp.-*E. todtiana*	*Banksia* spp.-*E. todtiana*		*Banksia prionotes*	*Banksia* spp.-*E. todtiana*	*Closed*	*Open*	*Melaleuca* spp.	
58	Mogumber-North	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
59	Mogumber-South	–	–	–	–	○	●	○	○	–	–	○	○	–	–	–	–	–
60	Karamal-North	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–
61	Karamal-South	●	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–	–
62	Cullala	–	–	–	–	–	○	–	○	–	–	●	–	–	–	–	–	–
63	Wannamal	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
64	Moondah	–	○	○	–	–	–	○	–	–	●	●	○	–	–	–	–	–
65	Reagan	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	○
66	Gingin	–	○	○	–	–	–	●	–	–	–	–	–	–	–	–	–	–

● Structural Formation should be present
○ Structural Formation should be present, but absence not critical
– Structural Formation generally absent

in the south to the lower rainfall in the north, jarrah disappears first, then marri. The intermingling of pricklybark and jarrah evident on the Bassendean sand dunes near Perth and Gnangara is repeated in **Mogumber** complex. Understorey species vary considerably depending on proportion of sand and gravel, depth of sand and moisture levels, but include such species as *Nuytsia floribunda, Stirlingia latifolia, Petrophile linearis, Daviesia pectinata, Calothamnus sanguineus, Mesomelaena tetragona, Baeckea camphorosmae, Hypocalymma angustifolium, Leptocarpus scariosus, Casuarina humilis, Lyginia tenax* and *Bossiaea eriocarpa.*

60. **Karamal Complex-North** is distinguished by the open-woodland of wandoo with some marri. Distinctive understorey species, such as *Dryandra carduacea* and *D. polycephala,* are elsewhere restricted to similar latitudes on the lateritic gravels of the **Yalanbee** and **Dwellingup** units of the Darling Plateau (Table 3.6). The marked absence of jarrah noted in **Mogumber-North** also characterises this complex and further distinguishes it from **Karamal-South** where jarrah is the dominant eucalypt. Other plant species associated with the wandoo woodlands are *Callitris morrisonii, Melaleuca uncinata, Hakea lissocarpha, Bossiaea eriocarpa, Macrozamia riedlei, Petrophile serruriae* and the uncommon *Stirlingia simplex.* On the sandier soils the vegetation has greater affinities with the adjacent complexes of **Moondah** and **Mogumber-North** with woodlands of marri and associated species of banksia.

61. **Karamal Complex-South** is dominated by an open-forest of jarrah-marri with a definite second storey of *B. grandis* on the gravelly soils and *B. attenuata* and *B. menziesii* on the sandier soils (Table 3.6). Elsewhere on the Dandaragan Plateau *B. grandis* is restricted mainly to the **Gingin** complex. Small areas of wandoo occur in pockets on **Karamal-South.** Other species in the open-forest of jarrah-marri include *Stirlingia latifolia, Dryandra sessilis, D. nivea, Hakea ruscifolia, Petrophile linearis, Jacksonia floribunda* and species of *Calytrix, Conostephium* and *Hakea.*

62. **Cullala Complex** is a mixture of low open-forest of banksia-pricklybark and an open woodland of marri with a well-defined second storey of *B. attenuata-B. menziesii-B. ilicifolia* (Table 3.6). The drier sands are dominated by the first two species of banksia. The understorey species of the **Cullala** complex on the deeper

sand reflect the similarities of the adjacent **Mogumber** complex and include such species as *Nuytsia floribunda, Stirlingia latifolia, Calothamnus sanguineus* and *Casuarina humilis.*

63. **Wannamal Complex** is distinguished by the extensive areas of low shrubland of *Melaleuca* spp. on the swamps located to the west of the Wannamal township. A minor component is the sedgelands associated with the areas subject to inundation (Table 3.6). On the low dunes the vegetation consists of extensions of the **Cullala** complex, while to the east and north of **Wannamal** complex the open-woodland of wandoo, and less consistently York gum, adjoins the swamp vegetation.
64. **Moondah Complex** supports predominantly a low closed to low open-forest of *B. attenuata-B. menziesii-B. prionotes-E. todtiana* on the slopes and an open-woodland of marri-banksia in the valley (Table 3.6). Along the water courses the vegetation is dominated by a woodland of *E. rudis-M. rhaphiophylla* with some mixture of *M. preissiana* and thickets of *Kunzea vestita* in the understorey. One of the distinctive features of **Moondah** is the presence of large numbers of *B. prionotes.* In other respects, due to the sandy soils, the vegetation has affinities with both **Mogumber** complexes, and with **Cullala** and **Reagan.**
65. **Reagan Complex** supports vegetation ranging from low open-woodland of *B. attenuata-B. menziesii-E. todtiana* to closed-heath, depending on the depth of soil (Table 3.6). The composition of the understorey varies slightly depending on the proportion of sand and gravel. Plant species include *Adenanthos cygnorum, Petrophile linearis, Mesomelaena tetragona, Casuarina humilis, Mesomelaena stygia, Hakea trifurcata, Daviesia juncea* and species of *Hibbertia, Eremaea, Conospermum* and *Conostephium.*
66. **Gingin Complex** supports an open-woodland of marri with a definite second storey of *B. grandis* and *Nuytsia floribunda.* This marri woodland is replaced by a woodland of *E. rudis-M. rhaphiophylla* along the major streams which dissect the **Gingin** unit (Table 3.6). Several unique floristic features have been noted in this area (pers. comm. A.S. George): outlier occurrences of *Boronia molloyae, Leptospermum firmum, Utricularia volubilis* and *Corybas dilatatus.*

Collie Basin

The Collie Basin supports 3 vegetation complexes. Structural formations of these complexes are summarised in Table 3.7.

Several features become evident from the vegetation on the Collie Basin:

1. The importance of the landforms and soils as determinants of the vegetation.
2. The observations support both the concept of individuality of species distribution and the continuity of distribution of some plant species with adjacent regions. Therefore, despite the overlap in distribution of some plant species with the surrounding vegetation on the Darling Plateau, there are also distinctive floristic

TABLE 3.7: SUMMARY OF VEGETATION COMPLEXES OF THE COLLIE BASIN IN RELATION TO THE STRUCTURAL FORMATIONS

Mapping Unit No.	Vegetation Complexes	STRUCTURAL FORMATIONS: OPEN-FOREST *E. marginata-E. calophylla-C. fraserana*	WOODLAND *Banksia* spp.	OPEN-WOODLAND *Banksia* spp.	OPEN-WOODLAND *M. preissiana-B. littoralis*	OPEN-WOODLAND *M. preissians-B. littoralis-E. patens*
67	Collie	●	–	–	–	–
68	Cardiff	–	○	●	–	–
69	Muja	–	○	○	●	●

● Structural Formation should be present
○ Structural Formation should be present, but absence not critical
– Structural Formation generally absent.

features on the Collie Basin.

67. **Collie Complex** consists of an open-forest of jarrah-marri-sheoak with a range of understorey species which reflect the relative proportion of sand and gravel in the soils (Table 3.7). The species which reflect the gravelly soils include *Banksia grandis, Persoonia longifolia, Hibbertia hypericoides, Leucopogon capitellatus, Bossiaea ornata, Acacia browniana, Hakea lissocarpha* and *Astroloma pallidum.* On the sandier soils common plant species are *Xylomelum occidentale, Daviesia incrassata, Bossiaea eriocarpa, Lyginia tenax, Dasypogon bromeliaefolius* and species of *Calytrix.*
68. **Cardiff Complex** consists of an open-woodland of *B. attenuata-B. ilicifolia* and *Nuytsia floribunda* with a distinctive understorey with a range of species that reflects the levels of soil moisture (Table 3.7). On the drier soils the understorey plant species include *Kunzea vestita, Banksia meissneri, Calothamnus* spp., *Lepidosperma angustatum, Xylomelum occidentale, Leucopogon glabellus, Jacksonia furcellata, Bossiaea eriocarpa* and *Daviesia incrassata.* On the moister soils common understorey species include *Leptospermum ellipticum, Adenanthos obovatus, Hypocalymma angustifolium* and *Schoenus brevifolius.*

69. **Muja Complex** consists of an open-woodland of *M. preissiana-B. littoralis* with some admixture of yarri *(E. patens)* dominating the moister areas, and replaced by a woodland of *Banksia* spp. on the drier sites (Table 3.7). The understorey species reflect the level of soil moisture. On the drier soils common plant species include *Lepidosperma angustatum, Dasypogon bromeliaefolius, Lyginia tenax* and *Xylomelum occidentale.* Common plant species on the moister soils include *Hakea ceratophylla, Agonis linearifolia, Leptospermum ellipticum, Hypocalymma angustifolium, Adenanthos obovatus* and *Leptocarpus scariosus.*

Blackwood Plateau

The Blackwood Plateau supports 6 vegetation complexes. The structural formations of these complexes are summarised in Table 3.8. Several features become evident from the vegetation of the Blackwood Plateau:

1. The importance of landforms and soils as determinants of the vegetation.
2. The observations support the concept of individuality of species distribution and the continuity of distribution of some plant species with adjacent regions.

70. **Kingia Complex** consists of an open-forest of jarrah-marri with a well-defined second storey of *B. grandis-C. fraserana* and *Persoonia longifolia* (Table 3.8). The wide range of soils is reflected in the floristic composition of the understorey. Common plant species include *Acacia extensa, Macrozamia riedlei, Bossiaea ornata, Xylomelum occidentale, Isopogon sphaerocephalus, Hovea chorizemifolia, Styphelia tenuiflora, Leucopogon verticillatus, L. capitellatus, Podocarpus drouyniana* and *Tetratheca viminea.*

71. **Mungardup Complex** supports a mixture of open-forest of jarrah-marri and open-woodland of *B. attenuata-B. ilicifolia* (Table 3.8). Common plant species in the understorey include *Nuytsia floribunda, Hibbertia vaginata, Mirbelia* spp., *Hakea lissocarpha, Kingia australis, Leucopogon australis, Kunzea vestita, Pimelea spectabilis, Xanthorrhoea gracilis, Agonis parviceps, Pultenaea reticulata* and *Adenanthos obovatus.*

72. **Darradup Complex** consists of a fringing woodland of yarri *(E. patens)* and flooded gum *(E. rudis)* dominating the moist gullies (Table 3.8). Common understorey species include *Bossiaea linophylla, Trymalium spathulatum, Pteridum esculentum, Banksia littoralis* var. *seminuda, Agonis linearifolia, A. parviceps, Pultenaea reticulata* and *Gahnia trifida.*

73. **Preston Complex** supports vegetation ranging from a fringing woodland of flooded gum *(E. rudis)* and peppermint *(Agonis flexuosa)* along the streams to a woodland of marri-jarrah on the slopes (Table 3.8). This vegetation occurs along the major water courses in the area and consequently the vegetation along the streams has affinities with that of the **Swan** and **Lowdon** complexes. The composition of the understorey is similar to that in the

TABLE 3.8: SUMMARY OF VEGETATION COMPLEXES OF THE BLACKWOOD PLATEAU IN RELATION TO THE STRUCTURAL FORMATIONS

Mapping Unit No.	Vegetation Complexes	STRUCTURAL FORMATIONS: OPEN-FOREST *E. marginata-E. calophylla*	*E. marginata-E. calophylla-E. haematoxylon*	WOODLAND *E. patens-E. rudis*	*E. rudis-Agonis flexuosa*	*E. calophylla-E. marginata*	*E. patens-E. megacarpa-B. littoralis*	*M. preissiana*	OPEN-WOODLAND *B. attenuata-B. ilicifolia*	LOW OPEN-FOREST *E. marginata-E. calophylla-E. haematoxylon*
70	Kingia	●	–	–	–	–	–	–	–	–
71	Mungardup	●	–	–	–	–	–	–	●	–
72	Darradup	–	–	●	–	–	–	–	–	–
73	Preston	–	–	–	●	●	–	–	–	–
74	Jarrahwood	●	–	–	–	–	●	○	–	–
75	Cartis	○	●	–	–	–	–	–	–	●

● Structural Formation should be present
○ Structural Formation should be present, but absence not critical
– Structural Formation generally absent.

Jarrahwood complex.

74. **Jarrahwood Complex** consists of an open-forest of jarrah-marri on the slopes, and woodland of *E. patens-E. megacarpa-B. littoralis* and patches of *M. preissiana* on the moister sites (Table 3.8). Common understorey species include *Gahnia trifida, Hakea ceratophylla, H. lasiantha, Hypocalymma angustifolium, Dasypogon hookeri, Pultenaea reticulata, Agonis parviceps, Leptospermum ellipticum, Adenanthos obovatus, Leptocarpus scariosus, Agonis linearifolia* and *Lepidosperma angustatum.* Several common plant species occur in the **Mungardup, Darradup** and **Jarrahwood** complexes, reflecting the continuity of the vegetation on the Blackwood Plateau.

75. **Cartis Complex** consists of a low open-forest to open-forest of jarrah-marri-mountain gum *(E. marginata-E. calophylla-E. haematoxylon)* with a definite second storey of *Banksia* spp. (Table 3.8). This complex has affinities with the vegetation of the

southern section of the **Darling Scarp** complex. Mountain gum is common to both. A noteworthy difference is the absence of wandoo on the **Cartis** complex. Common understorey species include *Xylomelum occidentale, Casuarina fraserana, Melaleuca thymoides, Pityrodia bartlingii, Pultenaea reticulata, Podocarpus drouyniana, Leucopogon glabellus, Hibbertia subvaginata, Hakea ruscifolia* and *Calothamnus* sp.

DISCUSSION

The text and maps clearly delineate a pattern of distribution of plant communities which is linked to landforms, soils and climate. This accounts for the similarity of the boundaries of the landform-soil units as defined by Churchward and McArthur (see Chapter 2) and those of the vegetation complexes. The range of vegetation associated with one complex is large in areas where the rate of change is rapid and therefore unmappable on a scale of 1:250 000. Where the boundaries between the landform-soil units and vegetation complexes are dissimilar it is mainly due to the influence of varying climatic conditions on the composition of the vegetation.

Of the trends expanded in the text the most noteworthy are those associated with the decreasing rainfall as reflected in the west-east trend on the Darling Plateau and the south-north trend on the Swan Coastal Plain, the Darling Plateau and the Dandaragan Plateau. In all these areas increasing aridity is associated with a change in structure (a decrease in height and percentage foliage cover of the tallest stratum) and a distinct transitional change in floristics. These floristic changes form a very distinctive continuum, with individual species and groups of species having dissimilar distribution patterns along the environmental gradients. By emphasising structural formations and site-vegetation types in the definition of the complexes the difficulties associated with such a continuum have been partly overcome. The multi-dimensional nature of the vegetation is by no means unique to Western Australia. Earlier workers (Ramensky 1924; Gleason 1926) pointed to the individuality of species distributions, and continuity of undisturbed communities along an uninterrupted environmental gradient. These were later supported by field research (Whittaker 1956, 1960, 1962, 1967; Curtis 1959; McIntosh 1958, 1967). Earlier workers recognised this continuum in the Darling System (Diels 1906; Williams 1932, 1942; Speck 1952, 1958; Churchill 1961, 1968; Havel 1968, 1975a and b). The vegetation distribution in all five geomorphological regions supports these concepts: although there are distinct floristic characteristics to each region there is also marked overlapping of some plant species and groups of species between the regions.

Essentially, these maps and the level of classification adopted narrow the gap between the broad-scale structural approach and the detailed detection of pattern at the site-vegetation level. Ultimately it is hoped that a complete distribution pattern for individual plant species in the area will be achieved. Although this need is recognised it is not yet feasible at the current level of documentation.

Vegetation is not static but dynamic in that it changes under the influence of both natural factors and human activities. By mapping the vegetation prior to disturbance by European man, it is hoped to provide a better base-line for investigating the influence of man on his environment. At present such an assessment for the Darling System can be achieved in part by a comparison of the land-use and vegetation maps. In Chapter 4 McArthur and Mulcahy expand on the current impact of man's activities.

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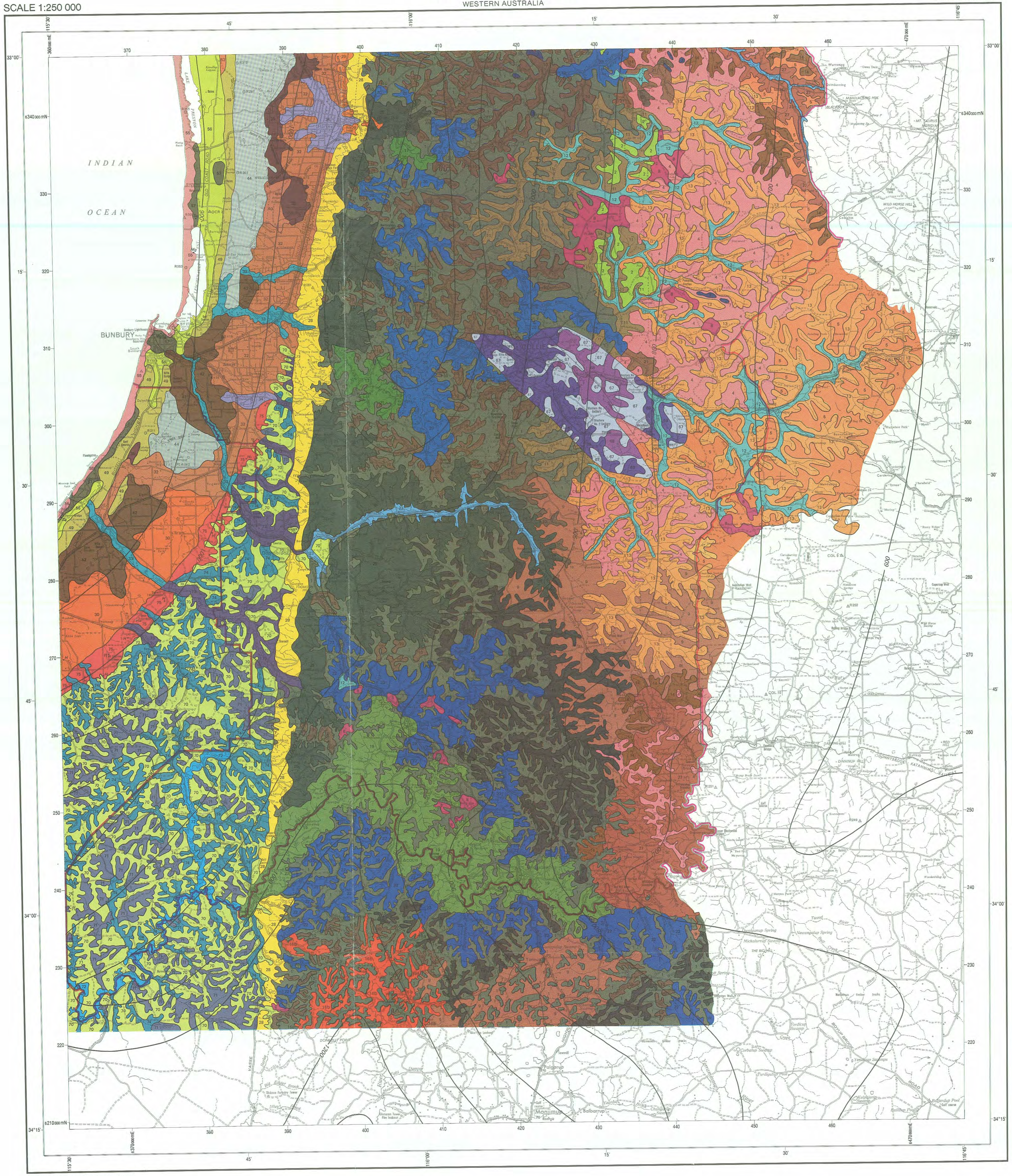
DARLING SYSTEM

WESTERN AUSTRALIA

SCALE 1:250 000

COLLIE SHEET



COMPILED on the Australian Map Grid from Department of Lands and Surveys standard series mapping and topographical base maps made available by courtesy of the Division of National Mapping and the Director of Military Surveys.

PROJECTION: Universal Transverse Mercator, C.M. 117°E.

HORIZONTAL DATUM: Australian Geodetic Datum 1966.

VERTICAL DATUM: Australian Height Datum 1971.

PREPARED: under the direction of the Surveyor General, Department of Lands and Surveys Perth, Western Australia.

Scale 1:250 000

5 0 5 10 15 20 25 Kilometres

LEGEND

VEGETATION COMPLEXES CHARACTERISTIC OF THE VARIOUS COMBINATIONS OF LANDFORMS, SOILS AND RAINFALL

DARLING PLATEAU

SITE VEGETATION TYPES A TO Z REFER TO THOSE OF J.J. HAVEL FOR THE DARLING PLATEAU, FORESTS DEPARTMENT BULLETIN Nos. 86, 87; 1975 (SEE TABLE A FOR EXTRACT FROM BULLETINS)

Lateritic Uplands

1 DWELLINGUP AND HESTER COMPLEX IN HIGH RAINFALL—CENTRAL AND SOUTH : Open forest of *E. marginata - E. calophylla*. Dominant vegetation types S, T; less consistently O, P, R.

2 DWELLINGUP COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata - E. calophylla*. Dominant vegetation types P, S; less consistently O, R, Z, H.

3 DWELLINGUP AND YALANBEE COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata-E. calophylla*. Dominant vegetation types H,P,Z; less consistently G,R.

4 DWELLINGUP, YALANBEE AND HESTER COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata - E. calophylla*. Dominant vegetation types H, Z; less consistently P.

5 YALANBEE AND DWELLINGUP COMPLEX IN LOW RAINFALL: Mixture of open forest of *E. marginata-E. calophylla* and woodland of *E. wandoo-E. calophylla*. Dominant vegetation types H.Z.M; less consistently G.

6 YALANBEE COMPLEX IN LOW RAINFALL: Woodland of *E. wandoo-E. accedens* and less consistently an open forest of *E. marginata-E. calophylla*. Dominant vegetation types M; less consistently H and G.

7 COOK COMPLEX : Vegetation ranging from open forest of *E. marginata - E. calophylla* on deep soils through heath and herbland to lichens on granite rocks. Dominant vegetation types R, G; less consistently S, P, Z, M.

8 GOONAPING COMPLEX : Open forest of *E. marginata* and low open woodland of *B. attenuata - B. menziesii* on the dry sites and low open forest of *M. preissiana* on moist sites. Dominant vegetation types F, J; less consistently A, B.

9 WILGA COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata - E. calophylla*. Dominant vegetation types H, W, R; and less consistently E.

Minor Valleys

10 YARRAGIL COMPLEX (MINIMUM DEVELOPMENT SWAMPS) IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata-E.calophylla* on upper slopes with admixture of *E.patens* and *E. megacarpa* on the valley floors. Dominant vegetation types C,D,W; less consistently Q,T,U.

11 YARRAGIL COMPLEX (MAXIMUM DEVELOPMENT SWAMPS) IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata-E. calophylla*. Dominant vegetation types D,E,W; less consistently P,F,J,A,B.

12 SWAMP COMPLEX: Vegetation ranges from low open woodland of *M.preissiana-B.littoralis* to sedgelands. Dominant vegetation type A.

13 PINDALUP AND YARRAGIL COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata - E. calophylla* on slopes and open woodland of *E. wandoo* with some *E. patens* in the lower gullies. Dominant vegetation types H, M, Y; less consistently A, L, Z, E.

14 COOLAKIN COMPLEX IN LOW RAINFALL: Woodland of *E. wandoo* with admixture of *E. patens* and *E. marginata*. Dominant vegetation types M, Y; less consistently H, L, G.

15 CATTERICK COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata - E. calophylla* on slopes mixed with *E. patens, E. rudis* and *B. littoralis* on valley floors. Dominant vegetation types C. D. W. Q.

16a YARRAGIL AND CATTERICK COMPLEX IN HIGH RAINFALL: Tall open forest of *E. diversicolor* ranging to open forest of *E. marginata-E. calophylla.*

Major Valleys Combining Slopes and Floors

16b BALINGUP COMPLEX IN HIGH RAINFALL - SOUTH : Tall open forest of *E. diversicolor* with some admixture of open forest of *E. marginata - E. calophylla*.

17 HELENA COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata - E. calophylla - E. patens* through heath and herbland to lichens on granite rock. Dominant vegetation types G, R; less consistently C, Q, T.

18 HELENA COMPLEX IN LOW TO MEDIUM RAINFALL: Vegetation ranges from a mixture of open forest of *E. marginata - E. calophylla* and open woodland of *E. wandoo* through heath and herbland to lichens on the granite rocks. Dominant vegetation types G, R; less consistently C, Y, Q.

19 BRIDGETOWN COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata - E. calophylla* with some *E. patens* to a low open forest of *E. rudis - M. rhaphiophylla* on the valley floors. Dominant vegetation types C, Q, T; less consistently R, G.

20 MURRAY COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata - E. calophylla* with *E. patens* on the slopes to fringing woodland of *E. rudis - M. rhaphiophylla* on the valley floors. Dominant vegetation types C, Q, U, T; less consistently D, O, R, W.

21 MURRAY AND BINDOON COMPLEX IN LOW TO MEDIUM RAINFALL: Vegetation ranges from open forest of *E. marginata - E. calophylla* to woodland of *E. wandoo* with *E. rudis* and *E. patens* on the valley floors. Dominant vegetation types A, Y, G, R; less consistently C, H, M, L, W, Q.

22 BALINGUP COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata - E. calophylla* on the slopes, and fringing woodland of *E. rudis* along the streams. Dominant vegetation types C, D, W; less consistently S, T.

Major Valley Floors and Scarps

23 WILLIAMS—AVON—BROCKMAN—MUMBALLUP COMPLEX : Fringing woodland of *E. rudis - M. rhaphiophylla*.

24 NOONING COMPLEX : Vegetation ranges from low open forest of *C. obesa* and open scrub of *C. obesa - Acacia* spp. - *Melaleuca* spp. to the fringing woodland of *E. rudis - M. rhaphiophylla* along the streams.

25 LOWDON COMPLEX : Open forest of *E. marginata - E. calophylla* and low open forest of *Agonis flexuosa* on the slopes, fringing woodland of *E. rudis - M. rhaphiophylla* in the gullies. Less consistently woodland of *E. wandoo* on slopes.

26 BINDOON COMPLEX : Woodland of *E. loxophleba* flanked by woodland of *E. wandoo - E. accedens* on the upper slopes and breakaways.

27 MICHIBIN COMPLEX : Open woodland of *E. wandoo* with some admixture of *E. loxophleba*. *Acacia acuminata* and *C. huegeliana* dominate the understorey.

28 DARLING SCARP COMPLEX : Vegetation ranges from low open woodland to lichens according to depth of soils. Woodland components chiefly *E. wandoo*, with *E. laeliae* in the north, *E. haematoxylon* in the south, and *E. calophylla* throughout the region. Dominant vegetation types R, G.

SWAN COASTAL PLAIN

Ridge Hill Shelf

29 FORRESTFIELD COMPLEX : Vegetation ranges from open forest of *E. calophylla - E. wandoo - E. marginata* to open forest of *E. marginata - E. calophylla - C. fraserana - Banksia* spp. Fringing woodland of *E. rudis* in the gullies that dissect this landform.

Fluviatile Deposits

30 ABBA COMPLEX: A mixture of open forest of *E.calophylla-E. marginata-Banksia* spp. and woodland of *E. calophylla* with minor occurrences of *E. haematoxylon*. Woodland of *E. rudis-Melaleuca* spp. along creeks and on flood plains.

31 COONAMBIDGEE COMPLEX: Vegetation ranges from a low open forest and low woodland of *E. todtiana-B. attenuata-B. menziesii-B. ilicifolia* with localized admixtures of *B. prionotes* to an open woodland of *E. calophylla-Banksia* spp.

32 GUILDFORD COMPLEX : A mixture of open forest to tall open forest of *E. calophylla - E. wandoo - E. marginata* and woodland of *E. wandoo* (with rare occurrences of *E. lane-poolei*). Minor components include *E. rudis - M. rhaphiophylla*.

33 SWAN COMPLEX : Fringing woodland of *E. rudis - M. rhaphiophylla* with localized occurrence of low open forest of *C. obesa* and *M. cuticularis*.

34 DARDANUP COMPLEX: Mosaic of vegetation types characteristic of adjacent vegetation complexes such as Serpentine River, Southern River and Guildford.

35 SERPENTINE RIVER COMPLEX : Closed scrub of *Melaleuca* spp. and fringing woodland of *E. rudis - M. rhaphiophylla* along streams.

36 BEERMULLAH COMPLEX : Mixture of low open forest of *C. obesa* and open woodland of *E. calophylla - E. wandoo - E. marginata*. Minor components include closed scrub of *Melaleuca* spp. and occurrence of *Actinostrobus pyramidalis*.

37 BOOTINE COMPLEX : Predominantly low open forest of *B. attenuata - B. menziesii - B. ilicifolia - E. todtiana*. On lake margins transition from woodland of *E. rudis - M. rhaphiophylla* to sedgelands.

38 YANGA COMPLEX : Predominantly a closed scrub of *Melaleuca* spp. and low open forest of *C. obesa* on the flats subject to inundation. On drier sites the vegetation reflects the adjacent vegetation complexes of Bassendean and Coonambidgee.

39 MUNGALA COMPLEX : Vegetation ranges from open woodland of *E. calophylla - E. decipiens* to closed scrub of *Melaleuca* spp. - *Casuarina* spp.

40 CANNINGTON COMPLEX : Mosaic of vegetation from adjacent vegetation complexes of Bassendean, Karrakatta, Southern River and Vasse.

41 MOORE COMPLEX : Fringing woodland of *E. rudis - M. rhaphiophylla*.

Aeolian Deposits

42 SOUTHERN RIVER COMPLEX : Open woodland of *E. calophylla - E. marginata - Banksia* spp. with fringing woodland of *E. rudis - M. rhaphiophylla* along creek beds.

43 BASSENDEAN COMPLEX—NORTH: Vegetation ranges from a low open forest and low woodland of *Banksia* spp.-*E. todtiana* to low woodland of *Melaleuca* spp., and sedgelands which occupy the moister sites.

44 BASSENDEAN COMPLEX—CENTRAL AND SOUTH: Vegetation ranges from woodland of *E. marginata-C. fraserana-Banksia* spp. to low woodland of *Melaleuca* spp., and sedgelands on the moister sites. This area includes the transition of *E. marginata* to *E. todtiana* in the vicinity of Perth.

45 BASSENDEAN COMPLEX—NORTH—TRANSITION VEGETATION COMPLEX: A transition complex of low open forest and low woodland of *Banksia* spp. -*E. todtiana* on a series of high sand dunes. The understorey species reflect similarities with both the Bassendean-North and Karrakatta-North vegetation complexes.

46 BASSENDEAN COMPLEX—CENTRAL AND SOUTH—TRANSITION VEGETATION COMPLEX: Woodland of *E. marginata-E. calophylla* with well defined second storey of *C. fraserana* and *B. grandis* on the deeper soils and a closed scrub on the moister sites. The understorey species reflect similarities with the adjacent vegetation complexes.

47 KARRAKATTA COMPLEX—NORTH: Predominantly low open forest and low woodland of *Banksia* spp.- *E. todtiana*, less consistently open forest of *E. gomphocephala-E. todtiana-Banksia* spp.

48 KARRAKATTA COMPLEX—NORTH—TRANSITION VEGETATION COMPLEX: A transition complex of low open forest and low woodland of *Banksia* spp.-*E.todtiana* on the transition zone of a series of high sand dunes between Bassendean-North and Karrakatta-North.

49 KARRAKATTA COMPLEX – CENTRAL AND SOUTH : Predominantly open forest of *E. gomphocephala - E. marginata - E. calophylla* and woodland of *E. marginata - Banksia* spp.

50 CALADENIA COMPLEX : Mosaic of vegetation from adjacent vegetation complexes of Karrakatta, Yanga and Bassendean.

51 COTTESLOE COMPLEX—NORTH: Predominantly low open forest and low woodland of *B. attenuata-B. menziesii-E. todtiana;* closed heath on the limestone outcrops.

52 COTTESLOE COMPLEX—CENTRAL AND SOUTH: Mosaic of woodland of *E. gomphocephala* and open forest of *E. gomphocephala - E. marginata - E. calophylla* ; closed heath on the limestone outcrops.

53 HERDSMAN COMPLEX : Sedgelands and fringing woodland of *E. rudis - Melaleuca* spp.

54 PINJAR COMPLEX: Vegetation ranges from woodland of *E. marginata-Banksia* spp. to a fringing woodland of *E. rudis-M. preissiana* and sedgelands.

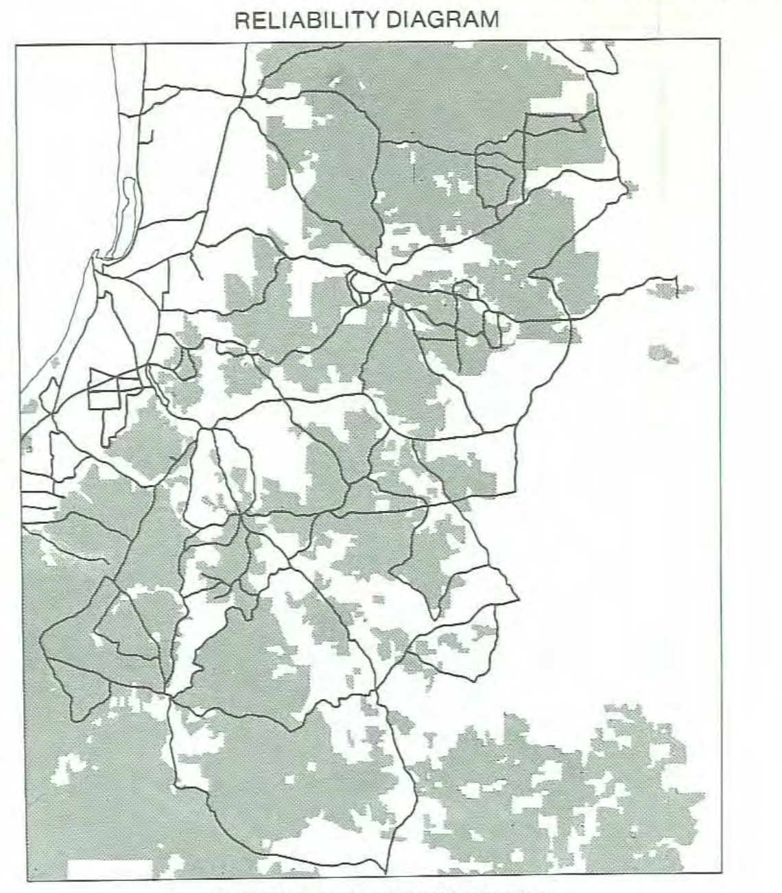
55 QUINDALUP COMPLEX : Coastal dune complex consisting mainly of two alliances - the strand and fore dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *M. lanceolata - Callitris preissii* and the closed scrub of *Acacia rostellifera*.

Marine Deposits

56 YOONGARILLUP COMPLEX : Woodland to tall woodland of *E. gomphocephala* with *Agonis flexuosa* in the second storey. Less consistently an open forest of *E. gomphocephala - E. marginata - E. calophylla*.

57 VASSE COMPLEX : Mixture of the closed scrub of *Melaleuca* spp., fringing woodland of *E. rudis - Melaleuca* spp. and open forest of *E. gomphocephala - E. marginata - E. calophylla*.

RELIABILITY DIAGRAM



VEGETATION SURVEY TRAVERSES

▨ STATE FOREST AREAS
VEGETATION COMPLEXES DERIVED FROM:
(a) Aerial Photography
(b) Road Traverses
(c) Ground Survey

☐ AREAS OTHER THAN STATE FOREST
VEGETATION COMPLEXES DERIVED FROM:
(a) Aerial Photography
(b) Road Traverses

TABLE A

DEFINITION OF SITE VEGETATION TYPES
NORTHERN JARRAH FOREST (DARLING PLATEAU)

PLANT SPECIES | A | B | D | E | W | C | F | J | H | P | Z | S | T | U | R | Q | M | L | Y | O

Acacia alata
Acacia extensa
Acacia browniana
Acacia urophylla
Adenanthos barbigerus
Adenanthos obovatus
Agonis linearifolia
Astartea fascicularis
Baeckea camphorosmae
Banksia attenuata
Banksia grandis
Banksia littoralis
Bossiaea aquifolium
Casuarina fraserana
Casuarina humilis
Caustis dioica
Chorizema ilicifolium
Clematis pubescens
Conospermum stoechadis
Dampiera alata
Dasypogon bromeliaefolius
Daviesia pectinata
Diplolaena drummondii
Dillwynia cinerascens
Eucalyptus calophylla
Eucalyptus marginata
Eucalyptus megacarpa
Eucalyptus patens
Eucalyptus wandoo
Gastrolobium calycinum
Grevillea diversifolia
Grevillea wilsonii
Hakea cyclocarpa
Hakea ceratophylla
Hakea lissocarpha
Hakea ruscifolia
Hakea varia
Hibbertia lineata
Hibbertia polystachya
Hovea chorizemifolia
Hypocalymma angustifolium
Isopogon dubius
Kennedia coccinea
Kingia australis
Lasiopetalum floribundum
Lepidosperma angustatum
Lepidosperma tetraquetrum
Leptocarpus scariosus
Leptomeria cunninghamii
Leptospermum ellipticum
Leucopogon capitellatus
Leucopogon oxycedrus
Leucopogon cordatus
Leucopogon propinquus
Leucopogon verticillatus
Lyginia tenax
Macrozamia riedlei
Melaleuca preissiana
Mesomelaena tetragona
Nuytsia floribunda
Patersonia occidentalis
Patersonia rudis
Persoonia longifolia
Phyllanthus calycinus
Pteridium esculentum
Sphaerolobium medium
Stirlingia latifolia
Styphelia tenuiflora
Synaphea petiolaris
Trymalium ledifolium
Trymalium spathulatum

J. J. Havel Forests Department Bulletin Nos. 86, 87; 1975

☐ Species generally absent.
▨ Species should be present, but absence not critical.
■ Species should be present.

TYPE G was defined subsequently. It has a variable and unique set of indicator species which are characteristic of granite outcrops and their surroundings in low to medium rainfall zone, such as lichens, *Borya nitida, Grevillea bipinnatifida, Hakea elliptica, Hakea undulata, Eucalyptus laeliae* and *Casuarina huegeliana*.

KEY TO ABBREVIATIONS

E. -	*Eucalyptus* spp.	*L.* -	*E. laeliae*
B. -	*Banksia* spp.	*LP.* -	*E. lane-poolei*
C. -	*Casuarina* spp.	*Mg.* -	*Avicennia marina*
M. -	*Melaleuca* spp.	*Sa.* -	*Arthrocnemum* spp.
H. -	*E. haematoxylon*		

RAINFALL

Isohyets (mms) 1000

COLLIE BASIN

Lateritic Uplands

67 COLLIE COMPLEX : Open forest of *E. marginata - E. calophylla - C. fraserana* with a range of understorey species which reflect the relative proportion of sand and gravel in the soils.

68 CARDIFF COMPLEX : Open woodland of *Banksia* spp. with a distinctive understorey, the variation of which reflects the level of soil moisture.

Valleys

69 MUJA COMPLEX : Open woodland of *M. preissiana - B. littoralis* with some *E. patens* on moist sites, woodland of *Banksia* spp. on dry sites.

BLACKWOOD PLATEAU

Lateritic Uplands

70 KINGIA COMPLEX : Open forest of *E. marginata - E. calophylla* with well defined second storey of *B. grandis - C. fraserana* and *Persoonia longifolia*. The understorey reflects a range depending on the proportions of sand and gravel in the soils.

71 MUNGARDUP COMPLEX: Mixture of open forest of *E. marginata-E. calophylla* and open woodland of *B. attenuata-B. ilicifolia*.

Valleys

72 DARRADUP COMPLEX: Fringing woodland of *E. patens* and *E. rudis*.

73 PRESTON COMPLEX : Fringing woodland of *E. rudis* and *Agonis flexuosa* along streams, woodland of *E. calophylla - E. marginata* on the slopes.

74 JARRAHWOOD COMPLEX : Open forest of *E. marginata - E. calophylla* on the slopes, woodland of *E. patens - E. megacarpa - B. littoralis* and patches of *M. preissiana* on the moister sites.

Scarps

75 CARTIS COMPLEX: Low open forest to open forest of *E. marginata-E. calophylla-E. haematoxylon* with definite second storey of *Banksia* spp.

SYSTEM 6 BOUNDARY

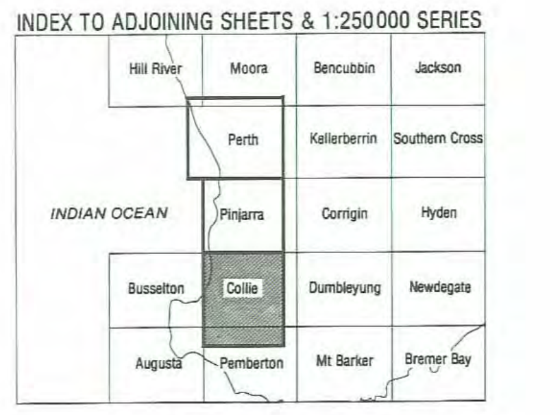
Department of
CONSERVATION and ENVIRONMENT

Darling System, Vegetation Complexes by E.M. HEDDLE, O.W. LONERAGAN and J.J. HAVEL, Forests Department, Perth, Western Australia.

Vegetation Complexes defined in relation to landform and Soil Units as determined by H.M. Churchward and W.M.Mc Arthur, Land Resources Management, C.S.I.R.O., Perth, Western Australia, on the Darling System, Landforms and Soils maps, 1978.

Interpolation of Isohyets by the Department of Lands and Surveys, Perth, Western Australia, based on mean annual rainfall records to December 1976 provided by the Bureau of Meteorology and the Public Works Department, Perth, Western Australia. August, 1978.

INDEX TO ADJOINING SHEETS & 1:250000 SERIES

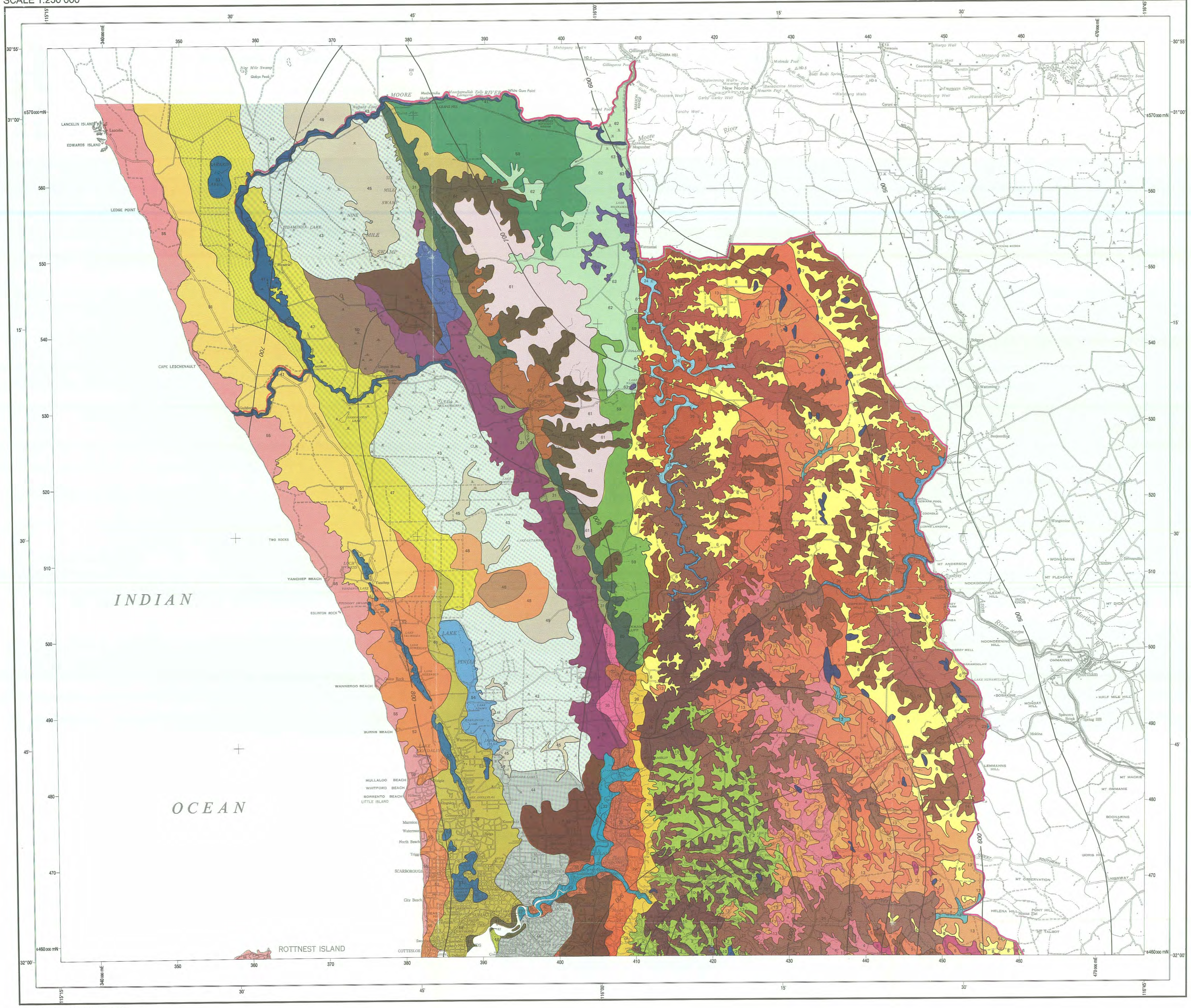


COLLIE SHEET
VEGETATION
WESTERN AUSTRALIA

DARLING SYSTEM
WESTERN AUSTRALIA

SCALE 1:250 000

PERTH SHEET



COMPILED on the Australian Map Grid from Department of Lands and Surveys standard series mapping and topographical base maps made available by courtesy of the Division of National Mapping and the Director of Military Surveys.

PROJECTION: Universal Transverse Mercator, C.M. 117°E.

HORIZONTAL DATUM: Australian Geodetic Datum 1966.

VERTICAL DATUM: Australian Height Datum 1971.

PREPARED: under the direction of the Surveyor General, Department of Lands and Surveys Perth, Western Australia.

Scale 1:250 000

5 0 5 10 15 20 25 Kilometres

LEGEND
VEGETATION COMPLEXES CHARACTERISTIC OF THE VARIOUS COMBINATIONS OF LANDFORMS, SOILS AND RAINFALL

DARLING PLATEAU

SITE VEGETATION TYPES A TO Z REFER TO THOSE OF J.J. HAVEL FOR THE DARLING PLATEAU, FORESTS DEPARTMENT BULLETIN Nos. 86, 87; 1975 (SEE TABLE A FOR EXTRACT FROM BULLETINS)

Lateritic Uplands

1	DWELLINGUP AND HESTER COMPLEX IN HIGH RAINFALL—CENTRAL AND SOUTH : Open forest of *E. marginata* - *E. calophylla*. Dominant vegetation types S, T; less consistently O, P, R.
2	DWELLINGUP COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata* - *E. calophylla*. Dominant vegetation types P, S; less consistently O, R, Z, H.
3	DWELLINGUP AND YALANBEE COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata-E. calophylla*. Dominant vegetation types H,P,Z; less consistently G,R.
4	DWELLINGUP, YALANBEE AND HESTER COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata* - *E. calophylla*. Dominant vegetation types H, Z; less consistently P.
5	YALANBEE AND DWELLINGUP COMPLEX IN LOW RAINFALL: Mixture of open forest of *E. marginata-E. calophylla* and woodland of *E. wandoo-E. calophylla*. Dominant vegetation types H.Z.M; less consistently G.
6	YALANBEE COMPLEX IN LOW RAINFALL: Woodland of *E. wandoo-E. accedens* and less consistently an open forest of *E. marginata-E. calophylla*. Dominant vegetation types M; less consistently H and G.
7	COOK COMPLEX : Vegetation ranging from open forest of *E. marginata* - *E. calophylla* on deep soils through heath and herbland to lichens on granite rocks. Dominant vegetation types R, G; less consistently S, P, Z, M.
8	GOONAPING COMPLEX : Open forest of *E. marginata* and low open woodland of *B. attenuata* - *B. menziesii* on the dry sites and low open forest of *M. preissiana* on moist sites. Dominant vegetation types F, J; less consistently A, B.
9	WILGA COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata* - *E. calophylla*. Dominant vegetation types H, W, R; and less consistently E.

Minor Valleys

10	YARRAGIL COMPLEX (MINIMUM DEVELOPMENT SWAMPS) IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata-E. calophylla* on upper slopes with admixture of *E. patens* and *E. megacarpa* on the valley floors. Dominant vegetation types C,D,W; less consistently Q,T,U.
11	YARRAGIL COMPLEX (MAXIMUM DEVELOPMENT SWAMPS) IN MEDIUM TO HIGH RAINFALL: Open forest of *E.marginata-E. calophylla*. Dominant vegetation types D,E,W; less consistently P,F,J,A,B.
12	SWAMP COMPLEX: Vegetation ranges from low open woodland of *M. preissiana-B. littoralis* to sedgelands. Dominant vegetation type A.
13	PINDALUP AND YARRAGIL COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata* - *E. calophylla* on slopes and open woodland of *E. wandoo* with some *E. patens* in the lower gullies. Dominant vegetation types H, M, Y; less consistently A, L,Z, E . .
14	COOLAKIN COMPLEX IN LOW RAINFALL: Woodland of *E. wandoo* with admixture of *E. patens* and *E. marginata*. Dominant vegetation types M, Y; less consistently H, L, G.
15	CATTERICK COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata* - *E. calophylla* on slopes mixed with *E. patens*, *E. rudis* and *B. littoralis* on valley floors. Dominant vegetation types C, D, W, Q.
16a	YARRAGIL AND CATTERICK COMPLEX IN HIGH RAINFALL: Tall open forest of *E. diversicolor* ranging to open forest of *E. marginata-E. calophylla*.

Major Valleys Combining Slopes and Floors

16b	BALINGUP COMPLEX IN HIGH RAINFALL - SOUTH : Tall open forest of *E. diversicolor* with some admixture of open forest of *E. marginata* - *E. calophylla*.
17	HELENA COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata* - *E. calophylla* - *E. patens* through heath and herbland to lichens on granite rock. Dominant vegetation types G, R; less consistently C, Q, T.
18	HELENA COMPLEX IN LOW TO MEDIUM RAINFALL: Vegetation ranges from a mixture of open forest of *E. marginata* - *E. calophylla* and open woodland of *E. wandoo* through heath and herbland to lichens on the granite rocks. Dominant vegetation types G, R; less consistently C, Y, Q.
19	BRIDGETOWN COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata* - *E. calophylla* with some *E. patens* to a low open forest of *E. rudis* - *M. rhaphiophylla* on the valley floors. Dominant vegetation types C, Q, T; less consistently R, G.
20	MURRAY COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata* - *E. calophylla* with *E. patens* on the slopes to fringing woodland of *E. rudis* - *M. rhaphiophylla* on the valley floors. Dominant vegetation types C, Q, U, T; less consistently D, O, R, W.
21	MURRAY AND BINDOON COMPLEX IN LOW TO MEDIUM RAINFALL: Vegetation ranges from open forest of *E. marginata* - *E. calophylla* to woodland of *E. wandoo* with *E. rudis* and *E. patens* on the valley floors. Dominant vegetation types A, Y, G, R; less consistently C, H, M, L, W, Q.
22	BALINGUP COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata* - *E. calophylla* on the slopes, and fringing woodland of *E. rudis* along the streams. Dominant vegetation types C, D, W; less consistently S, T.

Major Valley Floors and Scarps

23	WILLIAMS—AVON—BROCKMAN—MUMBALLUP COMPLEX : Fringing woodland of *E. rudis* - *M. rhaphiophylla*.
24	NOONING COMPLEX : Vegetation ranges from low open forest of *C. obesa* and open scrub of *C. obesa* - *Acacia* spp. - *Melaleuca* spp. to the fringing woodland of *E. rudis* - *M. rhaphiophylla* along the streams.
25	LOWDON COMPLEX : Open forest of *E. marginata* - *E. calophylla* and low open forest of *Agonis flexuosa* on the slopes, fringing woodland of *E. rudis* - *M. rhaphiophylla* in the gullies. Less consistently woodland of *E. wandoo* on slopes.
26	BINDOON COMPLEX : Woodland of *E. loxophleba* flanked by woodland of *E. wandoo* - *E. accedens* on the upper slopes and breakaways.
27	MICHIBIN COMPLEX : Open woodland of *E. wandoo* with some admixture of *E. loxophleba*. *Acacia acuminata* and *C. huegeliana* dominate the understorey.
28	DARLING SCARP COMPLEX : Vegetation ranges from low open woodland to lichens according to depth of soils. Woodland components chiefly *E. wandoo*. with *E. laeliae* in the north, *E. haematoxylon* in the south, and *E. calophylla* throughout the region. Dominant vegetation types R, G.

TABLE A
DEFINITION OF SITE VEGETATION TYPES
NORTHERN JARRAH FOREST (DARLING PLATEAU)

PLANT SPECIES	A	B	D	E	W	C	F	J	H	P	Z	S	T	U	R	Q	M	L	Y	O
Acacia alata						■														
Acacia extensa					▨															▨
Acacia browniana									▨	■	▨	■								
Acacia urophylla												■	▨			▨				▨
Adenanthos barbigerus								▨		■		■			▨					
Adenanthos obovatus	▨	▨																		
Agonis linearifolia						■														
Astartea fascicularis	■					■														
Baeckea camphorosmae			▨	■				▨	▨								▨		■	
Banksia attenuata								▨												
Banksia grandis										■		▨	▨							■
Banksia littoralis	■					▨														
Bossiaea aquifolium												▨	▨			▨				▨
Casuarina fraserana								▨		■		▨								▨
Casuarina humilis															▨					
Caustis dioica		▨		▨			▨													
Chorizema ilicifolium													■	▨		■				
Clematis pubescens													■	▨		■				
Conospermum stoechadis		■						■												
Dampiera alata			■	■	▨	▨											▨		■	
Desypogon bromeliaefolius	▨	■																		
Daviesia pectinata		▨		▨				■	■	▨		▨								
Diplolaena drummondii																		■		
Dillwynia cinerascens				▨												▨	▨			
Eucalyptus calophylla	▨	■	■	▨	■			▨		▨	▨	▨	■	■	■	■	▨			■
Eucalyptus marginata		■	■	■	▨		■	■	■	■	■	■	■		■	▨	▨			■
Eucalyptus megacarpa						▨														
Eucalyptus patens	■		▨		■	▨							▨	■		■	▨	▨		
Eucalyptus wandoo																	■	■	■	
Gastrolobium calycinum												▨					▨		▨	
Grevillea diversifolia						▨														
Grevillea wilsonii				▨				■		■										
Hakea cyclocarpa								▨	▨			▨								
Hakea ceratophylla	■			▨																
Hakea lissocarpha			▨	■	■						■	▨	▨	■	■	■	■	■	■	
Hakea ruscifolia				▨				■	▨	▨										
Hakea varia	■																			
Hibbertia lineata																▨		■	■	
Hibbertia polystachya		■					▨	■												
Hovea chorizemifolia										■		■	■			▨				▨
Hypocalymma angustifolium	■	▨	■	■	■	▨			▨						▨	■	▨	■	■	
Isopogon dubius								▨	▨											
Kennedia coccinea													▨			▨				▨
Kingia australis			▨	■																
Lasiopetalum floribundum									▨	▨	▨	▨	■							
Lepidosperma angustatum	▨	■	■	■	■			▨	■	■	▨	▨			▨	▨			▨	■
Lepidosperma tetraquetrum						■														
Leptocarpus scariosus	■	■	■	■	▨	■	▨	▨											▨	
Leptomeria cunninghamii										▨	▨	■	▨		▨		▨			
Leptospermum ellipticum	■		■	▨	▨															
Leucopogon capitellatus											■	■	■		■	▨				
Leucopogon oxycedrus										▨										
Leucopogon cordatus		■		▨																
Leucopogon propinquus											■	▨	▨		■	▨				▨
Leucopogon verticillatus												▨	■							
Lyginia tenax		■						■												
Macrozamia riedlei										■	■	■	■	■	■	■	▨			
Melaleuca preissiana	■																			
Mesomelaena tetragona	■	■	■	■	■	▨	■	■											▨	
Nuytsia floribunda						▨	▨													
Patersonia occidentalis		■		▨		▨													▨	
Patersonia rudis				▨			▨	■	■	■	▨		▨		▨					
Persoonia longifolia									■		▨									
Phyllanthus calycinus										▨	▨	■	■	■	▨					
Pteridium esculentum												■	■			▨				
Sphaerolobium medium		▨		▨			▨	▨												
Stirlingia latifolia						■	▨	▨												
Styphelia tenuiflora								■	■	■			▨							
Synaphea petiolaris	▨	■	■	■				▨												
Trymalium ledifolium								▨	▨	▨			■							
Trymalium spathulatum																■				

J. J. Havel Forests Department Bulletin Nos. 86, 87; 1975

- ☐ Species generally absent.
- ▨ Species should be present, but absence not critical.
- ■ Species should be present.

TYPE G was defined subsequently. It has a variable and unique set of indicator species which are characteristic of granite outcrops and their surroundings in low to medium rainfall zone, such as lichens, *Borya nitida*, *Grevillea bipinnatifida*, *Hakea elliptica*, *Hakea undulata*, *Eucalyptus laeliae* and *Casuarina huegeliana*.

RAINFALL

Isohyets (mms) —1000—

SWAN COASTAL PLAIN

Ridge Hill Shelf

29	FORRESTFIELD COMPLEX : Vegetation ranges from open forest of *E. calophylla* - *E. wandoo* - *E. marginata* to open forest of *E. marginata* - *E. calophylla* - *C. fraserana* - *Banksia* spp. Fringing woodland of *E. rudis* in the gullies that dissect this landform.

Fluviatile Deposits

30	ABBA COMPLEX: A mixture of open forest of *E.calophylla* -*E. marginata-Banksia* spp. and woodland of *E. calophylla* with minor occurrences of *E. haematoxylon*. Woodland of *E. rudis-Melaleuca* spp. along creeks and on flood plains.
31	COONAMBIDGEE COMPLEX: Vegetation ranges from a low open forest and low woodland of *E. todtiana-B. attenuata-B. menziesii-B. ilicifolia* with localized admixtures of *B. prionotes* to an open woodland of *E. calophylla-Banksia* spp.
32	GUILDFORD COMPLEX : A mixture of open forest to tall open forest of *E. calophylla* - *E. wandoo* - *E. marginata* and woodland of *E. wandoo* (with rare occurrences of *E. lane-poolei)*. Minor components include *E. rudis* - *M. rhaphiophylla*.
33	SWAN COMPLEX : Fringing woodland of *E. rudis* - *M. rhaphiophylla* with localized occurrence of low open forest of *C. obesa* and *M. cuticularis*.
34	DARDANUP COMPLEX: Mosaic of vegetation types characteristic of adjacent vegetation complexes such as Serpentine River, Southern River and Guildford.
35	SERPENTINE RIVER COMPLEX : Closed scrub of *Melaleuca* spp. and fringing woodland of *E. rudis* - *M. rhaphiophylla* along streams.
36	BEERMULLAH COMPLEX : Mixture of low open forest of *C. obesa* and open woodland of *E. calophylla* - *E. wandoo* - *E. marginata*. Minor components include closed scrub of *Melaleuca* spp. and occurrence of *Actinostrobus pyramidalis*.
37	BOOTINE COMPLEX : Predominantly low open forest of *B. attenuata* - *B. menziesii* - *B. ilicifolia* - *E. todtiana*. On lake margins transition from woodland of *E. rudis* - *M. rhaphiophylla* to sedgelands.
38	YANGA COMPLEX : Predominantly a closed scrub of *Melaleuca* spp. and low open forest of *C. obesa* on the flats subject to inundation. On drier sites the vegetation reflects the adjacent vegetation complexes of Bassendean and Coonambidgee.
39	MUNGALA COMPLEX : Vegetation ranges from open woodland of *E. calophylla* - *E. decipiens* to closed scrub of *Melaleuca* spp. - *Casuarina* spp.
40	CANNINGTON COMPLEX : Mosaic of vegetation from adjacent vegetation complexes of Bassendean, Karrakatta, Southern River and Vasse.
41	MOORE COMPLEX : Fringing woodland of *E. rudis* - *M. rhaphiophylla*.

Aeolian Deposits

42	SOUTHERN RIVER COMPLEX : Open woodland of *E. calophylla* - *E. marginata* - *Banksia* spp. with fringing woodland of *E. rudis* - *M. rhaphiophylla* along creek beds.
43	BASSENDEAN COMPLEX—NORTH: Vegetation ranges from a low open forest and low woodland of *Banksia* spp. -*E. todtiana* to low woodland of *Melaleuca* spp., and sedgelands which occupy the moister sites.
44	BASSENDEAN COMPLEX—CENTRAL AND SOUTH: Vegetation ranges from woodland of *E. marginata-C. fraserana-Banksia* spp. to low woodland of *Melaleuca* spp., and sedgelands on the moister sites. This area includes the transition of *E. marginata* to *E. todtiana* in the vicinity of Perth.
45	BASSENDEAN COMPLEX—NORTH—TRANSITION VEGETATION COMPLEX: A transition complex of low open forest and low woodland of *Banksia* spp. -*E. todtiana* on a series of high sand dunes. The understorey species reflect similarities with both the Bassendean-North and Karrakatta-North vegetation complexes.
46	BASSENDEAN COMPLEX—CENTRAL AND SOUTH—TRANSITION VEGETATION COMPLEX: Woodland of *E. marginata-E. calophylla* with well defined second storey of *C. fraserana* and *B. grandis* on the deeper soils and a closed scrub on the moister sites. The understorey species reflect similarities with the adjacent vegetation complexes.
47	KARRAKATTA COMPLEX—NORTH: Predominantly low open forest and low woodland of *Banksia* spp.- *E. todtiana*, less consistently open forest of *E. gomphocephala-E. todtiana-Banksia* spp.
48	KARRAKATTA COMPLEX—NORTH—TRANSITION VEGETATION COMPLEX: A transition complex of low open forest and low woodland of *Banksia* spp.-*E.todtiana* on the transition zone of a series of high sand dunes between Bassendean-North and Karrakatta-North.
49	KARRAKATTA COMPLEX – CENTRAL AND SOUTH : Predominantly open forest of *E. gomphocephala-E. marginata-E. calophylla* and woodland of *E. marginata-Banksia* spp.
50	CALADENIA COMPLEX : Mosaic of vegetation from adjacent vegetation complexes of Karrakatta, Yanga and Bassendean.
51	COTTESLOE COMPLEX—NORTH: Predominantly low open forest and low woodland of *B. attenuata-B. menziesii-E. todtiana;* closed heath on the limestone outcrops.
52	COTTESLOE COMPLEX—CENTRAL AND SOUTH: Mosaic of woodland of *E. gomphocephala* and open forest of *E. gomphocephala* - *E. marginata* - *E. calophylla;* closed heath on the limestone outcrops.
53	HERDSMAN COMPLEX : Sedgelands and fringing woodland of *E. rudis* - *Melaleuca* spp.
54	PINJAR COMPLEX: Vegetation ranges from woodland of *E. marginata-Banksia* spp. to a fringing woodland of *E. rudis-M. preissiana* and sedgelands.
55	QUINDALUP COMPLEX : Coastal dune complex consisting mainly of two alliances - the strand and fore dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *M. lanceolata* - *Callitris preissii* and the closed scrub of *Acacia rostellifera*.

Marine Deposits

56	YOONGARILLUP COMPLEX : Woodland to tall woodland of *E. gomphocephala* with *Agonis flexuosa* in the second storey. Less consistently an open forest of *E. gomphocephala* - *E. marginata* - *E. calophylla*.
57	VASSE COMPLEX : Mixture of the closed scrub of *Melaleuca* spp., fringing woodland of *E. rudis* - *Melaleuca* spp. and open forest of *E. gomphocephala* - *E. marginata* - *E. calophylla*.

DANDARAGAN PLATEAU

Lateritic Uplands

58	MOGUMBER COMPLEX —NORTH : Open to closed heath of *Banksia* spp. - *Casuarina humilis*.
59	MOGUMBER COMPLEX —SOUTH : Open woodland of *E. calophylla*, with some admixture of *E. marginata* and a second storey of *E. todtiana* - *B. attenuata* - *B. menziesii* - *B. ilicifolia*.
60	KARAMAL COMPLEX —NORTH : Open woodland of *E. wandoo*. Under storey of *Dryandra carduacea* and *Dryandra polycephala*.
61	KARAMAL COMPLEX —SOUTH : Open forest of *E. marginata* - *E. calophylla* with second storey of *B. grandis*.
62	CULLULA COMPLEX : Mixture of low open forest of *Banksia* spp. -*E. todtiana* and open woodland of *E. calophylla* with second storey of *E. todtiana* - *B. attenuata* - *B. menziesii* - *B. ilicifolia*.
63	WANNAMAL COMPLEX : Mixture of low shrubland of *Melaleuca* spp., and open woodland of *E. wandoo* - *E. loxophleba*.

Valleys

64	MOONDAH COMPLEX : Low closed to low open forest of *B. attenuata* - *B. menziesii* - *E. todtiana* - *B. prionotes* on slopes, open woodland of *E. calophylla* - *Banksia* spp. in valley.

Scarps

65	REAGAN COMPLEX : Vegetation ranges from low open woodland of *Banksia* spp. - *E. todtiana* to closed heath depending on the depth of soil.
66	GINGIN COMPLEX : Open woodland of *E. calophylla* with second storey of *B. grandis* and *Nuytsia floribunda*. Fringing woodland of *E. rudis* - *M. rhaphiophylla* along streams.

KEY TO ABBREVIATIONS

E.	*Eucalyptus* spp.
B.	*Banksia* spp.
C.	*Casuarina* spp.
M.	*Melaleuca* spp.
H.	*E. haematoxylon*
L.	*E. laeliae*
LP.	*E. lane-poolei*
Mg.	*Avicennia marina*
Sa.	*Arthrocnemum* spp.

SYSTEM 6 BOUNDARY

RELIABILITY DIAGRAM

VEGETATION SURVEY TRAVERSES

▨ STATE FOREST AREAS

VEGETATION COMPLEXES DERIVED FROM:
(a) Aerial Photography
(b) Road Traverses
(c) Ground Survey

☐ AREAS OTHER THAN STATE FOREST

VEGETATION COMPLEXES DERIVED FROM:
(a) Aerial Photography
(b) Road Traverses

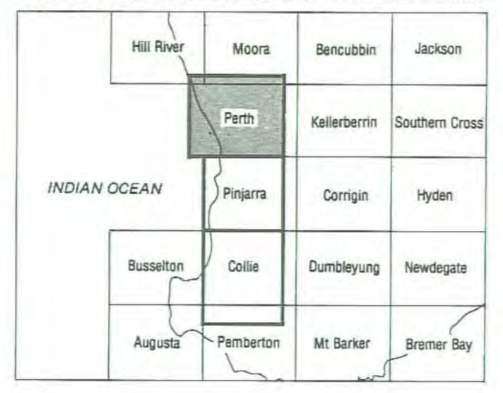
Department of
CONSERVATION and ENVIRONMENT

Darling System, Vegetation Complexes by E.M. HEDDLE, O.W. LONERAGAN and J.J. HAVEL, Forests Department, Perth, Western Australia.

Vegetation Complexes defined in relation to Landform and Soil Units as determined by H.M. Churchward and W.M.Mc Arthur, Land Resources Management, C.S.I.R.O., Perth, Western Australia, on the Darling System, Landforms and Soils maps,1978.

Interpolation of Isohyets by the Department of Lands and Surveys, Perth, Western Australia, based on mean annual rainfall records to December 1976 provided by the Bureau of Meteorology and the Public Works Department, Perth, Western Australia. August, 1978.

INDEX TO ADJOINING SHEETS & 1:250 000 SERIES



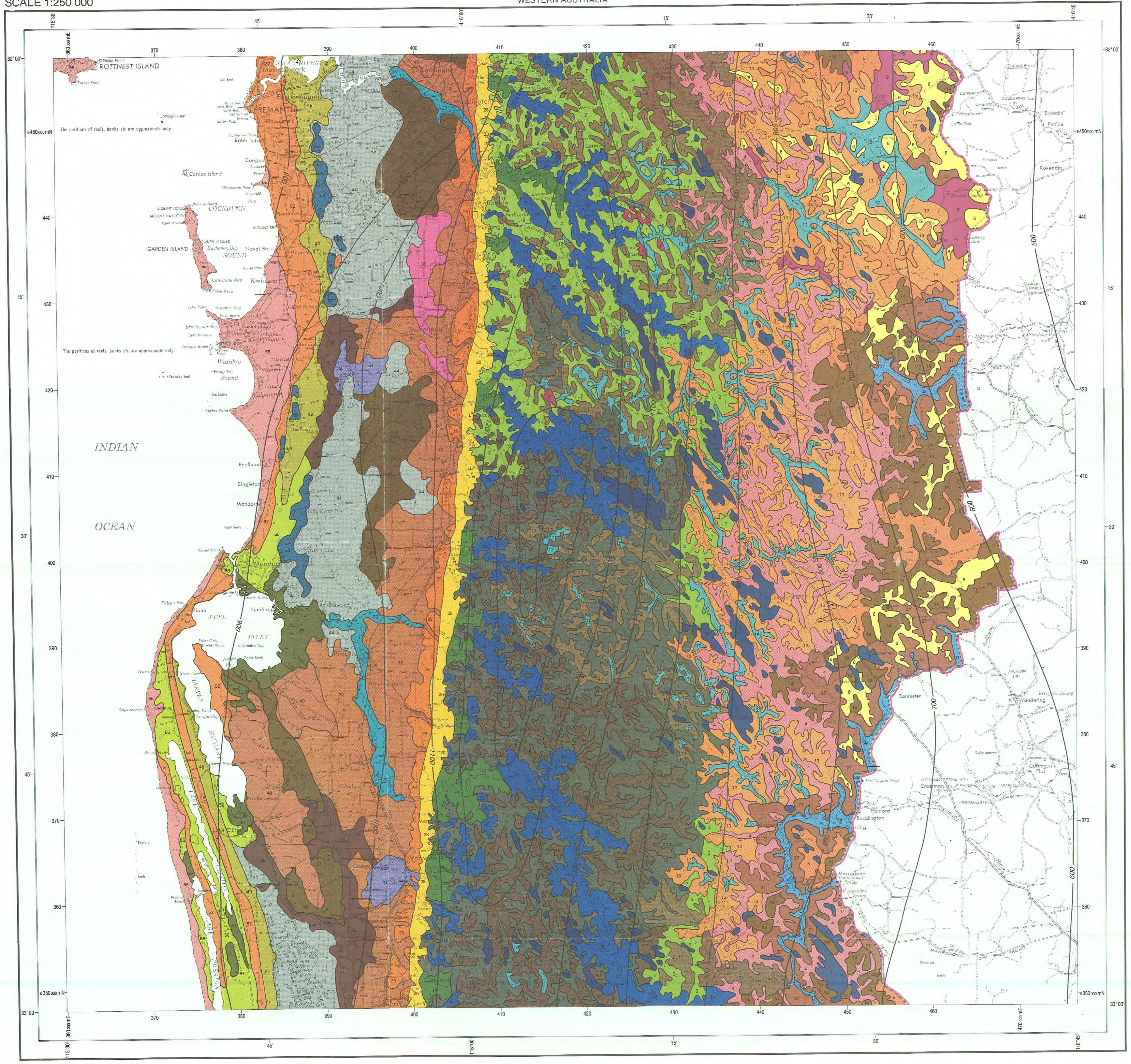
PERTH SHEET
VEGETATION
WESTERN AUSTRALIA

SCALE 1:250 000

DARLING SYSTEM

WESTERN AUSTRALIA

PINJARRA SHEET



COMPILED on the Australian Map Grid from Department of Lands and Surveys standard series mapping and topographical base maps made available by courtesy of the Division of National Mapping and the Director of Military Surveys.
PROJECTION: Universal Transverse Mercator, C.M. 117°E
HORIZONTAL DATUM: Australian Geodetic Datum 1966.
VERTICAL DATUM: Australian Height Datum 1971.
PREPARED: under the direction of the Surveyor General, Department of Lands and Surveys Perth, Western Australia

Scale 1:250 000

5 0 5 10 15 20 25 Kilometres

LEGEND

VEGETATION COMPLEXES CHARACTERISTIC OF THE VARIOUS COMBINATIONS OF LANDFORMS, SOILS AND RAINFALL

DARLING PLATEAU

SITE VEGETATION TYPES A TO Z REFER TO THOSE OF J.J. HAVEL FOR THE DARLING PLATEAU, FORESTS DEPARTMENT BULLETIN Nos. 86, 87; 1975 (SEE TABLE A FOR EXTRACT FROM BULLETINS)

Lateritic Uplands

1 DWELLINGUP AND HESTER COMPLEX IN HIGH RAINFALL—CENTRAL AND SOUTH : Open forest of *E. marginata - E. calophylla.* Dominant vegetation types S, T; less consistently O, P, R.

2 DWELLINGUP COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata - E. calophylla.* Dominant vegetation types P, S; less consistently O, R, Z, H.

3 DWELLINGUP AND YALANBEE COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata-E. calophylla.* Dominant vegetation types H,P,Z; less consistently G,R.

4 DWELLINGUP, YALANBEE AND HESTER COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata - E. calophylla.* Dominant vegetation types H, Z; less consistently P.

5 YALANBEE AND DWELLINGUP COMPLEX IN LOW RAINFALL: Mixture of open forest of *E. marginata-E. calophylla* and woodland of *E. wandoo-E. calophylla.* Dominant vegetation types H,Z,M; less consistently G.

6 YALANBEE COMPLEX IN LOW RAINFALL: Woodland of *E. wandoo-E. accedens* and less consistently an open forest of *E. marginata-E. calophylla.* Dominant vegetation types M; less consistently H and G.

7 COOK COMPLEX : Vegetation ranging from open forest of *E. marginata - E. calophylla* on deep soils through heath and herbland to lichens on granite rocks. Dominant vegetation types R, G; less consistently S, P, Z, M.

8 GOONAPING COMPLEX : Open forest of *E. marginata* and low open woodland of *B. attenuata - B. menziesii* on the dry sites and low open forest of *M. preissiana* on moist sites. Dominant vegetation types F, J; less consistently A, B.

9 WILGA COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata - E. calophylla.* Dominant vegetation types H, W, R; and less consistently E.

Minor Valleys

10 YARRAGIL COMPLEX (MINIMUM DEVELOPMENT SWAMPS) IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata-E.calophylla* on upper slopes with admixture of *E. patens* and *E. megacarpa* on the valley floors. Dominant vegetation types C,D,W; less consistently Q,T,U.

11 YARRAGIL COMPLEX (MAXIMUM DEVELOPMENT SWAMPS) IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata-E. calophylla.* Dominant vegetation types D,E,W; less consistently P,F,J,A,B.

12 SWAMP COMPLEX: Vegetation ranges from low open woodland of *M. preissiana-B. littoralis* to sedgelands. Dominant vegetation type A.

13 PINDALUP AND YARRAGIL COMPLEX IN LOW TO MEDIUM RAINFALL: Open forest of *E. marginata - E. calophylla* on slopes and open woodland of *E wandoo* with some *E. patens* in the lower gullies. Dominant vegetation types H, M, Y; less consistently A, L, Z, E .

14 COOLAKIN COMPLEX IN LOW RAINFALL: Woodland of *E. wandoo* with admixture of *E. patens* and *E. marginata.* Dominant vegetation types M, Y; less consistently H, L, G.

15 CATTERICK COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata - E. calophylla* on slopes mixed with *E. patens, E. rudis* and *B. littoralis* on valley floors. Dominant vegetation types C, D, W, Q.

16a YARRAGIL AND CATTERICK COMPLEX IN HIGH RAINFALL: Tall open forest of *E. diversicolor* ranging to open forest of *E. marginata-E. calophylla.*

Major Valleys Combining Slopes and Floors

16b BALINGUP COMPLEX IN HIGH RAINFALL - SOUTH : Tall open forest of *E. diversicolor* with some admixture of open forest of *E.marginata - E. calophylla.*

17 HELENA COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata - E. calophylla - E. patens* through heath and herbland to lichens on granite rock. Dominant vegetation types G, R; less consistently C, Q, T.

18 HELENA COMPLEX IN LOW TO MEDIUM RAINFALL: Vegetation ranges from a mixture of open forest of *E. marginata - E. calophylla* and open woodland of *E. wandoo* through heath and herbland to lichens on the granite rocks. Dominant vegetation types G, R; less consistently C, Y, Q.

19 BRIDGETOWN COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata - E. calophylla* with some *E. patens* to a low open forest of *E. rudis - M. rhaphiophylla* on the valley floors. Dominant vegetation types C, Q, T; less consistently R, G.

20 MURRAY COMPLEX IN MEDIUM TO HIGH RAINFALL: Vegetation ranges from open forest of *E. marginata - E. calophylla* with *E. patens* on the slopes to fringing woodland of *E. rudis - M. rhaphiophylla* on the valley floors. Dominant vegetation types C, Q, U, T; less consistently D, O, R, W.

21 MURRAY AND BINDOON COMPLEX IN LOW TO MEDIUM RAINFALL: Vegetation ranges from open forest of *E. marginata - E. calophylla* to woodland of *E. wandoo* with *E. rudis* and *E. patens* on the valley floors. Dominant vegetation types A, Y, G, R; less consistently C, H, M, L, W, Q.

22 BALINGUP COMPLEX IN MEDIUM TO HIGH RAINFALL: Open forest of *E. marginata - E. calophylla* on the slopes, and fringing woodland of *E. rudis* along the streams. Dominant vegetation types C, D, W; less consistently S, T.

Major Valley Floors and Scarps

23 WILLIAMS—AVON—BROCKMAN—MUMBALLUP COMPLEX : Fringing woodland of *E. rudis - M. rhaphiophylla.*

24 NOONING COMPLEX : Vegetation ranges from low open forest of *C. obesa* and open scrub of *C. obesa - Acacia* spp. - *Melaleuca* spp. to the fringing woodland of *E. rudis - M. rhaphiophylla* along the streams.

25 LOWDON COMPLEX : Open forest of *E. marginata - E. calophylla* and low open forest of *Agonis flexuosa* on the slopes, fringing woodland of *E. rudis - M. rhaphiophylla* in the gullies. Less consistently woodland of *E. wandoo* on slopes.

26 BINDOON COMPLEX : Woodland of *E. loxophleba* flanked by woodland of *E. wandoo - E. accedens* on the upper slopes and breakaways.

27 MICHIBIN COMPLEX : Open woodland of *E. wandoo* with some admixture of *E. loxophleba. Acacia acuminata* and *C. huegeliana* dominate the understorey.

28 DARLING SCARP COMPLEX : Vegetation ranges from low open woodland to lichens according to depth of soils. Woodland components chiefly *E. wandoo,* with *E. laeliae* in the north, *E. haematoxylon* in the south, and *E. calophylla* throughout the region. Dominant vegetation types R, G.

SWAN COASTAL PLAIN

Ridge Hill Shelf

29 FORRESTFIELD COMPLEX : Vegetation ranges from open forest of *E. calophylla - E. wandoo - E. marginata* to open forest of *E. marginata - E. calophylla - C. fraserana - Banksia* spp. Fringing woodland of *E. rudis* in the gullies that dissect this landform.

Fluviatile Deposits

30 ABBA COMPLEX: A mixture of open forest of *E. calophylla-E. marginata-Banksia* spp. and woodland of *E. calophylla* with minor occurrences of *E. haematoxylon.* Woodland of *E. rudis-Melaleuca* spp. along creeks and on flood plains.

31 COONAMBIDGEE COMPLEX: Vegetation ranges from a low open forest and low woodland of *E. todtiana-B. attenuata-B. menziesii-B. ilicifolia* with localized admixtures of *B. prionotes* to an open woodland of *E. calophylla-Banksia* spp.

32 GUILDFORD COMPLEX : A mixture of open forest to tall open forest of *E. calophylla - E. wandoo - E. marginata* and woodland of *E. wandoo* (with rare occurrences of *E. lane-poolei).* Minor components include *E. rudis - M. rhaphiophylla.*

33 SWAN COMPLEX : Fringing woodland of *E. rudis - M. rhaphiophylla* with localized occurrence of low open forest of *C. obesa* and *M. cuticularis.*

34 DARDANUP COMPLEX: Mosaic of vegetation types characteristic of adjacent vegetation complexes such as Serpentine River, Southern River and Guildford.

35 SERPENTINE RIVER COMPLEX : Closed scrub of *Melaleuca* spp. and fringing woodland of *E. rudis - M. rhaphiophylla* along streams.

36 BEERMULLAH COMPLEX : Mixture of low open forest of *C. obesa* and open woodland of *E. calophylla - E. wandoo - E. marginata.* Minor components include closed scrub of *Melaleuca* spp. and occurrence of *Actinostrobus pyramidalis.*

37 BOOTINE COMPLEX : Predominantly low open forest of *B. attenuata - B. menziesii - B. ilicifolia - E. todtiana.* On lake margins transition from woodland of *E. rudis - M. rhaphiophylla* to sedgelands.

38 YANGA COMPLEX : Predominantly a closed scrub of *Melaleuca* spp. and low open forest of *C. obesa* on the flats subject to inundation. On drier sites the vegetation reflects the adjacent vegetation complexes of Bassendean and Coonambidgee.

39 MUNGALA COMPLEX : Vegetation ranges from open woodland of *E. calophylla - E. decipiens* to closed scrub of *Melaleuca* spp. - *Casuarina* spp.

40 CANNINGTON COMPLEX : Mosaic of vegetation from adjacent vegetation complexes of Bassendean, Karrakatta, Southern River and Vasse.

41 MOORE COMPLEX : Fringing woodland of *E. rudis - M. rhaphiophylla.*

Aeolian Deposits

42 SOUTHERN RIVER COMPLEX : Open woodland of *E. calophylla - E. marginata - Banksia* spp. with fringing woodland of *E. rudis - M. rhaphiophylla* along creek beds.

43 BASSENDEAN COMPLEX—NORTH: Vegetation ranges from a low open forest and low woodland of *Banksia* spp.-*E. todtiana* to low woodland of *Melaleuca* spp., and sedgelands which occupy the moister sites.

44 BASSENDEAN COMPLEX—CENTRAL AND SOUTH: Vegetation ranges from woodland of *E. marginata-C. fraserana-Banksia* spp. to low woodland of *Melaleuca* spp., and sedgelands on the moister sites. This area includes the transition of *E. marginata* to *E. todtiana* in the vicinity of Perth.

45 BASSENDEAN COMPLEX—NORTH—TRANSITION VEGETATION COMPLEX: A transition complex of low open forest and low woodland of *Banksia* spp. -*E. todtiana* on a series of high sand dunes. The understorey species reflect similarities with both the Bassendean-North and Karrakatta-North vegetation complexes.

46 BASSENDEAN COMPLEX—CENTRAL AND SOUTH—TRANSITION VEGETATION COMPLEX: Woodland of *E. marginata-E. calophylla* with well defined second storey of *C. fraserana* and *B. grandis* on the deeper soils and a closed scrub on the moister sites. The understorey species reflect similarities with the adjacent vegetation complexes.

47 KARRAKATTA COMPLEX—NORTH: Predominantly low open forest and low woodland of *Banksia* spp.-*E. todtiana,* less consistently open forest of *E. gomphocephala-E. todtiana-Banksia* spp.

48 KARRAKATTA COMPLEX—NORTH—TRANSITION VEGETATION COMPLEX: A transition complex of low open forest and low woodland of *Banksia* spp.-*E.todtiana* on the transition zone of a series of high sand dunes between Bassendean-North and Karrakatta-North.

49 KARRAKATTA COMPLEX – CENTRAL AND SOUTH : Predominantly open forest of *E. gomphocephala - E. marginata - E. calophylla* and woodland of *E. marginata - Banksia* spp.

50 CALADENIA COMPLEX : Mosaic of vegetation from adjacent vegetation complexes of Karrakatta, Yanga and Bassendean.

51 COTTESLOE COMPLEX—NORTH: Predominantly low open forest and low woodland of *B. attenuata-B. menziesii-E. todtiana;* closed heath on the limestone outcrops.

52 COTTESLOE COMPLEX—CENTRAL AND SOUTH: Mosaic of woodland of *E. gomphocephala* and open forest of *E. gomphocephala - E. marginata - E. calophylla* ; closed heath on the limestone outcrops.

53 HERDSMAN COMPLEX : Sedgelands and fringing woodland of *E. rudis - Melaleuca* spp.

54 PINJAR COMPLEX: Vegetation ranges from woodland of *E. marginata-Banksia* spp. to a fringing woodland of *E. rudis-M. preissiana* and sedgelands.

55 QUINDALUP COMPLEX : Coastal dune complex consisting mainly of two alliances - the strand and fore dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *M. lanceolata - Callitris preissii* and the closed scrub of *Acacia rostellifera.*

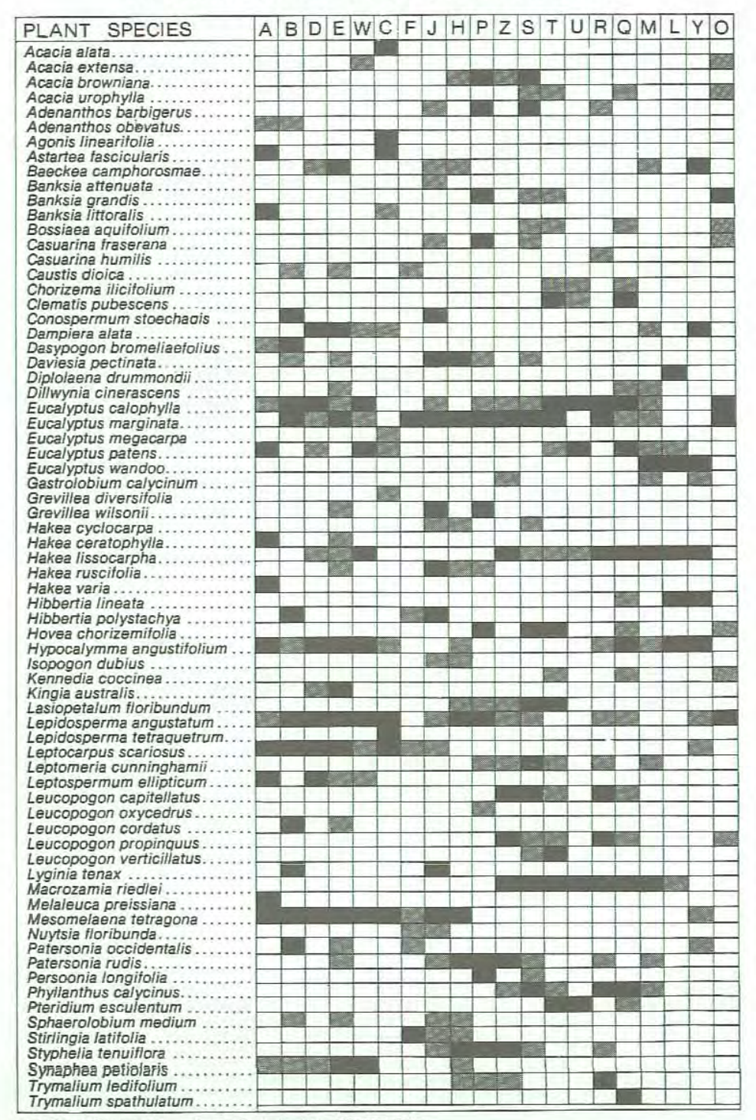
Marine Deposits

56 YOONGARILLUP COMPLEX : Woodland to tall woodland of *E. gomphocephala* with *Agonis flexuosa* in the second storey. Less consistently an open forest of *E. gomphocephala - E. marginata - E. calophylla.*

57 VASSE COMPLEX : Mixture of the closed scrub of *Melaleuca* spp., fringing woodland of *E. rudis - Melaleuca* spp. and open forest of *E. gomphocephala - E. marginata - E. calophylla.*

TABLE A

DEFINITION OF SITE VEGETATION TYPES
NORTHERN JARRAH FOREST (DARLING PLATEAU)



PLANT SPECIES: A B D E W C F J H P Z S T U R Q M L Y O

Acacia alata
Acacia extensa
Acacia browniana
Acacia urophylla
Adenanthos barbigerus
Adenanthos obovatus
Agonis linearifolia
Astartea fascicularis
Baeckea camphorosmae
Banksia attenuata
Banksia grandis
Banksia littoralis
Bossiaea aquifolium
Casuarina fraserana
Casuarina humilis
Caustis dioica
Chorizema ilicifolium
Clematis pubescens
Conospermum stoechadis
Dampiera alata
Dasypogon bromeliaefolius
Daviesia pectinata
Diploleena drummondii
Dillwynia cinerascens
Eucalyptus calophylla
Eucalyptus marginata
Eucalyptus megacarpa
Eucalyptus patens
Eucalyptus wandoo
Gastrolobium calycinum
Grevillea diversifolia
Grevillea wilsonii
Hakea cyclocarpa
Hakea ceratophylla
Hakea lissocarpha
Hakea ruscifolia
Hakea varia
Hibbertia lineata
Hibbertia polystachya
Hovea chorizemifolia
Hypocalymma angustifolium
Isopogon dubius
Kennedia coccinea
Kingia australis
Lasiopetalum floribundum
Lepidosperma angustatum
Lepidosperma tetraquetrum
Leptocarpus scariosus
Leptomeria cunninghamii
Leptospermum ellipticum
Leucopogon capitellatus
Leucopogon oxycedrus
Leucopogon cordatus
Leucopogon propinquus
Leucopogon verticillatus
Lyginia tenax
Macrozamia riedlei
Melaleuca preissiana
Mesomelaena tetragona
Nuytsia floribunda
Patersonia occidentalis
Patersonia rudis
Persoonia longifolia
Phyllanthus calycinus
Pteridium esculentum
Sphaerolobium medium
Stirlingia latifolia
Styphelia tenuiflora
Synaphea petiolaris
Trymalium ledifolium
Trymalium spathulatum

J. J. Havel Forests Department Bulletin Nos. 86, 87; 1975

☐ Species generally absent.
▨ Species should be present, but absence not critical.
■ Species should be present.

TYPE G was defined subsequently. It has a variable and unique set of indicator species which are characteristic of granite outcrops and their surroundings in low to medium rainfall zone, such as lichens, *Borya nitida, Grevillea bipinnatifida, Hakea elliptica, Hakea undulata, Eucalyptus laeliae* and *Casuarina huegeliana.*

KEY TO ABBREVIATIONS

E. - *Eucalyptus* spp.			
B. - *Banksia* spp.		*L.* - *E. laeliae*	
C. - *Casuarina* spp.		*LP.* - *E. lane-poolei*	
M. - *Melaleuca* spp.		*Mg.* - *Avicennia marina*	
H. - *E. haematoxylon*		*Sa.* - *Arthrocnemum* spp.	

RAINFALL: **Isohyets** (mms) 1000

SYSTEM 6 BOUNDARY:

RELIABILITY DIAGRAM

VEGETATION SURVEY TRAVERSES

▨ STATE FOREST AREAS
VEGETATION COMPLEXES DERIVED FROM:
(a) Aerial Photography
(b) Road Traverses
(c) Ground Survey

☐ AREAS OTHER THAN STATE FOREST
VEGETATION COMPLEXES DERIVED FROM:
(a) Aerial Photography
(b) Road Traverses

Department of
CONSERVATION and ENVIRONMENT

Darling System, Vegetation Complexes by E.M. HEDDLE, O.W. LONERAGAN and J.J. HAVEL, Forests Department, Perth , Western Australia.

Vegetation Complexes defined in relation to Landform and Soil Units as determined by H.M. Churchward and W.M.Mc Arthur, Land Resources Management, C.S.I.R.O., Perth, Western Australia, on the Darling System, Landforms and Soils maps,1978.

Interpolation of Isohyets by the Department of Lands and Surveys, Perth, Western Australia, based on mean annual rainfall records to December 1976 provided by the Bureau of Meteorology and the Public Works Department, Perth, Western Australia.

August, 1978.

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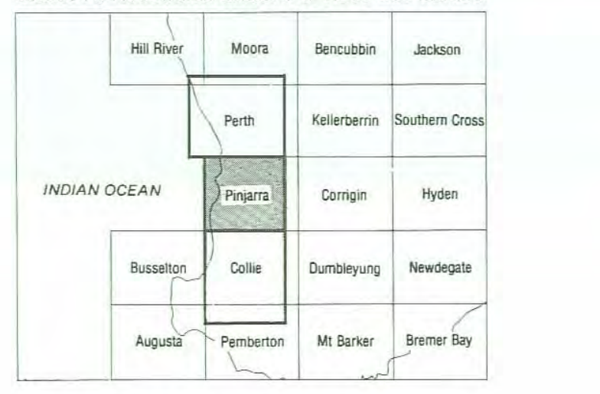

PINJARRA SHEET
VEGETATION

WESTERN AUSTRALIA