Interim Bioregions
West Midlands

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Introduction

This document is an interim attempt to define floristic bioregions in the West Midlands area. The assessment is necessary because the high floristic diversity in this area means that there is a need for more certainty in the definition bioregions. To date it has been Beard's (e.g. Beard 1976, 1979) vegetation types which have been used for regional analysis.

Griffin (1990, 1992, 1993 and 1994) demonstrated that Beard's vegetation types were unsatisfactory in describing many of the floristic patterns identified in those studies. In each of these three studies alternate bioregions were proposed. However, the limited geographic coverage of these studies has meant that the recommendations have not been utilised in such as IBRA boundaries.

In this study, an attempt is made to identify surrogate spatial data which can be used to extrapolate the floristic assessments of Griffin. Many of the boundaries identified by Griffin were geological or geomorphic in character. However, most Quaternary surface geology units (e.g. Lowry ???) were too generic to be useful, even though the mapping was reasonably detailed. The geomorphology units (Baxter 1977) was at too coarse a scale to be useful.

The soil-landscape mapping being prepared by Agriculture WA is at a detailed scale and has a hierarchy of map units which are analogs of Beard's systems, districts and provinces.

The method of correlation at this stage has been limited, however, it is expected that the relationship is strong enough for the essence to be clear in this study.

Study Area

The West Midlands area has been defined in a number of ways going back almost 100 years. Essentially it is the portion of the Perth Sedimentary Basin between the Moore and Irwin Rivers. This is roughly the area which Speck (1958) recognised as the Lesueur Botanical District. Most of the endemic species typical of this area are wholly contained within this area (Griffin 1981).

The Darling Fault has been recognised as a sound basis for separating geomorphic and bioregions. The greatest uncertainty appears to be any natural subdivision of the Swan Coastal Plain and subdivisions of the Dandaragan Plateau.

Why associate floristic patterns with soil-landscape patterns?

"It is concluded that geological substrate, as modified by soil development and stripping patterns, is fundamental to the variation in composition of the vegetation supported." (Griffin 1994, p ...).

Griffin (1990) in recognising floristic regions noted that the regions could be "... readily recognised on aerial photographs."

Soil-landscape mapping involves more than mapping of soil types. It is mapping landscapes with a particular combinations of soil types. It takes information such as geology and geomorphology into consideration. It is also hierarchical and the soil-landscape system is close to the landscape catena concept as outlined by Beard (1969):

"A Vegetation System consists of a particular series of plant communities recurring in a catenary sequence an mosaic pattern linked to topographic, pedogenic and/or geological features."

The recent soil-landscape mapping in the south-west of Australia is nearing completion. It is based on stereo interpretation of aerial photographs flown at the equivalent of the scale of 1:20,000 to 1:50,000. This mapping has several advantages over Beard's mapping. Firstly, much of Beard's mapping in the west midlands used a photomosaic but no aerial photo interpretation. It also relies on mental reconstruction of a fragmented vegetation coverage. In contrast, the soil-landscapes are relatively unaltered by agricultural clearing and can be readily interpreted from aerial photographs. Also, the soil-landscape mapping programme has had much greater resources including field verification than had the mapping which Beard did. The methods of capturing the mapping in a digital form has produced a more accurate product then was possible in Beard's time.

Floristic Patterns

Griffin (1994) identified a number of common geographic boundaries which described a significant portion of the floristic distribution in the present study area. The major ones also corresponded with some of the boundaries of Beard's units and soil-landscape system boundaries.

A visual correspondence between the scatter plots generated by Griffin (1994, Figure 10) and the soil-landscape system boundaries (Grose in prep, Schoknecht in prep, Griffin in prep) was undertaken. (An objectively based method would have been more appropriate but was beyond the time currently available.) Never-the-less the subjective assessment has produced a number clear associations. The bioregions described here are those which are most relevant to the current round of assessment of land clearing applications. Further descriptions will be prepared as required.

Figure 1 indicates interim bioregions based on soil-landscape boundaries and subdivisions based on floristic patterns. This shows that the coastal dunes are distinct bioregions. Inland areas are mainly related to differences in Mesozoic sediments and the degree of landscape stripping. There were some subdivisions made solely on the basis of floristic patterns.

Bioregion Descriptions

The Quindalup bioregion include a number of floristic groups which are quite confined to these recent calcareous dunes (Fig 9o - 9t). Griffin (1993) identified further regional divisions.

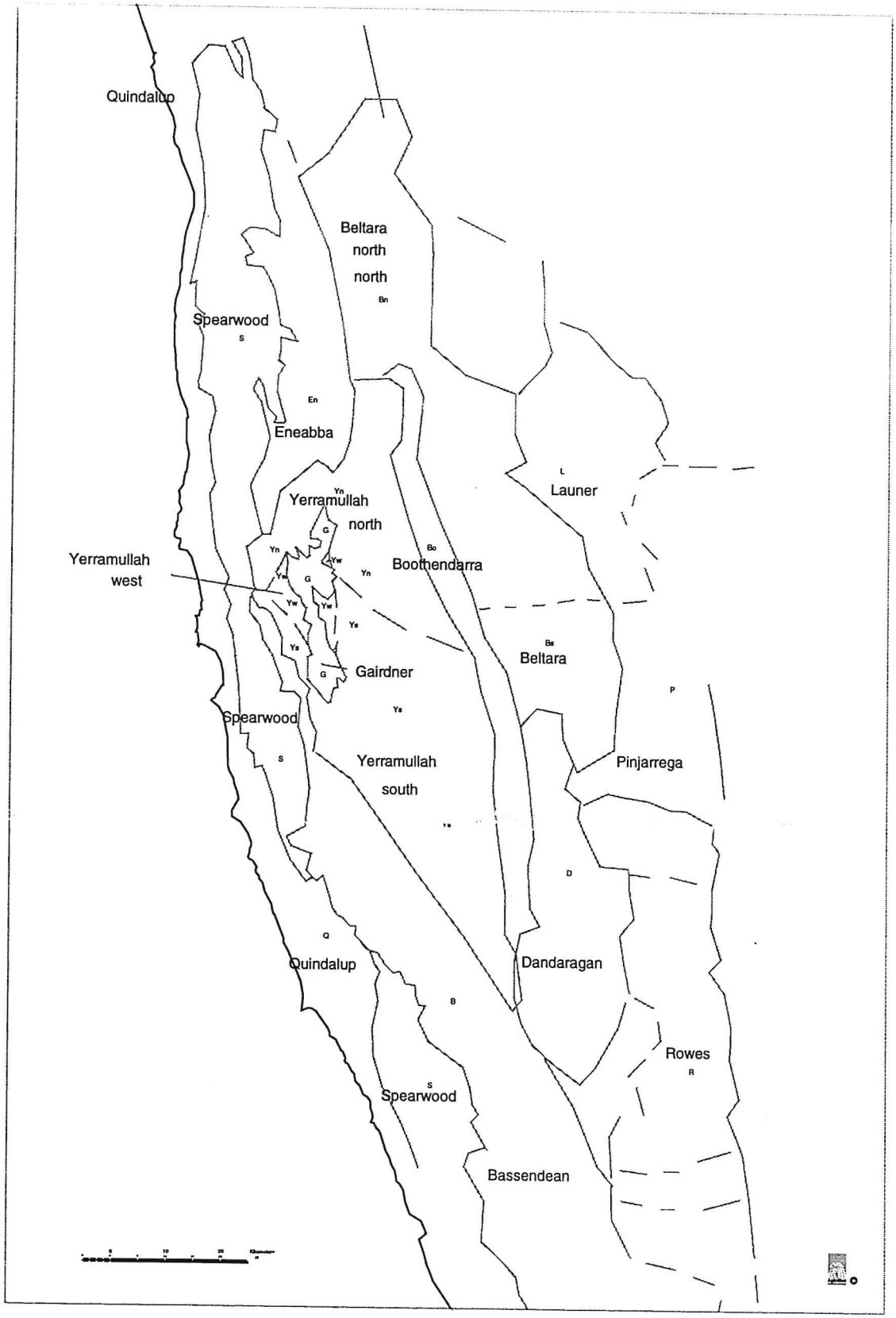
The Spearwood bioregion (Spearwood and the Tamala systems) include closely related floristic groups (Fig 10g). It is probable that these might be further sub-divided.

The Bassendean bioregion included a number of floristic groups. It is clear that it could be subdivided. (Griffin and Keighery 1989).

The Eneabba bioregion is the Eneabba system. This has been defined on an interim basis as is has similarities with part of the Yerramullah bioregion and undefined ones in the north.

The Gairdner bioregion is essentially the Mintaga Hills and the Lesueur soil-landscape systems. Potentially this could be amalgamated with the western portion of the Yerramullah bioregion. This might be reconciled with more detailed investigations of these data sets. It corresponds with much of the Cockleshell Gully Formation where it has not been covered by the coastal dunes.

Figure 1 Interim Bioregions West Midlands



The Yerramullah bioregion includes the Yerramullah and Nylagada soil-landscape systems and covers a significant portion of the Arrowsmith Region (a geomorphic unit, Baxter, 1977). It is also the majority of the Yarragadee Formation south of Eneabba where it has not been covered by the coastal plains. This bioregion is typical of the Badgingarra sandplain and ranges from Cataby to Eneabba. It was called the Badgingarra Floristic Region by Griffin (1990). On the basis of the floristic analysis, several clear divisions were possible; a small western, a northern and a southern portion. As mentioned earlier, the western portion might best be incorporated with the Gairdner bioregion. The eastern boundary between this and the southern portion is the Warradagee Fault which separates distinct geological formations. The boundary between the southern and northern portion was difficult to define due to limited data. It has been set at between the north-east corner of the Lesueur National Park and the eastern boundary of the Coomallo Nature Reserve.

The Boothendarra bioregion is equal to the Boothendarra soil-landscape system and corresponds to the Otorowiri member of the Yarragadee Formation and the Carnac member of the Parmelia Formation south of the Eneabba-Carnamah Road. It was called the Otorowiri Floristic Region by Griffin (1990). This region has a wide range of soils and many different vegetation types, most of which are documented poorly.

The Beltara bioregion is a major portion of the western half of the Parmelia Formation and lies on the Dandaragan Plateau (Baxter 1977). It was called Boothendarra Floristic Region by Griffin (1990). It has similar topography to the Yerramullah bioregion. However, its less dissected eastern portions are relatively intact plateau surfaces. It shares some floristic groups with the Yerramullah bioregion. Two divisions were recognised within Beltara. The Big Soak Plain appears to be a significant boundary and an interim line has been set to correspond with the southern boundary of the residual upland of Big Soak Plain. This might be an artifact of the low sampling effort along the Dandaragan Scarp (the western boundary of the Dandaragan Plateau) north of Big Soak Plain. The floristic composition of vegetation on the northern portion appears to intergrade with those on the northern portion of the Yerramullah bioregion.

The Launer bioregion is tentatively defined and is the sandplain west of Yarra Yarra lake.

The Pinjarrega bioregion is the alluvial plain and sand sheets associated with the ancient drainage line discharging southward from Yarra Yarra lakes.

The Dandaragan bioregion is the moderately stripped portion of the Cretaceous Lancelin Formation (and its various sub units) and corresponds roughly to the distribution of marri in the Dandaragan area.

The Rowes bioregion is an interim combination of the Rowes and Capitella soil-landscape systems. It is the less stripped areas of the Lancelin Formation between Moora and Dandaragan. Griffin (1990) implied that the Watheroo National Park would be part of this bioregion. But, this appears to not be the case.

Conservation status of bioregions

The area of uncleared vegetation was obtained from an unpublished spatial data set generated from satellite imagery from 1995 (Wallace et al in prep.). The proportions uncleared and that in NPNCA reserves is summarised in Table 1.

The Quindalup bioregion is well conserved in this study area with some local deficiencies and threats.

The Spearwood bioregion is also well represented in this study area, though the southern portion is less well represented.

The Bassendean bioregion has much uncleared (mainly Crown) land but is poorly represented in the conservation estate and has significant threats from mineral sands mining.

Table 1 Area analysis of proportion of bioregion and soil-landscape system vegetated and in conservation reserves

Interim Bioregion	Soil-landscape system	proportion Vegetated	proportion NPNCA
Quindalup	Quindalup	0.76	0.46
	Eatha	0.64	0.89
Spearwood	Spearwood	0.64	0.16
	Tamala	0.92	0.66
Bassendean	Bassendean	0.70	0.09
Eneabba	Eneabba	0.40	0.18
Gairdner	Mintaga Hills	0.31	0.16
	Mount Lesueur	1.00	0.80
Yerramullah	Yerramullah	0.38	0.17
	Nylagarda	0.27	0.10
western		0.76	0.60
southern		0.38	0.20
northern		0.37	0.12
Boothendara	Boothendara	0.09	0.02
Beltara	Beltara	0.43	0.12
northern		0.43	0.10
southern		0.41	0.15
Launer	Launer	0.28	0.07
Pinjarrega	Pinjarrega	0.66	0.53
Dandaragan	Dandaragan	0.09	0.00
Rowes	Rowes	0.10	0.00
	Capitella	0.19	0.01
	Moore River	0.60	0.03

proportion vegetated — proportion of soil-landscape system which has native vegetation.

proportion NPNCA — proportion of soil-landscape system which is in NPNCA estate.

The Eneabba bioregion also has much uncleared Crown land but there are local deficiencies and significant threats from mineral sands mining.

The Gairdner bioregion (Mt Lesueur and Mintaga Hills soil-landscape systems) is well represented in the Lesueur National Park which includes at least 1/3 of its original extent. The Mintaga Hills soil-landscape system is less well represented than the Mt Lesueur.

The Yerramullah bioregion is moderately well represented in the Badgingarra and Lesueur National Parks and the Coomallo and South Eneabba Nature Reserves. These represent about 17% of its original extent. The sub-regions within the Yerramullah bioregion varied in their representation. The northern portion of Yerramullah is least well represented having only the South Eneabba Nature Reserve. There are several unvested Crown reserves which if included would increase the representation.

The Boothendarra bioregion is very poorly represented with only a small portion uncleared let-alone in the conservation estate; the western portion of the Alexander Morrison National Park.

The Beltara bioregion is moderately well represented in the conservation estate. The northern portion is represented by the Watto Nature Reserve, and the Tathra and Alexander Morrison National Parks. The southern portion is less well represented by the Boothendarra Nature Reserve and a part of the Watheroo National Park. In addition there is a big area of Vacant Crown Land in the northern portion (Big Soak Plain). However, this includes areas not well represented in the conservation estate, the residual upland, and only some of the land cleared for agriculture.

The Launer bioregion is poorly represented in the conservation estate. There are a few small Crown reserves in the area and some areas of uncleared private land.

The Pinjarrega bioregion is very well represented by the Watheroo National Park and Pinjarrega Nature Reserve. A minority of the vegetation types are poorly represented.

The Dandaragan bioregion is very poorly represented with just one small conservation reserve (Jam Hill Nature Reserve). There is very little of this bioregion left uncleared.

The Rowes bioregion (Rowes and Capitella soil-landscape systems) is poorly represented with only part of Jam Hill Nature Reserve and the small Bundarra Nature Reserve. Much of the area has been cleared but there are some uncleared parts of significance in private ownership.

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