

# **Swan Region Strategy**

for

## **Natural Resource Management**

**Appendix 8**

**Major Landform Elements in the Swan Region**



(after Heddle *et al.* 1980., Mattiske and Havel 1998) and based on the vegetation complexes within each major landform element. Descriptions after Government of WA (2000b) and Mattiske and Havel (1998).

Sourced from Bronwen Keighery Department of Environment 2003

SWAN COASTAL PLAIN	
SWAN COASTAL PLAIN 1	
<p><b>Gingin Scarp</b> REAGAN COMPLEX : Vegetation ranges from low open woodland of <i>Banksia</i> species <i>E. todtiana</i> to closed heath depending on the depth of soil.</p> <p><b>Dandaragan Plateau COMPLEXES:</b> UPLANDS CULLULA KARAMAL COMPLEX – SOUTH MOGUMBER – NORTH MOGUMBER – SOUTH : Open woodland of <i>Eucalyptus calophylla</i>, with some admixture of <i>E. marginata</i> and a second storey of <i>E. todtiana</i> - <i>Banksia attenuata</i> - <i>B. menziesii</i> - <i>B. ilicifolia</i> VALLEYS MOONDAH VALLEY FLOORS AND SWAMPS WANNAMAL</p>	<p>The Dandaragan Plateau is geologically part of the Swan Coastal Plain and is separated from the other major landform elements identified on the Plain by the Gingin Scarp. The Dandaragan Plateau has lower relief than the Darling Plateau and is a wedge-shaped landform of about 200 metres in elevation.</p> <p>Soils are predominantly deep grey or pale brown sands with outcropping laterite areas. At times the laterites are overlaid with sand. Brown or red earthy sands are found along the valleys.</p> <p>Mapping of native vegetation in the Swan Region indicates that 51 per cent of the vegetation complexes associated with the Dandaragan Plateau remain as native vegetation. Past clearing on the Plateau has focused on the valleys where soils are most suitable for agriculture, the sandy slopes and lateritic ridges being least cleared. Recent clearing has been associated with smaller landholdings as a result of special rural subdivisions.</p> <p>At the regional level, nine vegetation complexes have been identified within the Dandaragan Plateau. A single complex is also associated with the Gingin Scarp in the Swan Region. Four floristic community types (one wetland type and three upland types) are the principal regional floristic groups expected to be found on the Dandaragan Plateau in the Swan Region. One of these floristic community types is a threatened ecological community.</p> <p>The patterning of plant communities and plant species on the Dandaragan Plateau and Gingin Scarp is not as well known as that of the other major landform elements, consequently they are described here as a group.</p> <p>The main vegetation associations are Woodlands to Open Forests dominated by <i>Eucalyptus marginata</i>, <i>E. calophylla</i>, <i>E. wandoo</i> and combinations of these; <i>E. calophylla</i> Woodland to Open Forest and Low Woodlands dominated by <i>E. marginata</i>, <i>E. todtiana</i>, <i>Banksia attenuata</i>, <i>B. ilicifolia</i> and <i>B. menziesii</i>. <i>Eucalyptus wandoo</i> is associated with the lateritic soils. These Woodlands to Open Forests are characteristically associated with a species-rich understorey. There are significant differences between the species on laterites and sands. On the Gingin Scarp there are extensive patches of species-rich heaths. Such species-rich shrublands also occur in patches on the Plateau.</p> <p>The upper sandy slopes of the valleys are dominated by combinations of <i>B. attenuata</i>, <i>B. menziesii</i>, <i>B. prionotes</i> and <i>E. todtiana</i>. At the base of the valleys are woodlands dominated by <i>E. calophylla</i> and <i>Banksia</i> species, or when a watercourse is present, a band of wetland vegetation dominated by <i>Eucalyptus rudis</i> and <i>Melaleuca raphiophylla</i>. The eastern Wannamal wetlands are dominated by a mosaic of wetland communities being sedgeland dominated by <i>Baumea</i> and <i>Meeboldina</i> species, shrublands dominated by <i>Melaleuca</i> species and woodlands dominated by <i>Casuarina obesa</i>.</p> <p>Significant taxa are known from the Dandaragan Plateau in the Swan Region. Other taxa associated with the Plateau are also expected to be at the southern extent of their range as the most southern extent of the Dandaragan Plateau is in the Swan Region. An example of this is the Black Kangaroo Paw (<i>Macropidia fuliginosa</i>) which occurs at its southern most extent in the Bullsbrook area.</p>

<p><b>Foothills</b> COONAMBIDGEE COMPLEX : Vegetation ranges from a low open forest and low woodland of <i>E. todtiana</i> - <i>B. attenuata</i> - <i>B. menziesii</i> - <i>B. ilicifolia</i> with localised admixtures of <i>B. prionotes</i> to an open woodland of <i>E. calophylla</i> - <i>Banksia</i> species</p> <p>FORRESTFIELD COMPLEX : Vegetation ranges from open forest of <i>E. calophylla</i> - <i>E. wandoo</i> - <i>E. marginata</i> to open forest of <i>E. marginata</i> - <i>E. calophylla</i> - <i>C. fraseriana</i> - <i>Banksia</i> species. Fringing woodland of <i>E. rudis</i> in the gullies that dissect this landform.</p>	<p>The Foothills lie on the east of the Swan Coastal Plain and are contiguous with the Gingin and Darling Scarps. The gentle slopes of the foothills are predominantly light grey colluvial quartz sands, clays and silts with intrusions of gravel which may be at the surface or at depth. Creeklines are characterised by clays and sandy clays.</p> <p>The well-drained relatively fertile soils of the Foothills have been selectively cleared for agriculture. Remnant native vegetation mapping for the Swan Region indicates that 13 per cent of the vegetation complexes associated with the Foothills remain as native vegetation.</p> <p>At the regional level, two vegetation complexes are associated with the Foothills. Six floristic community types are the principal regional floristic groups expected to be found on the Foothills in the Swan Region. Four of these floristic community types are threatened ecological communities.</p> <p>A complex suite of vegetation associations has been identified on the Foothills of the Plain in response to changes in topography and soils, both surface and subsurface. The main associations are uplands associated with woodlands to open forests over a very diverse understorey, some communities having the highest species diversity on the Plain. The broad units and associated dominant species are:  <b>Open Forests and Woodlands:</b> Eucalypts — <i>Eucalyptus calophylla</i>, <i>E. wandoo</i>, <i>E. marginata</i>, <i>E. lanepolei</i>, <i>E. haematoxylon</i>; Sheoaks — <i>Allocasuarina fraseriana</i> and <i>Banksias</i> — <i>Banksia attenuata</i>, <i>B. menziesii</i>, <i>B. prionotes</i>, <i>B. grandis</i>  <b>Shrublands:</b> <i>Bossiaea eriocarpa</i>, <i>Daviesia triflora</i>, <i>D. nudiflora</i>, <i>D. physodes</i>, <i>Dryandra lindleyana</i> subsp. <i>lindleyana</i>, <i>Scaevola repens</i>, <i>Conostephium pendulum</i>, <i>Eriostemon spicatus</i>, <i>Gompholobium tomentosum</i>, <i>Hibbertia hypericoides</i>, <i>H. huegelii</i>, <i>Xanthorrhoea preissii</i>, <i>X. acanthostachya</i>, <i>Kingia australis</i>, <i>Acacia willdenowiana</i>, <i>A. sessilis</i>, <i>A. pulchella</i>  <b>Herblands:</b> <i>Lomandra</i> species, <i>Conostylis aurea</i>, <i>C. setigera</i>, <i>Patersonia occidentalis</i>, <i>Dampiera linearis</i>, <i>Burchardia congesta</i>, <i>Haemodorum laxum</i>, <i>Drosera</i> species, <i>Stylidium</i> species  <b>Sedgelands:</b> <i>Mesomelaena tetragona</i>, <i>M. pseudostygia</i>, <i>Tetraria octandra</i>, <i>Cyathochaeta clandestina</i>, <i>C. avenacea</i>,  <b>Grasslands:</b> <i>Austrodanthonia occidentalis</i>, <i>Neurachne alopecuroidea</i>, <i>Amphipogon turbinatus</i></p> <p>The wetlands are principally associated with creeklines dominated by <i>Eucalyptus calophylla</i>, <i>E. rudis</i> and <i>E. wandoo</i>.</p>
<p><b>Pinjarra Plain</b> GUILDFORD COMPLEX : A mixture of open forest to tall open forest of <i>E. calophylla</i> - <i>E. wandoo</i> - <i>E. marginata</i> and woodland of <i>E. wandoo</i> (with rare occurrences of <i>E. lane-polei</i>). Minor components include <i>E. rudis</i> - <i>M. raphiophylla</i>.</p> <p>SWAN COMPLEX : Fringing woodland of <i>E. rudis</i> - <i>M. raphiophylla</i> with localised occurrence of low open forest of <i>Casuarina obesa</i> and <i>M. cuticularis</i>.</p> <p>DARDANUP COMPLEX : Mosaic of vegetation types characteristic of adjacent vegetation complexes such as Serpentine River, Southern River and Guildford.</p> <p>SERPENTINE RIVER COMPLEX : Closed scrub of <i>Melaleuca</i> species and fringing woodland of <i>E. rudis</i> - <i>M. raphiophylla</i> along streams.</p> <p>BEERMULLAH COMPLEX : Mixture of low open forest of <i>C. obesa</i> and open woodland of <i>E. calophylla</i> - <i>E. wandoo</i> - <i>E. marginata</i>. Minor components include closed scrub of <i>Melaleuca</i> species and occurrence of <i>Actinostrobos pyramidalis</i>.</p> <p>YANGA COMPLEX : Predominantly a closed scrub of <i>Melaleuca</i> species and low open forest of <i>C. obesa</i> on the flats subject to inundation. On drier sites the vegetation reflects the adjacent vegetation</p>	<p>The Pinjarra Plain is a flat plain that rises gently to the east to meet the Foothills. The alluvial soils of the Pinjarra Plain are predominantly clays and silts. In places, low dunes of aeolian sands from the west or colluvial sands from the east may overlay the alluvial soils. In areas of the Pinjarra Plain deposits of ironstones (bog iron ore) and limestones (Muchea Limestones) have formed. At times the different soils and the ironstones and limestones interleave. The interleaving of layers, of very different permeability, contributes to complex drainage patterns that are often not apparent at the surface. The other major factor contributing to the complexity of the patterns of seasonal inundation and waterlogging is extensive surface water run-off from the Darling Plateau as most of the creeks entering the flat Pinjarra Plain form ill-defined channels on the Plain. Before the extensive drainage system was instigated early this century most of the Pinjarra Plain would have been a vast seasonal wetland extending between the Foothills and the Bassendean Dunes.</p> <p>The eastern side of the Plain (Foothills and Pinjarra Plain) is characterised by high levels of clearing as the relatively fertile soils of the area have been selectively cleared for agriculture. Remnant native vegetation mapping for the Swan Region indicates 16 per cent of the vegetation complexes associated with the Pinjarra Plain remain as native vegetation.</p> <p>At the regional level, six vegetation complexes are associated with the Pinjarra Plain in the Swan Region. Twenty-two floristic community are the principal regional floristic groups identified on the eastern side of the Plain in the Perth Metropolitan Region. Thirteen of the floristic community types associated with the eastern side of the Plain are considered to be threatened ecological communities. Two other communities are also identified as threatened ecological communities, namely plant communities associated with Muchea Limestones and a faunal wetland ecological community. The wetland community is associated with tumulus springs.</p> <p>A complex suite of vegetation associations has been identified on the Pinjarra Plain in response to changes in topography, soils and drainage. The main associations are listed below.</p> <p>Uplands The uplands are associated with woodlands to open forests over a very diverse understorey, some communities having the highest species diversity on the Plain. The broad units and associated dominant species are:  <b>Open Forests and Woodlands:</b> Eucalypts — <i>Eucalyptus calophylla</i>, <i>E. wandoo</i>, <i>E. marginata</i>, <i>E. lanepolei</i>, <i>E. haematoxylon</i>; Sheoaks —</p>

Major Landform Elements in the Swan Region

<p>complexes of Bassendean and Coonambidgee.</p>	<p><i>Allocasuarina fraseriana</i>; Banksias — <i>Banksia attenuata</i>, <i>B. menziesii</i>, <i>B. prionotes</i>, <i>B. ilicifolia</i>, <i>B. grandis</i> and Others — <i>Acacia saligna</i>  <b>Shrublands:</b> <i>Jacksonia densiflora</i>, <i>Bossiaea eriocarpa</i>, <i>Daviesia triflora</i>, <i>D. nudiflora</i>, <i>D. physodes</i>, <i>Dryandra lindleyana</i> subsp. <i>lindleyana</i>, <i>Scaevola repens</i>, <i>Conostephium pendulum</i>, <i>Eriostemon spicatus</i>, <i>Gompholobium tomentosum</i>, <i>Hibbertia hypericoides</i>, <i>H. huegelii</i>, <i>Xanthorrhoea preissii</i>, <i>X. acanthostachya</i>, <i>Kingia australis</i>, <i>Acacia willdenowiana</i>, <i>A. sessilis</i>, <i>A. pulchella</i>  <b>Herblands:</b> <i>Lomandra</i> species, <i>Conostylis aurea</i>, <i>C. setigera</i>, <i>Patersonia occidentalis</i>, <i>Dampiera linearis</i>, <i>Burchardia congesta</i>, <i>Haemodorum laxum</i>, <i>Drosera</i> species, <i>Stylidium piliferum</i>  <b>Sedgeland:</b> <i>Mesomelaena tetragona</i>, <i>M. pseudostygia</i>, <i>Tetraria octandra</i>, <i>Alexgeorgea nitens</i>, <i>Cyathochaeta clandestina</i>, <i>C. avenacea</i>, <i>Desmocladius flexuosa</i>  <b>Grasslands:</b> <i>Austrodanthonia occidentalis</i>, <i>Neurachne alopecuroidea</i>, <i>Amphipogon turbinatus</i></p> <p>Wetlands  The wetlands are associated with a variety of shrublands, herblands and sedgelands and, less commonly, forests. Some of the wetland communities have the highest wetland species diversity on the Plain. These broad units and associated dominant species are:  <b>Forests and Woodlands:</b> Eucalypts — <i>Eucalyptus calophylla</i>, <i>E. rudis</i>; Sheoaks — <i>Casuarina obesa</i> and Melaleucas — <i>Melaleuca preissiana</i>, <i>M. rhapsiophylla</i>  <b>Shrublands:</b> <i>Actinostrobos pyramidalis</i>, <i>Viminaria juncea</i>, <i>Melaleuca rhapsiophylla</i> (shrub form), <i>M. uncinata</i>, <i>M. teretifolia</i>, <i>M. viminea</i>, <i>M. lateritia</i> (and <i>M. huegelii</i> on Muchea Limestones) <i>Astartea</i> aff. <i>fascicularis</i>, <i>Hypocalymma angustifolium</i>, <i>Dryandra lindleyana</i> subsp. <i>lindleyana</i>, <i>Grevillea thelemanniana</i>, <i>Hakea varia</i>, <i>H. sulcata</i>, <i>Calytrix aurea</i>, <i>Verticordia densiflora</i>, <i>Pericalymma ellipticum</i>, <i>Halosarcia indica</i>, <i>Sarcocornia quinqueflora</i>, <i>Xanthorrhoea preissii</i>, <i>Kingia australis</i>, <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>  <b>Herblands:</b> <i>Borya</i> species, <i>Burchardia multiflora</i>, <i>Lomandra</i> species, <i>Patersonia occidentalis</i>, <i>Drosera</i> species, <i>Stylidium utricularioides</i>, <i>S. longitubum</i>, <i>S. calcaratum</i>, <i>Polypompholyx multifida</i>  <b>Sedgeland:</b> <i>Schoenus rigens</i>, <i>Mesomelaena tetragona</i>, <i>Cyathochaeta avenacea</i>, <i>Meeboldina cana</i>, <i>M. coangustata</i>, <i>Chaetanthus aristatus</i>, a variety of annual sedges including <i>Centrolepis aristatus</i>  <b>Grasslands:</b> <i>Neurachne alopecuroidea</i></p> <p>These woodland and wetland communities are typified by large numbers of significant taxa and some of the highest levels of species diversity on the Plain.</p>
<p><b>Bassendean Dunes</b>  <b>BASSENDAN COMPLEX – NORTH :</b> Vegetation ranges from a low open forest and low open woodland of <i>Banksia</i> species <i>E. todtiana</i> to low woodland of <i>Melaleuca</i> species and sedgelands which occupy the moister sites.  <b>BASSENDAN COMPLEX – CENTRAL AND SOUTH :</b> Vegetation ranges from woodland of <i>E. marginata</i> - <i>C. fraseriana</i> - <i>Banksia</i> spp. to low woodland of <i>Melaleuca</i> species, and sedgelands on the moister sites. This area includes the transition of <i>E. marginata</i> to <i>E. todtiana</i> in the vicinity of Perth.  <b>BASSENDAN COMPLEX – NORTH – TRANSITION VEGETATION COMPLEX :</b> A transition complex of low open forest and low woodland of <i>Banksia</i> species – <i>E. todtiana</i> on a series of high sand dunes. The understorey species reflect similarities with both the Bassendean-North and Karrakatta-North vegetation complexes.  <b>BASSENDAN COMPLEX – CENTRAL AND SOUTH – TRANSITION VEGETATION COMPLEX :</b></p>	<p>The Bassendean Dunes lie in the centre of the Swan Coastal Plain and are the oldest of the three aeolian dune systems. The dunes of the Bassendean system are generally of low relief, often with broad swales or relatively flat sand sheets between the low dunes. The tallest dunes, of up to 80 metres, occur in the north of the Swan Region, in the area east of Lake Pinjar.</p> <p>Soils are predominantly deep grey leached quartz sands. To the west the Bassendean Dunes overlay the Pinjarra Plain and wetlands which interleave the dunes or sand sheets have a clay base. Towards the west the wetlands are generally associated with peaty sands formed between the dunes. As a consequence a diversity of wetlands occurs within the Bassendean Dune. In addition distinctive wetlands occur where the Bassendean Dunes and Pinjarra Plain interface (two natural groups) and where the Spearwood and Bassendean Dunes interface.</p> <p>Until recently the Bassendean Dunes were characterised by low levels of clearing, the infertile sands being unsuitable for agriculture or forestry. The predominant land use was low-level grazing, the interleaving wetlands being the focus for more intensive grazing or horticulture. In recent times, with the expansion of urban areas, these dunes have proved suitable for housing lands. Recent mapping of native vegetation in the Swan Region indicates that 48 per cent of the vegetation complexes associated with the Bassendean Dunes only remain as native vegetation.</p> <p>At the regional level, four vegetation complexes are confined to the Bassendean Dunes and three others are associated with the Bassendean Dunes. Nineteen floristic community types are the principal regional floristic groups identified on the Bassendean Dunes in the Swan Region. The most species-rich of the woodlands — floristic community type 23a — is virtually confined to the Swan Region. Ten plant and faunal communities associated with the area of the Bassendean Dunes are identified as threatened ecological communities. The nine threatened plant communities are not common within the Bassendean Dunes, generally being associated with the Pinjarra Plain and Foothills. They are found on the clay-based wetlands of the Pinjar Complex and on the Muchea Limestones, clay-based wetlands and sands of the interface of the Bassendean Dunes and Pinjarra Plain, principally within the Southern River Complex. The tenth group is a faunal wetland community associated with tumulus springs.</p>

<p>Woodland of <i>E. marginata</i> - <i>E. calophylla</i> with well defined second storey of <i>Allocasuarina fraseriana</i> and <i>B. grandis</i> on the deeper soils and a closed scrub on the moister sites. The understorey species reflect similarities with the adjacent vegetation complexes.</p>	<p>The area of Bassendean Dunes vegetation remaining on the Swan Coastal Plain is comparatively large when compared with the area remaining vegetated of the other major landform elements. With appropriate planning and protection the plant communities and flora of the Bassendean Dunes will be able to be protected in areas of sufficient size and diversity to allow for the continuation of natural processes.</p> <p>A diverse suite of vegetation associations has been identified on the Bassendean Dunes. The main associations are listed below.</p> <p><b>Uplands</b> The main upland associations are low forests to low woodlands associated with a very diverse understorey (Table 4.3). These broad units and associated dominant species are:</p> <p><b>Forests and Woodlands:</b> Eucalypts — <i>Eucalyptus marginata</i>, <i>E. todtiana</i>, <i>E. calophylla</i>; Sheoaks — <i>Allocasuarina fraseriana</i>; Banksias — <i>Banksia attenuata</i>, <i>B. menziesii</i>, <i>B. ilicifolia</i>, <i>B. grandis</i> and Others — <i>Nuytsia floribunda</i>, <i>Acacia saligna</i>  <b>Shrublands:</b> <i>Adenanthos cygnorum</i>, <i>Bossiaea eriocarpa</i>, <i>Hovea trisperma</i>, <i>Leucopogon conostephioides</i>, <i>Daviesia physodes</i>, <i>Dryandra lindleyana</i> subsp. <i>lindleyana</i>, <i>Petrophile linearis</i>, <i>Stirlingia linearis</i>, <i>Scholtzia involucreta</i>, <i>Calytrix flavescens</i>, <i>Conostephium pendulum</i>, <i>Gompholobium tomentosum</i>, <i>Hibbertia hypericoides</i>, <i>H. huegelii</i>, <i>Xanthorrhoea preissii</i>, <i>Acacia pulchella</i>  <b>Herblands:</b> <i>Phlebocarya ciliata</i>, <i>Lomandra</i> species, <i>Conostylis aculeata</i>, <i>C. juncea</i>, <i>Patersonia occidentalis</i>, <i>Dampiera linearis</i>, <i>Burchardia congesta</i>, <i>Drosera</i> species, <i>Stylidium bulbiferum</i>, <i>S. repens</i>, <i>S. piliferum</i>  <b>Sedgeland:</b> <i>Schoenus curvifolius</i>, <i>Lyginia barbata</i>, <i>Lepidosperma angustatum</i>, <i>Desmocladius flexuosa</i>  <b>Grasslands:</b> <i>Austrodanthonia occidentalis</i>, <i>Amphipogon turbinatus</i></p> <p><b>Wetlands</b> These broad units and associated dominant species are:</p> <p><b>Open Forests and Woodlands:</b> Eucalypts — <i>Eucalyptus rudis</i>, <i>E. calophylla</i>; Banksias — <i>Banksia ilicifolia</i>, <i>B. littoralis</i>; Melaleucas — <i>Melaleuca preissiana</i>, <i>M. raphiophylla</i> and Others — <i>Acacia saligna</i>  <b>Shrublands:</b> <i>Kunzea ericifolia</i>, <i>Regelia ciliata</i>, <i>Hypocalymma angustifolium</i>, <i>Hakea varia</i>, <i>Pericalymma ellipticum</i>, <i>Melaleuca teretifolia</i>, <i>Xanthorrhoea preissii</i>, <i>Acacia pulchella</i>  <b>Herblands:</b> <i>Phlebocarya ciliata</i>, <i>Conostylis juncea</i>, <i>Patersonia occidentalis</i>, <i>Drosera</i> species, <i>Stylidium repens</i>, <i>S. bulbiferum</i>, <i>Villarsia</i> species  <b>Sedgeland:</b> <i>Baumea vaginalis</i>, <i>B. articulata</i>, <i>B. juncea</i>, <i>Lyginia barbata</i>, <i>Hypolaena exsulca</i>, <i>Evandra pauciflora</i>, <i>Lepidosperma longitudinale</i>, <i>Hypolaena pubescens</i>, <i>Restio stenostachyus</i>, <i>Juncus pallidus</i>  <b>Grasslands:</b> <i>Amphipogon debilis</i></p> <p>The woodland communities of the Bassendean Dunes have high levels of species diversity.</p>
<p><b>Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes</b> SOUTHERN RIVER COMPLEX : Open woodland of <i>E. calophylla</i> - <i>E. marginata</i> - <i>Banksia</i> species with fringing woodland of <i>E. rudis</i> - <i>M. raphiophylla</i> along creek beds. CANNINGTON COMPLEX : Mosaic of vegetation from adjacent vegetation complexes of Bassendean, Karrakatta, Southern River and Vasse.</p>	<p>These two complexes contain vegetation typically allied with a series of complexes. The majority of the area of the Southern River complex supports communities associated with the Bassendean Dunes but contains pockets of alluvial and colluvial soils which support plant communities characteristic of the Pinjarra Plain. This is to be expected as the Southern River Complex is characterised by being in the transition between the Pinjarra Plain and the Bassendean Dunes. The Cannington Complex is also associated with the transition between the Pinjarra Plain and other major landform units but is grouped here as the vegetation remaining on the Cannington Complex is more closely allied with the communities of the Pinjarra Plain.</p>
<p><b>Spearwood Dunes</b></p>	

<p><b>Quindalup Dunes</b>          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 <i>M. lanceolata</i> - <i>Callitris preissii</i> and the closed scrub of <i>Acacia rostellifera</i>.</p>	<p>The Quindalup Dunes are of aeolian origin, being the youngest of the dune systems on the Swan Coastal Plain. This system is characterised by a series of dunes — from the low sequence of ridges typical of the beach ridge plains of the Rockingham area to the large parabolic dunes found north of the Swan River. Broad to narrow swales and sand sheets can occur between the dunes. The dunes, swales and sheets are typically white sands. The wetlands of the Quindalup Dunes are characterised by carbonate mud, humic sand, peats and muddy sands over sands.</p> <p>Relatively large areas of the Quindalup Dunes remain as bushland. The soils of the Quindalup Dunes have very low fertility and, until recently, have remained vegetated. However, similarly to the Spearwood Dunes, the uncleared dunes have been subject to substantial grazing pressure. While this has had low impact on the slopes of the dunes, the protected swales have been favoured as stock watering and shelter points and the vegetation in the swales has been degraded.</p> <p>Recent mapping for the Swan Region indicates that 48 per cent of the vegetation complexes associated with the Quindalup Dunes remain as native vegetation.</p> <p>At the regional level one vegetation complex has been identified as being confined to the Quindalup Dunes. A wetland complex is also associated with the Quindalup Dunes. Eleven floristic community types are the principal regional floristic groups identified on the Quindalup Dunes in the Swan Region. Two floristic community types have been determined threatened ecological communities.</p> <p>A variety of vegetation associations has been identified on the Quindalup Dunes. The different associations are related to the age of the dunes on which they occur, the degree of protection from prevailing winds and the relationship between the Quindalup sands and the adjacent Tamala Limestone surfaces. These broad units and associated dominant species are:</p> <p>Uplands: The main upland associations are grasslands, shrublands and less commonly woodlands to open woodlands. These broad units and associated dominant species are:  <b>Woodlands:</b> Eucalypts — <i>Eucalyptus gomphocephala</i>; Melaleucas — <i>Melaleuca lanceolata</i> (uncommon in the Perth Metropolitan Region ) and Rottneest Island Cypress — <i>Callitris preissii</i>  <b>Shrublands:</b> <i>Jacksonia furcellata</i>, <i>Olearia axillaris</i>, <i>Melaleuca acerosa</i>, <i>Phyllanthus calycinus</i>, <i>Rhagodia baccata</i>, <i>Nemcia reticulata</i>, <i>Eremophila glabra</i>, <i>Scaevola crassifolia</i>, <i>S. nitida</i>, <i>Spyridium globulosum</i>, <i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i>, <i>A. rostellifera</i>, <i>A. cyclops</i>  <b>Herblands:</b> <i>Lomandra maritima</i>, <i>Conostylis candicans</i>, <i>Opercularia vaginata</i>, <i>Senecio lautus</i>, <i>Acanthocarpus preissii</i>  <b>Sedgeland:</b> <i>Desmocladius flexuosa</i>, <i>Isolepis nodosus</i>, <i>Lepidosperma gladiatum</i>, <i>L. angustatum</i>, <i>Schoenus grandiflorus</i>  <b>Grasslands:</b> <i>Spinifex hirsutus</i>, <i>S. longifolius</i>, <i>Austrostipa flavescens</i>, <i>Austrodanthonia occidentalis</i>, <i>Poa porphyroclados</i></p> <p>Wetlands: The main wetland associations are sedgelands, shrublands and, less commonly, low woodlands to forests. These broad units and associated dominant species are:  <b>Woodlands:</b> Eucalypts — <i>Eucalyptus gomphocephala</i>; Melaleucas — <i>Melaleuca raphiophylla</i>, <i>M. cuticularis</i> and Others — <i>Acacia saligna</i>  <b>Herblands:</b> <i>Lobelia alata</i>  <b>Sedgelands:</b> <i>Baumea juncea</i>, <i>B. articulata</i>, <i>Isolepis nodosus</i>, <i>Lepidosperma gladiatum</i>, <i>Gahnia trifida</i></p> <p>Over 15 significant taxa are associated with the Quindalup Dunes in the Swan Region.</p>
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<p><b>Wetlands</b> HERDSMAN COMPLEX : Sedgeland and fringing woodland of <i>E. rudis</i> - <i>Melaleuca</i> species. PINJAR COMPLEX : Vegetation ranges from woodland of <i>E. marginata</i> - <i>Banksia</i> species to a fringing woodland of <i>E. rudis</i> - <i>M. preissiana</i> and sedgelands.</p>	<p>These complexes map the two most extensive areas of wetlands on the Plain centred on lakes and are described for the wetlands in the adjacent major landform element/s. The Herdsman traverses two major landform elements — the Bassendean and Spearwood Dunes — and has 15 per cent remaining. The Pinjar Complex supports a diversity of wetlands similar to those of both the Bassendean Dunes and the Pinjarra Plain and contains areas of threatened ecological community.</p> <p>Recent mapping for the Swan Region indicates that 40 per cent of the vegetation complexes associated with Wetlands remain as native vegetation.</p>
<p><b>Marine (lagoonal and estuarine) Deposits</b> VASSE COMPLEX : Mixture of the closed scrub of <i>Melaleuca</i> species fringing woodland of <i>E. rudis</i> - <i>Melaleuca</i> species and open forest of <i>E. gomphocephala</i> - <i>E. marginata</i> - <i>E. calophylla</i>.</p>	<p>Mixture of the closed scrub of <i>Melaleuca</i> species fringing woodland of <i>E. rudis</i> - <i>Melaleuca</i> species and open forest of <i>E. gomphocephala</i> - <i>E. marginata</i> - <i>E. calophylla</i>.</p>
<p><b>ESTUARIES, RIVERS AND CREEKS</b></p>	<p>Collectively, the estuaries, rivers and creeks on the Swan Coastal Plain in the Swan Region cross all of the major landform elements. Associated landforms range through steep Tamala Limestone cliffs of the Swan Estuary, sandy bars and flats, and waterlogged alluvial flats.</p> <p>Recent mapping for the Swan Region indicates that 1 per cent of the vegetation complexes associated with Marine Deposits remain as native vegetation.</p> <p>The soils associated with these estuaries, rivers and creeks range from mud and sand overlaying quartz sand to sand overlaying Tamala Limestone cliffs, alluvium of quartz sand and clay and quartz sands. In addition the soils of the estuaries are influenced by saline and/or freshwater inundation and/or waterlogging while the rivers and creeks are predominantly fresh but are increasingly subject to salinity.</p> <p>Vegetation associated with estuaries, rivers and creeks is typically highly cleared. The presence of relatively fertile soils and fresh water from the river or creek or shallow wells adjacent to transport corridors made these areas the first focus for agriculture. In addition many of the wet flats have been drained and filled for agriculture, playing fields and roads</p> <p>At the regional level, three vegetation complexes (Swan, Canning and Vasse) have been identified as being associated with the estuaries, rivers and creeks. Two of the floristic community types associated with the creeks that traverse the Foothills, and another associated with the Swan Estuary are threatened ecological communities.</p> <p>A variety of vegetation associations has been identified on the slopes and wetflats along estuaries, rivers and creeks. These are best dealt with under each of the wetland types.</p> <p><u>Estuaries/Wetflats</u> The main vegetation associations on the wetflats are forest to woodland, shrublands and sedgelands. While the estuarine margins are typically saline, freshwater seepages result in the local occurrence of freshwater communities. These broad units and associated dominant species are:  <b>Forests and Woodlands:</b> Eucalypts — <i>Eucalyptus rudis</i>; Sheoaks — <i>Casuarina obesa</i> and Melaleucas — <i>Melaleuca raphiophylla</i>, <i>M. cuticularis</i>  <b>Shrublands:</b> <i>Melaleuca viminea</i>, <i>Halosarcia</i> species, <i>Sarcocornia</i> species  <b>Sedgelands:</b> <i>Baumea juncea</i>, <i>Bolboschoenus caldwellii</i>, <i>Schoenoplectus validus</i>, <i>Gahnia trifida</i>, <i>Meeboldina</i>, <i>Juncus kraussii</i>, <i>J. pallidus</i></p> <p><u>Estuaries/Slopes</u> The main vegetation associations on the slopes are low woodlands and shrublands, dominated by species typical of the Quindalup and/or Spearwood Dunes (Keighery, GJ, and Keighery 1998). The broad units and associated dominant species are:  <b>Woodlands:</b> Eucalypts — <i>Eucalyptus gomphocephala</i>; Banksias — <i>Banksia attenuata</i>, <i>B. menziesii</i>; Sheoaks — <i>Allocasuarina fraseriana</i> and Others — <i>Callitris preissii</i>  <b>Shrublands</b> (dominant and other taxa): <i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i>, <i>A. truncata</i>, <i>A. xanthina</i>, <i>Acanthocarpus preissii</i>, <i>Adriana quadripartita</i>, <i>Alyxia buxifolia</i>, <i>Anthocercis littorea</i>, <i>Comesperma integerrima</i>, <i>Dodonaea aptera</i>, <i>Dryandra sessilis</i> subsp. <i>cygnorum</i>,</p>

	<p><i>Grevillea vestita</i>, <i>Melaleuca huegelii</i>, <i>Pittosporum phylliraeoides</i> var. <i>phylliraeoides</i>, <i>Scaevola nitida</i>, <i>Spyridium globulosum</i>, <i>Templetonia retusa</i></p> <p><b>Herblands:</b> <i>Conostylis candicans</i></p> <p>Many of these taxa are typical of the Muchea Limestone communities and it is possible that the estuaries formed a corridor for the migration of elements of the Spearwood/Quindalup flora to the eastern side of the Swan Coastal Plain (Keighery, GJ, and Keighery 1998).</p> <p><u>Rivers</u> The main vegetation associations on the river banks and flats are forest to woodland, shrublands and sedgelands. These broad units and associated dominant species are:</p> <p><b>Forests and Woodlands:</b> Eucalypts — <i>Eucalyptus rudis</i>; Sheoaks — <i>Casuarina obesa</i> (occasional); Melaleucas — <i>Melaleuca raphiophylla</i>; Others — <i>Acacia saligna</i></p> <p><b>Shrublands:</b> <i>Melaleuca viminea</i>, <i>Astartea</i> aff. <i>fascicularis</i>, <i>Acacia dentifera</i>, <i>Agonis linearifolia</i></p> <p><b>Herblands:</b> <i>Centella cordifolia</i></p> <p><b>Sedgelands:</b> <i>Baumea juncea</i>, <i>B. articulata</i>, <i>Carex fascicularis</i>, <i>Lepidosperma tetraquetrum</i>, <i>L. effusum</i>, <i>Juncus pallidus</i>.</p> <p><b>Grasslands:</b> <i>Hemarthria uncinata</i></p> <p><u>Creeks</u> The vegetation associated with creeks may be similar to that described for rivers or their adjacent communities when the creek is traversing the Pinjarra Plain or Foothills. Creeks of the Pinjarra Plain and Foothills are generally dominated by <i>Eucalyptus calophylla</i> and/or <i>E. wandoo</i>.</p>
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<b>NORTHERN JARRAH FOREST</b>	
Darling Scarp Complex (DS)	<p>The steeply sloping surface of the Darling Scarp is characterised by loams, gravels, sands, quartzite sands and exposed granites. Mapping of native vegetation in the Swan Region indicates that 56 per cent of the vegetation complex associated with the Darling Scarp remains as native vegetation. The gentler slopes have been preferentially cleared for agriculture and localised clearing is associated with granite mines. More recent clearing is associated with smaller landholdings as a result of special rural subdivisions and pockets of urbanisation.</p> <p>At the regional level one vegetation complex has been identified on the Darling Scarp. A series of floristic community types have been identified in the Swan Region. These floristic community types have not, as yet, been considered for ranking as threatened ecological communities.</p> <p>A series of vegetation associations have been identified on the Darling Scarp in response to changes in topography, soils and soil depth. The uplands are associated with woodlands to open forests over a diverse understorey. The broad units and associated dominant species are:  <b>Open Forests and Woodlands:</b> Eucalypts — <i>Eucalyptus calophylla</i>, <i>E. marginata</i> (two subspecies present ssp. <i>elegantella</i> and <i>marginata</i>, <i>E. wandoo</i>, <i>E. accedens</i>, <i>E. laeliae</i>, <i>E. lanepoolei</i> and <i>E. haematoxylon</i>; Sheoaks - <i>Allocasuarina huegeliana</i>  <b>Shrublands:</b> <i>Grevillea endlicheriana</i>, <i>Petrophile biloba</i>, <i>Hakea lissocarpha</i>, <i>H. cristata</i>, <i>H. trifurcata</i>, <i>Dryandra sessilis</i>, <i>Leucopogon</i> species, <i>Xanthorrhoea preissii</i>, <i>X. acanthostachya</i>, <i>Acacia pulchella</i>  <b>Herblands:</b> <i>Haemodorum</i> species, <i>Drosera</i> species, <i>Stylidium</i> species  <b>Sedgeland:</b> <i>Lepidosperma squamatum</i>  <b>Grasslands:</b> <i>Neurachne alopecuroidea</i></p> <p>On the granite surfaces are wetlands dominated by  <b>Herblands:</b> on granite rocks with species from the following genera: <i>Borya</i>, <i>Patersonia</i>, <i>Drosera</i> and <i>Stylidium</i></p> <p>These woodland, shrublands and granite communities are associated with a number of significant taxa and diversity of species.</p>
Darling Plateau – Uplands Complexes: Cooke (Ce) Dwellingup (D1) Dwellingup 2 (D2) Dwellingup 3 (D3) Dwellingup 4 (D4)	<p>The gently undulating surface of the Darling Plateau uplands of between 250 - 300m in elevation are characterised by laterites dominated by duricrust, gravels and sands. At times this undulating surface is broken by taller hills associated with outcropping granites which also occur at lower elevation.</p> <p>Mapping of native vegetation in the Swan Region indicates that 71 per cent of the vegetation complexes associated with the Darling Plateau remain as native vegetation. Until recently much of the lateritic surfaces have been uncleared, being national parks, state forest and water catchment areas. Recent clearing has been associated with bauxite mining but these lands are being progressively revegetated. Other recent clearing has been associated with smaller landholdings as a result of special rural subdivisions and urban centres.</p> <p>At the regional level, five vegetation complexes have been identified on the Darling Plateau uplands in the Swan Region. Regional floristic groups have not been determined for this area.</p> <p>A series of vegetation associations have been identified on the Darling Plateau uplands in response to changes in topography, soils and soil depth. The uplands are associated with woodlands to open forests over a diverse understorey. The broad units and associated dominant species are:  Open Forests: Eucalypts — <i>Eucalyptus calophylla</i>, <i>E. marginata</i> (two subspecies present ssp. <i>thalassica</i> and <i>marginata</i>), <i>E. wandoo</i>, <i>E. laeliae</i>; Sheoaks — <i>Allocasuarina fraseriana</i>, <i>A. huegeliana</i> and <i>Banksia</i> — <i>Banksia grandis</i>  Shrublands: <i>Persoonia longifolia</i>, <i>Hakea lissocarpha</i>, <i>Leucopogon</i> species, <i>Hibbertia hypericoides</i>, <i>Xanthorrhoea preissii</i>, <i>X. gracilis</i>, <i>Kingia australis</i>, <i>Acacia pulchella</i>  Herblands: <i>Lomandra</i> species, <i>Conostylis</i> species, <i>Patersonia rudis</i>, <i>Dampiera linearis</i>, <i>Burchardia congesta</i>, <i>Haemodorum</i> species, <i>Drosera</i> species, <i>Stylidium</i> species  Sedgeland: <i>Lepidosperma squamatum</i>, <i>Mesomelaena tetragona</i>  Grasslands: <i>Neurachne alopecuroidea</i></p> <p>On the granite surfaces are wetlands dominated by  <b>Herblands:</b> on granite rocks with species from the following genera: <i>Borya</i>, <i>Patersonia</i>, <i>Drosera</i> and <i>Stylidium</i></p> <p>These woodland, shrublands and granite communities are associated with a number of significant taxa and diversity of species.</p>

Major Landform Elements in the Swan Region

<p><b>Darling Plateau – Depressions and Swamps Complexes:</b> Goonaping (G) Nooning Swamp (S) Williams</p>	<p>Sands are associated with the drier shallow depressions at the head of drainage lines peaty sands are associated with the wetter areas. Mapping of native vegetation in the Swan Region indicates that 99 per cent of the vegetation complexes associated with the Darling Plateau depressions and swamps remain as native vegetation.</p> <p>A series of vegetation associations have been identified on the Darling Plateau depressions and swamps in response to changes in topography, soils, soil depth and drainage. These units are listed below.</p> <p>Uplands: The uplands are associated with woodlands to forests over a diverse understorey. The broad units and associated dominant species are: <b>Open Forests and woodlands:</b> Eucalypts - <i>Eucalyptus marginata</i> (two subspecies present ssp. <i>thalassica</i> and <i>marginata</i>, <i>E. calophylla</i>, <i>E. wandoo</i>; Banksias - <i>Banksia attenuata</i>, <i>B. menziesii</i>, <i>B. littoralis</i>; Melaleucas — <i>Melaleuca</i> <b>Shrublands:</b> The dominant shrub species of these communities are from the following genera: <i>Allocasuarina</i>, <i>Jacksonia</i>, <i>Viminaria</i>, <i>Bossiaea</i>, <i>Daviesia</i>, <i>Leucopogon</i>, <i>Adenanthos</i>, <i>Dryandra</i>, <i>Grevillea</i>, <i>Hakea</i>, <i>Petrophile</i>, <i>Isopogon</i>, <i>Gompholobium</i>, <i>Calytrix</i>, <i>Verticordia</i>, <i>Hypocalymma</i>, <i>Pericalymma</i>, <i>Melaleuca</i>, <i>Hibbertia</i>, <i>Xanthorrhoea</i>, <i>Kingia</i> and <i>Acacia</i>. <b>Herblands:</b> Examples are from the following genera: <i>Borya</i>, <i>Lomandra</i>, <i>Conostylis</i>, <i>Patersonia</i>, <i>Drosera</i> and <i>Stylidium</i></p> <p>Wetlands: The wetlands are associated with the following units and associated dominant species are: <b>Woodlands to open woodlands:</b> Eucalypts — <i>Eucalyptus megacarpa</i>, <i>E. calophylla</i>, <i>E. marginata</i>, <i>E. wandoo</i>; Banksia - <i>Banksia littoralis</i> and Melaleucas — <i>Melaleuca preissiana</i>, <i>M. raphiophylla</i> <b>Shrublands:</b> <i>Hypocalymma angustifolium</i>, <i>Acacia pulchella</i> <b>Herblands:</b> on granite rocks with species from the following genera: <i>Borya</i>, <i>Patersonia</i>, <i>Drosera</i> and <i>Stylidium</i> <b>Sedgeland:</b> <i>Baumea</i>, <i>Gahnia</i>, <i>Mesomelaena</i>, <i>Lepidosperma</i>, <i>Desmocladius</i> and <i>Juncus</i>.</p>
<p><b>Darling Plateau – Valleys Complexes:</b> Bindoon Coolakin (Ck) Helena 1 (He1) Helena 2 (He2) Michibin Murray 1 (My1) Murray 2 (My2) Pindalup (Pn) Yarragil 1 (Yg1) Yarragil 2 (Yg2)</p>	<p>The drainage lines are associated with red, yellow and orange earthy sands and gravelly sands and exposed granites. Mapping of native vegetation in the Swan Region indicates that 68 per cent of the vegetation complexes associated with the Darling Plateau valleys remains as native vegetation. Past clearing on the Plateau has focused on the valleys where soils are most suitable for agriculture</p> <p>A series of vegetation associations have been identified on the Darling Plateau Valleys in response to changes in topography, soils, soil depth and drainage. These units are listed below.</p> <p>Uplands: The uplands are associated with woodlands to forests over a diverse understorey. The broad units and associated dominant species are: Forests and woodlands: Eucalypts - <i>Eucalyptus calophylla</i>, <i>E. marginata</i>, <i>E. marginata</i>, <i>E. accedens</i>, <i>E. wandoo</i> Shrublands: The dominant shrub species of these communities are from the following genera: <i>Allocasuarina</i>, <i>Jacksonia</i>, <i>Viminaria</i>, <i>Bossiaea</i>, <i>Daviesia</i>, <i>Leucopogon</i>, <i>Adenanthos</i>, <i>Dryandra</i>, <i>Grevillea</i>, <i>Hakea</i>, <i>Petrophile</i>, <i>Isopogon</i>, <i>Gompholobium</i>, <i>Calytrix</i>, <i>Verticordia</i>, <i>Hypocalymma</i>, <i>Pericalymma</i>, <i>Melaleuca</i>, <i>Hibbertia</i>, <i>Xanthorrhoea</i>, <i>Kingia</i> and <i>Acacia</i>. Herblands: Examples are from the following genera: <i>Borya</i>, <i>Lomandra</i>, <i>Conostylis</i>, <i>Patersonia</i>, <i>Drosera</i> and <i>Stylidium</i></p> <p>Wetlands - Valley Floors: The wetlands are associated with the following units and associated dominant species are: Woodlands to open woodlands: Eucalypts — <i>Eucalyptus calophylla</i>, <i>E. rudis</i>, <i>E. patens</i>, <i>E. megacarpa</i>; Banksia - <i>Banksia littoralis</i> and Melaleucas — <i>Melaleuca raphiophylla</i> Shrublands: <i>Hypocalymma angustifolium</i>, <i>Acacia pulchella</i> Sedgeland: <i>Baumea</i>, <i>Gahnia</i>, <i>Lepidosperma</i> and <i>Juncus</i>. species</p>