VEGETATION MAPPING

OF SOUTH WEST FOREST REGION

OF

WESTERN AUSTRALIA

PART 5 – APPENDIX E TO F

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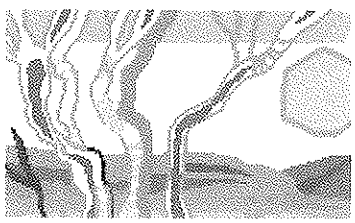

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Appendix E

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

INTRODUCTION

The following text provides an expanded legend for the ecological vegetation systems. The order of the ecological vegetation systems is arranged in the sequence that the agglomeration of the vegetation complexes was carried out, that is from the high to low rainfall in each of the main subregions, southern western, central and northern.

On the ecological vegetation system map, the legend represents a further stage of condensation, in that all dune systems of the southern and western sub-regions were dealt with together, as well as coastal plains and plateaus. Similarly in the central and northern subregions comparable landforms, such as lateritic uplands, were dealt with together.

This expanded version of the legend provides not only greater detail on the components of the ecological vegetation systems (**in bold**), the landforms, structure and composition of the vegetation, but also traces the process of agglomeration, documenting the vegetation complexes (***in italics and bold***) that contributed to a particular ecological vegetation system.

SOUTHERN SUBREGION

Southern dune systems

Qu9 Component vegetation complex ***Mu***.
Unstable dunes in hyperhumid zone. Mixture of bare sand, Coastal Complex and Grassland of **Ammophila arenaria*, mats of **Arctotheca populnifolia* and Closed Heath of *Olearia axillaris* and *Acacia cyclops*. Other associated species include *Senecio lautus* and *Carpobrotus* sp.

Py9 Component vegetation complexes ***Mc, Mp, Mr, My*** and ***E.***
Young stabilised dunes in hyperhumid zone. Coastal Complex and Closed Heath *of Acacia cochlearis, Hibbertia cuneiformis, Spyridium globulosum, Leucopogon parviflorus, Pimelea ferruginea, Acacia littorea* to Low Woodland of *Agonis flexuosa*.

Po9 Component vegetation complexes ***Ms*** and ***Mf***.
Old stabilised dunes in hyperhumid zone. Woodland of *Agonis flexuosa* to Open Forest of *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata, Eucalyptus cornuta, Eucalyptus megacarpa*. On optimum sites, Tall Open Forest of *Eucalyptus diversicolor*. The understorey shrub and herb species include *Hibbertia furfuracea, Lepidosperma effusum, Bossiaea linophylla, Billardiera variifolia, Tremandra stelligera, Leucopogon australis* and *Macrozamia riedlei*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

Southern coastal swamps and damplands - Estuarine swamps

Zv9 Component vegetation complex ***OW***.
Estuarine swamps in hyperhumid zone. Sedgeland *of Meeboldina scariosa, Baumea vaginalis, Lepyrodia drummondiana*, Closed Heath of *Hakea varia, Hakea ceratophylla, Astartea fascicularis* to Open Woodland of *Melaleuca cuticularis* and Tall Shrubland of *Agonis juniperina*. Associated shrub and herb species *include Patersonia occidentalis, Anthotium humile* and *Pericalymma ellipticum*.

Southern coastal swamps and damplands - Swampy depressions and plains of the southern coastal plain and hinterland

Gw9 Component vegetation complexes ***BW, BWp, Wp*** and ***KO***.
Fresh water swamps and damplands with sandy rises in hyper humid zones. Vegetation ranges from Sedgeland of *Anarthria scabra, Anarthria prolifera, Lyginia barbata, Evandra aristata* and Heath of *Agonis parviceps, Acacia hastata, Beaufortia sparsa, Adenanthos obovatus, Dasypogon bromeliifolius, Acacia myrtifolia* to Woodland of *Banksia ilicifolia, Banksia littoralis, Nuytsia floribunda, Eucalyptus patens* and *Eucalyptus megacarpa*. On rises, Woodland of *Eucalyptus marginata* subsp. *marginata, Allocasuarina fraseriana, Banksia attenuata*.

Sv9 Component vegetation complexes ***BU*** and ***Pi***.
Swampy plains with granitic and lateritic rises in hyperhumid zone. Vegetation ranges from Sedgeland of *Anarthria prolifera, Hypolaena exsulca, Empodisma gracillimum, Lepidosperma leptostachyum, Xyris lanata, Evandra aristata* through Heath of *Pultenaea reticulata, Adenanthos obovatus, Agonis linearifolia, Agonis parvicèps, Homalospermum firmum* to Woodland of *Eucalyptus patens, Eucalyptus megacarpa, Melaleuca preissiana* on flats and *Eucalyptus marginata* subsp. *marginata, Corymbia calophylla* on rises. Understorey on rises *Acacia pentadenia, Agonis hypericifolia, Podocarpus drouynianus, Bossiaea linophylla*.

Bw8 Component vegetation complexes ***A, CT, F, HA*** and ***Q***.
Subcoastal swamps and damplands in hyper and perhumid zones. Vegetation ranges from Sedgeland of *Evandra aristata, Anarthria scabra, Xyris lanata, Alexgeorgea ganopoda, Leptocarpus elegans* ms, *Anarthria prolifera,* Heath of *Pericalymma crassipes, Homalospermum firmum, Agonis parviceps, Agonis linearifolia, Banksia quercifolia, Kunzea sulphurea* to Woodland of *Melaleuca preissiana, Eucalyptus patens, Nuytsia floribunda, Banksia littoralis* and *Banksia ilicifolia*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Shallow coastal valleys

Kl9 Component vegetation complexes ***S1*** and ***V4***.
Shallow valleys on coastal plain in hyperhumid zone. Vegetation ranges from Tall Shrubland of *Agonis juniperina* through Woodland and Open Forest of *Eucalyptus patens, Eucalyptus megacarpa* to Tall Open Forest of *Eucalyptus diversicolor, Corymbia calophylla*. Second storey of *Allocasuarina decussata, Callistachys lanceolata, Agonis flexuosa*. Shrub understorey of *Agonis linearifolia, Astartea fascicularis, Acacia pentadenia, Trymalium floribundum*, with *Anigozanthos flavidus, Lepidosperma tetraquetrum.*

Iw8 Component vegetation complexes ***S3*** and ***S4***.
Shallow valleys in swampy terrain at the interface between the southern coastal plain and the hilly hinterland in the hyperhumid zone. Soils range from humus podzols in depressions to yellow duplex soils in swamps. Vegetation ranges from Open Woodland *of Melaleuca preissiana, Banksia littoralis* and *Nuytsia floribunda* in depressions to Woodland of *Eucalyptus marginata* subsp. *marginata* on the slopes. Shrub and sedge storey consists of *Astartea fascicularis, Agonis parviceps, Hakea varia, Beaufortia sparsa, Homalospermum firmum, Adenanthos obovatus, Anarthria scabra, Anarthria prolifera, Evandra aristata, Sphenotoma gracile* and *Mesomelaena tetragona*.

Iw6 Component vegetation complexes, ***S5*** and ***S6***.
Moderately incised headwater gullies at the southern margin of the Darling Plateau in the humid perhumid climate. Soils range from deep sands to yellow duplexes. The vegetation ranges from Shrubland and Sedgeland of *Agonis parviceps, Adenanthos cuneatus, Adenanthos obovatus, Dasypogon bromeliifolius, Anarthria prolifera, Anarthria scabra, Meeboldina coangustata, Homalospermum firmum, Evandra aristata, Leptocarpus tenax* through emergents or Open Woodland of *Melaleuca preissiana*, and *Banksia littoralis* to Woodland of *Allocasuarina fraseriana, Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* on slopes. Understorey on slopes *Melaleuca thymoides, Xanthorrhoea preissii, Hakea amplexicaulis, Xanthorrhoea preissii*.

Valleys in southern crystalline plateau with steep to moderate slopes

Ks8 Component vegetation complexes ***DO, WA, LF, V1, Vh2*** and ***Vh3***.
Deeply incised valleys in hilly coastal hinterland and southern margin of the Darling Plateau in hyper and perhumid zones. Dominant vegetation, Tall Open Forest of *Eucalyptus jacksonii, Eucalyptus guilfoylei* (within the vicinity of Walpole only), *Eucalyptus diversicolor, Eucalyptus patens, Corymbia calophylla* (throughout the range). Second storey *of Agonis juniperina, Callistachys lanceolata* (on stream lines only), *Allocasuarina decussata, Agonis flexuosa, Banksia grandis and Persoonia longifolia* (on slopes). Tall shrub storey of *Trymalium floribundum, Chorilaena quercifolium, Bossiaea aquifolium* subsp. *laidlawiana, Acacia pentadenia*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems (**bold**) and the vegetation complexes (***in italics and bold***).

Valleys in southern crystalline plateau with steep to moderate slopes (continued)

Km8 Component vegetation complexes ***PM1, WH1*** and ***YN1.***
Mildly to moderately incised valleys in the southern margin of the Darling Plateau in perhumid zone. Dominant vegetation, Tall Open Forest of *Eucalyptus diversicolor, Eucalyptus patens and Corymbia calophylla*. Second storey of *Banksia seminuda, Callistachys lanceolata, Agonis juniperina* on stream lines, *Agonis flexuosa, Allocasuarina decussata, Banksia grandis and Persoonia longifolia* on slopes. Shrub understorey of *Hovea elliptica, Bossiaea webbii, Bossiaea linophylla, Leucopogon verticillatus, Chorilaena quercifolia, Trymalium floribundum*, with sedge *Lepidosperma effusum*.

NM5 Component vegetation complexes, ***CB, ST*** and ***YN2***.
Mildly dissected valleys in the southern margin of the Darling Plateau in the humid zone, with yellow duplex soils. Vegetation ranges from Woodland of *Eucalyptus patens* and *Eucalyptus rudis* with second storey *of Banksia seminuda, Banksia littoralis, Callistachys lanceolata, Hakea oleifolia* and *Melaleuca preissiana* on the valley floor. Woodland of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* on slopes, with second storey of *Banksia grandis, Persoonia longifolia* and *Agonis flexuosa*. Shrub and herb storey consists of *Astartea fascicularis, Melaleuca viminea, Melaleuca incana, Anigozanthos flavidus, Trymalium floribundum, Leucopogon australis, Acacia saligna* on valley floor and *Pteridium esculentum, Leucopogon capitellatus, Hovea elliptica, Bossiaea ornata* and *Bossiaea linophylla* on slopes.

Mm5 Component vegetation complexes, ***CC1*** and ***GR.***
Moderately incised valleys in the Darling Plateau south and north of the Blackwood River in the humid zone. Soils range from shallow gritty loams on the steeper slopes through redish brown and yellow duplex soils to yellow brown loamy sand on the milder slopes. Vegetation ranges from Open Forest of *Eucalyptus patens* on valley floors to Open Forest *of Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* on slopes. Shrub and herb storey consists of *Hakea amplexicaulis, Pteridium esculentum, Xanthorrhoea preissii, Macrozamia riedlei, Phyllanthus calycinus, Bossiaea aquifolium* subsp. *aquifolium, Leucopogon propinquus, Leucopogon capitellatus, Clematis pubescens, Hibbertia hypericoides, Hakea amplexicaulis, Leucopogon propinquus, Pteridium esculentum, Hibbertia amplexicaulis, Acacia urophylla, Trymalium floribundum, Hibbertia commutata* and *Lasiopetalum floribundum*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

Valleys in southern crystalline plateau with steep to moderate slopes (continued)

Nm5 Component vegetation complexes, ***PM2, Va2, Va3, WH2*** and ***WL***.
Moderately to mildly incised valleys at the southern margin on the Darling Plateau in the humid zone, with red and yellow earths and duplex soils. Vegetation ranges from Woodland of *Eucalyptus rudis, Eucalyptus patens, Hakea oleifolia, Callistachys lanceolata* on the valley floor to Open Forest of *Eucalyptus marginata* subsp. *marginata, Corymbia calophylla*, more rarely *Eucalyptus cornuta*, with second storey *of Banksia grandis* and *Persoonia longifolia* on slopes. Shrub and herb storey of *Lepidosperma effusum, Chorizema ilicifolium, Agonis linearifolia, Baumea juncea, Tremandra diffusa* and *Xanthorrhoea preissii* on the valley floor and *Leucopogon verticillatus, Pteridium esculentum, Acacia urophylla, Hibbertia amplexicaulis, Macrozamia riedlei, Tremandra stelligera, Leucopogon capitellatus, Leucopogon propinquus, Hakea lissocarpha, Lomandra drummondii* and *Lomandra sericea* on slopes.

Uplands on southern crystalline plateau, red earth carrying Karri Forest

Ta8 Component vegetation complexes ***COb, Kb*** and ***MTb.***
Mild to moderately sloping uplands with red brown loamy soils, rising above the plateau and coastal plain in hyper and perhumid zones. Dominant vegetation, Tall Open Forest of *Eucalyptus jacksonii, Eucalyptus guilfoylei, Eucalyptus brevistylis* (near Walpole only), *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata.* Second storey of *Agonis flexuosa, Allocasuarina decussata, Banksia grandis*. Tall shrub understorey of *Chorilaena quercifolia, Acacia pentadenia, Trymalium floribundum, Pteridium esculentum, Hovea elliptica, Clematis pubescens* and *Billardiera floribunda.*

Kp8 Component vegetation complexes ***BEb*** and ***CRb***.
Ridges and upper slopes with red brown earths and duplexes, at the southern margin of Darling Plateau, in perhumid zone. Dominant vegetation Tall Open Forest of *Eucalyptus diversicolor, Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata*. Second storey of *Banksia grandis, Persoonia longifolia* and *Allocasuarina decussata*. Tall shrub storey *of Bossiaea aquifolium* subsp. *laidlawiana, Chorilaena quercifolia, Tremandra stelligera, Acacia urophylla, Bossiaea linophylla, Leucopogon verticillatus, Hovea elliptica, Hardenbergia comptoniana* and *Pteridium esculentum*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

Uplands on southern crystalline plateau, yellow duplex soils and lateritic carrying Jarrah Forest

Mp8 Component vegetation complexes ***BE1, BEy1, CO1, COy1, CRy, MT1*** and ***MTy1***.
Mildly sloping uplands with lateritic and yellow duplex soils at the southern margin of Darling Plateau and south coast hinterland in the hyper and perhumid zones. Dominant vegetation, Open Forest to Tall Open Forest of *Eucalyptus guilfoylei, Eucalyptus brevistylis* (near Walpole only), *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* through the range. Some minor intrusions of *Eucalyptus diversicolor*. Second storey of *Banksia grandis, Persoonia longifolia* and *Allocasuarina fraseriana*. Shrub storey of *Leucopogon verticillatus, Hovea chorizemifolia, Hovea elliptica, Hakea amplexicaulis, Macrozamia riedlei, Podocarpus drouynianus, Bossiaea linophylla, Grevillea trifida, Leucopogon verticillatus, Acacia urophylla* and *Clematis pubescens*.

Ja8 Component vegetation complexes, ***Ky*** and ***Ly***.
Mildly to moderately sloping uplands with lateritic and yellow duplex soils, on the hilly south coast hinterland in the perhumid hyperhumid zones. Dominant vegetation, Open Forest of *Eucalyptus guilfoylei, Eucalyptus brevistylis* (near Walpole only) *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*. Second storey of *Banksia grandis and Persoonia longifolia*. Shrub and herb storey of *Kingia australis, Leucopogon capitellatus, Leptomeria cunninghamii, Opercularia hispidula, Hibbertia amplexicaulis, Macrozamia riedlei, Hakea lissocarpha, Boronia gracilipes, Leucopogon verticillatus* and *Hovea elliptica*.

Ip8 Component vegetation complexes, ***COd*** and ***CRd***.
Mildly to moderately sloping uplands with some yellow duplex soils on the plateau and the rises above the plateau at the southern margin of the Darling Plateau in the perhumid zone. Dominant vegetation, Open Forest to Tall Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*. Second storey of *Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey of *Agonis parviceps, Agonis linearifolia, Lindsaea linearis, Xanthorrhoea preissii, Anarthria scabra, Patersonia umbrosa, Leucopogon australis, Bossiaea webbii, Lepidosperma effusum, Macrozamia riedlei, Adenanthos obovatus, Podocarpus drouynianus*.

Jp5 Component vegetation complexes, ***BE2, BEy2, CO2, COp2, COy2, MT2, MTp2, MTy2.*** and ***UC3.***
Mildly sloping uplands with lateritic and yellow duplex soils in the southern Darling Plateau in humid zone. Dominant vegetation is Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*, with second storey of *Banksia grandis, Persoonia longifolia* and *Allocasuarina fraseriana*. Shrub and herb storey consists of *Bossiaea linophylla, Hakea amplexicaulis, Agonis parviceps, Xanthosia rotundifolia, Leucopogon capitellatus, Acacia myrtifolia, Bossiaea ornata, Macrozamia riedlei, Leucopogon verticillatus* and *Clematis pubescens*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Uplands on southern crystalline plateau, yellow duplex soils and lateritic carrying Jarrah Forest (continued)

JP3 Component vegetation complexes, ***BE3*** and ***FH1***.
Uplands (upperslopes and ridges) at the southern margin of the Darling Plateau in the subhumid semiarid zones, with gravelly yellow duplex soils with some lateritic outcrops. Dominant vegetation is Woodland *of Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with some *Eucalyptus wandoo* and *Eucalyptus astringens* at the margins. There is weakly developed second storey of *Persoonia longifolia*. Shrub and herb storey consists of *Bossiaea ornata, Daviesia preissii, Hibbertia commutata, Macrozamia riedlei, Hakea lissocarpha, Dryandra sessilis* and *Lepidosperma tenue*.

Uplands in southern Darling Plateau and south coast hinterland, other than deep duplex soils with laterite

Ia8 Component vegetation complexes, ***COp1, Kp, Lp*** and ***MTp1.***
Moderate slopes with shallow gritty yellow duplex soils in the hilly south coast hinterland in the hyper perhumid zones. Dominant vegetation, Woodland to Open Forest of *Eucalyptus marginata* subsp. *marginata, Corymbia calophylla* and *Eucalyptus megacarpa*. Second storey *of Banksia grandis, Persoonia longifolia* to a lesser degree *Banksia attenuata* and *Nuytsia floribunda*. Shrub and herb storey of *Petrophile longifolia, Agonis parviceps, Synaphea petiolaris, Daviesia decurrens, Anarthria scabra, Adenanthos obovatus, Xanthosia candida, Banksia verticillata, Conospermum huegelii, Leucopogon unilateralis, Xanthosia rotundifolia, Lepidosperma squamatum, Eutaxia obovata, Andersonia sprengelioides, Hakea amplexicaulis* and *Podocarpus drouynianus*.

Ja4 Component vegetation complexes, ***BAf*** and ***PN.***
Slopes of hills rising above the southern margin of the Darling Plateau with gravelly yellow duplex soils on upper slopes and yellow podzolic soils on lower slope, in the humid subhumid zones. Vegetation ranges from Low Woodland of *Melaleuca rhaphiophylla* and *Callistachys lanceolata* on springs to Woodland of *Eucalyptus marginata* subsp. *marginata, Corymbia calophylla* and *Eucalyptus cornuta* on slopes. Weakly developed second storey of *Banksia grandis* and shrub and herb storey of *Agonis parviceps, Lepidosperma squamatum, Melaleuca thymoides* and *Mesomelaena tetragona*.

Ac8 Component vegetation complexes, ***BEs, Ks*** and ***Ls.***
Saddles and gentle slopes with sandy podzols in the hilly south coast hinterland in the perhumid hyperhumid zones. Vegetation ranges from Shrubland to Woodland of *Eucalyptus marginata* subsp. *marginata* and *Allocasuarina fraseriana*. Shrub and herb storey of *Kingia australis, Agonis parviceps, Acacia divergens, Anarthria scabra, Anarthria prolifera, Xanthosia candida, Burchardia umbellata, Adenanthos obovatus, Allocasuarina humilis, Johnsonia lupulina, Xanthosia rotundifolia, Mesomelaena tetragona, Leucopogon australis* and *Beaufortia decussata*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***)

Southern rocky steep slopes

Ra8 Component vegetation complexes, coastal, ***Gg*** and ***Kg***.
Steep slopes and crests of hills rising above the southern coastal plain with shallow gritty soils or bare rock in the perhumd hyperhumid zones. Vegetation is a mosaic of Lithic Complex (lichens, mosses), Herbfield, Heath and Woodland of *Eucalyptus brevistylis* (near Walpole only), *Eucalyptus megacarpa, Corymbia calophylla*. Shrub and herb storey of *Agonis linearifolia, Agonis marginata, Verticordia plumosa, Chamaescilla corymbosa, Cheilanthes austrotenuifolia, Dodonea ceratocarpa, Andersonia sprengelioides, Pimelea ferruginea* and dwarfed *Banksia grandis*.

Ms8 Component vegetation complexes ***WS2*** amd ***WSv***.
Moderate to steep slopes of the southern Darling Scarp with yellow and red duplex soils and earth in the humid to hyper humid zones. Vegetation ranges from Heath through Woodland to Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata*. Second storey of *Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey of *Xanthorrhoea preissii, Acacia pulchella, Acacia myrtifolia, Bossiaea linophylla, Bossiaea ornata, Hakea lissocarpha, Hakea amplexicaulis, Macrozamia riedlei, Leucopogon verticillatus, Leucopogon capitellatus, Hibbertia amplexicaulis* and *Acacia extensa*.

Rs7 Component vegetation complexes ***DS*** (southern).
Moderately sloping spurs and slopes of the southern Darling Scarp, with granite outcrops. Open Forest of *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata*, with weakly developed second storey of *Persoonia longifolia, Leucopogon verticillatus, Leucopogon capitellatus, Hakea amplexicaulis, Chorizema ilicifolium* and *Macrozamia riedlei*.

Rs5 Component vegetation complexes, ***BAg*** and ***Lg***.
Steep slopes and crests of hills rising above the southern Darling Plateau in the humid subhumid zones on shallow skeletal soils. Vegetation is a mosaic of Lithic Complex, Herbfield, Heath and Low Woodland of *Corymbia calophylla*. Components of the shrub layer consists of *Daviesia horrida, Hakea trifurcata, Dodonaea ceratocarpa, Hakea undulata, Trymalium floribundum, Desmocladus flexuosus, Verticordia plumosa* and *Eutaxia obovata*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

Overlay of coastal dunes over inland landforms

Jc8 Component vegetation complex ***HK***.
Sheets of aolian sand overlying crystalline rocks at the south western margin of the Darling Plateau in the hyperhumid zone. Soils range from humus podzols to red brown loamy sands over hardpan. Vegetation ranges from Woodland of *Banksia littoralis* and *Melaleuca preissiana*, through Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* to Tall Open Forest of *Eucalyptus diversicolor*. Second storey *of Agonis flexuosa, Banksia grandis, Persoonia longifolia*. Shrub and herb storey *Adenanthos obovatus, Dasypogon bromeliifolius, Agonis parviceps, Anarthria prolifera, Evandra aristata, Leucopogon australis* on deep moist leached sands to *Bossiaea linophylla, Hovea elliptica, Clematis pubescens, Leucopogon verticillatus, Leucopogon capitellatus, Leucopogon propinquus, Pteridium esculentum* and *Tremandra stelligera* on better drained loamy sands.

Semi-swampy uplands of southern Darling Plateau

Kv7 Component vegetation complex ***CP***.
Undulating terrain of low rises and shallow depressions near the southern margin of the Darling Plateau in the perhumid zone. Soils range from orange earth with bog iron pans and humus podzols in depressions to red and yellow earths and duplex soils on rises. Vegetation ranges from Woodland of *Melaleuca preissiana, Banksia littoralis* and *Callistachys lanceolata* in depressions to Tall Open Forest of *Corymbia calophylla* and *Eucalyptus diversicolor* with second storey of *Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey *Leucopogon verticillatus, Hovea elliptica, Pteridium esculentum, Podocarpus drouynianus* on rises, *Anarthria prolifera, Agonis parviceps, Leucopogon australis* in depressions.

Jw7 Component vegetation complex ***CL1***.
Gently undulating terrain of low rises and shallow depressions on the southern Darling Plateau in the perhumid zone. Soils range from gravelly yellow duplex soils on rises through sandy podzols to orange earth with bog iron pan in depressions. Vegetation ranges from Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey *of Banksia grandis, Persoonia longifolia* and *Allocasuarina fraseriana* on rises to Woodland of *Melaleuca preissiana* and *Banksia littoralis* in depressions. Shrub storey of *Bossiaea linophylla, Bossiaea ornata, Hovea trisperma, Macrozamia riedlei, Hakea amplexicaulis* and *Stirlingia latifolia* on rises; *Astartea fascicularis, Agonis linearifolia, Hypocalymma angustifolium, Mesomelaena tetragona, Leucopogon australis* and *Hakea varia* in depressions.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes (*in italics and bold*).

Semi-swampy uplands of southern Darling Plateau (continued)

Jw5 Component vegetation complexes, ***CL2*** and ***PP.***
Gently undulating uplands with low rises and swampy depressions in the humid subhumid zones of the southern Darling Plateau. Soils are yellow sandy duplex soils on rises and sandy podzols in depressions. Vegetation ranges from Woodland of *Melaleuca preissiana, Banksia littoralis* and *Hakea oleifolia* in depressions to Woodland or Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*, with understorey *of Persoonia longifolia, Allocasuarina fraseriana* and *Banksia grandis* on rises. Shrub and herb storey consists of *Bossiaea linophylla, Leucopogon australis, Hibbertia amplexicaulis, Cyathochaeta avenacea* on rises and *Boronia megastigma, Hypocalymma angustifolium, Leucopogon unilateralis* in depressions.

Shallow valleys and depressions with solonetzic soils

Sv6 Component vegetation complex ***CA***.
Extensive flat floored swampy plains with solonetzic and humus podzol soils among the hilly south coast hinterland in the humid perhumid zones. Dominant vegetation types are Sedgeland and Shrubland with some emergent *Melaleuca cuticularis, Nuytsia floribunda* and *Melaleuca preissiana,* with Woodland of *Banksia quercifolia, Banksia ilicifolia, Banksia attenuata* and *Corymbia ficifolia* (near Walpole only) on transition to uplands. Shrub and herb storey of *Agonis parviceps, Dampiera linearis, Leucopogon australis, Astartea fascicularis, Melaleuca densa, Chaetanthus aristatus, Hibbertia stellaris, Anarthria laevis, Evandra aristata, Homalospermum firmum, Callistemon glaucus, Meeboldina scariosa, Beaufortia sparsa, Adenanthos obovatus* and *Lepidosperma squamatum.*

Ev5 Component vegetation complex, ***S2***.
Minor headwater valleys at the southern margin of the Darling Plateau in the humid subhumid zone with yellow solonetzic and yellow duplex soils. Vegetation ranges from Open Woodland of *Melaleuca cuticularis* and *Eucalyptus occidentalis* on valley floors to Woodland *of Eucalyptus marginata* subsp. *marginata, Eucalyptus wandoo* and *Eucalyptus cornuta* on slopes. Shrub and herb storey consists of *Atriplex paludosa, Hakea varia, Hakea ceratophylla, Atriplex pumilio, Halosarcia* sp. and *Isolepis prolifera* on valley floors and *Acacia pulchella* subsp. *pulchella, Hakea lissocarpha, Hibbertia amplexicaulis, Astroloma pallidum, Baeckea camphorosmae* and *Hypocalymma angustifolium* on slopes.

Yv4 Component vegetation complexes, ***Bu, CM, MO*** and ***Wg***.
Shallow depressions in south coast hinterland and southern margin of the Darling Plateau in humid to semiarid zones. Soils range from unconsolidated clays and solonetz in depressions to sandy podzols on margins. Vegetation ranges from Open Woodland of *Melaleuca cuticularis and Eucalyptus occidentalis* in depressions to Woodland *of Banksia attenuata, Allocasuarina fraseriana* and *Eucalyptus marginata* subsp. m*arginata* on margins. Shrub and herb vegetation ranges from *Juncus pallidus, *Juncus bufonius, Samolus junceus, Harperia lateriflora, Baeckea astarteoides* in depressions to *Pultenaea reticulata, Adenanthos obovatus, Dasypogon bromeliifolius* and *Melaleuca thymoides* on slopes.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Shallow valleys and depressions with solonetzic soils

Zv4 Component vegetation complexes ***FH4, FH5, GD1, GD4*** and ***st.***
Valley floors and depressions in the Unicup Basin and Frankland and Gordon Valleys in subhumid zone. Soils range from sodic clays to yellow duplex soils. Vegetation is mainly Open Woodland of *Eucalyptus occidentalis* with some *Melaleuca cuticularis* and *Melaleuca preissiana* with *Eucalyptus decipiens* subsp. *chalara* and *Eucalyptus wandoo* on the margins. The understorey ranges from *Sporobolus virginicus, Salicornia* sp., *Hakea varia, Pericalymma ellipticum* and *Melaleuca viminea* in depressions to *Acacia extensa, Allocasuarina humilis, Mesomelaena tetragona* and *Hakea prostrata* on margins.

Shallow valleys and depressions

Gw6 Component vegetation complexes ***Nu, QN*** and ***SC.***
Swampy gullies and depressions with humus podzol and sandy yellow duplex soils near the southern margin of the Darling Plateau in the humid subhumid zones. Dominant vegetation is Woodland of *Eucalyptus marginata* subsp. *marginata, Melaleuca preissiana, Banksia littoralis* and *Corymbia calophylla.* Shrub and herb storey consists of *Agonis parviceps, Hakea varia, Astartea fascicularis, Synaphea reticulata, Beaufortia sparsa, Hibbertia amplexicaulis, Meeboldina scariosa, Lepidosperma squamatum, Hakea prostrata* and *Hypocalymma angustifolium.*

Jk6 Component vegetation complex, ***UC2.***
Mild lower slopes with deep grey sands in humid zone of the Unicup Basin. Vegetation ranges from Open Woodland of *Melaleuca preissiana* and *Banksia littoralis* downslope to Woodland of *Eucalyptus marginata* subsp. *marginata* and *Nuytsia floribunda* upslope with tall shrub storey of *Kunzea ericifolia, Bossiaea linophylla, Pultenaea reticulata* with *Anigozanthos flavidus.*

Gw5 Component vegetation complexes, ***KP*** and ***YR.***
Swampy plains with humus podzol and sandy yellow duplex soils (YR) and clays (KP only) on the southern Darling Plateau in the humid perhumid zones. Dominant vegetation is Woodland of *Banksia littoralis, Melaleuca preissiana* in depressions, *Banksia ilicifolia, Banksia grandis and Eucalyptus marginata* subsp. *marginata* on rises. There are also Sedgeland of *Meeboldina scariosa* and *Isolepis nodosa* and Shrubland *of Melaleuca densa.* The shrub and herb storey in the woodlands consists of *Adenanthos obovatus, Kingia australis, Mesomelaena tetragona, Hakea varia, Anarthria scabra, Agonis parviceps, Podocarpus drouynianus, Evandra aristata* and *Hypocalymma angustifolium.*

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Shallow valleys and depressions (continued)

Sw5 Component vegetation complexes, ***UC1*** and ***UC4***.
Swampy plains in the Unicup Basin with shallow sands over bogiron ore and shallow clay loams, in the humid subhumid zones. Vegetation ranges from Shrubland of *Melaleuca* spp. to Open Woodland *of Banksia ilicifolia, Melaleuca preissiana, Nuytsia floribunda* on sands and Woodland of *Eucalyptus occidentalis* and *Eucalyptus decipiens* subsp. *chalara* on the clay loams. The shrub and herb storey consists of *Agonis parviceps, Dasypogon bromeliifolius, Pultenaea reticulata, Anarthria prolifera, Adenanthos obovatus, Andersonia caerulea, Calytrix flavescens, Euchilopsis linearis, Hibbertia racemosa, Hibbertia stellaris, Xanthorrhoea preissii, Hakea varia, Hypocalymma angustifolium* and *Regelia ciliata*.

Sedimentary deposits within and south of Darling Plateau – crests and ridges

Jk8 Component vegetation complex ***Dc1*** and ***TR1***.
Mildly sloping uplands with gravelly sandy yellow duplex soils on sedimentary plateau in the south coast hinterland, in the perhumid hyperhumid zones. Dominant vegetation Woodland to Open Forest of *Eucalyptus marginata* subsp. *marginata*, and *Corymbia calophylla* with second storey of *Corymbia ficifolia* (near Walpole only), *Allocasuarina fraseriana, Nuytsia floribunda* and *Banksia grandis*. Shrub and herb storey of *Agonis parviceps, Adenanthos obovatus, Dasypogon bromeliifolius, Anarthria prolifera, Melaleuca thymoides, Strangea stenocarpoides, Synaphea obtusata, Petrophile longifolia, Xanthosia rotundifolia, Bossiaea linophylla, Leucopogon verticillatus* and *Leucopogon australis*.

Jg6 Component vegetation complexes, ***Dc2, MI, R*** and ***TR2***.
Broadly undulating uplands on sedimentary deposits south of the Darling Plateau in humid zone. Soils are gravelly sandy yellow duplex with some laterite outcrops. Dominant vegetation is Woodland to Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with minor admixture of *Eucalyptus staeri*. Second storey of *Banksia grandis, Allocasuarina fraseriana*. Shrub and herb storey of *Agonis hypericifolia, Agonis parviceps, Podocarpus drouynianus, Adenanthos obovatus, Adenanthos cuneatus, Lyginia barbata* and *Melaleuca thymoides*.

Jc6 Component vegetation complexes, ***QP, QT*** and ***TP***.
Crests and upper slopes of low hills of sedimentary material on the southern Darling Plateau in the humid subhumid zones. The soils are mainly podzols and sandy duplex soils with lateritic outcrops. Dominant vegetation is Woodland of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey of *Podocarpus drouynianus, Acacia extensa, Bossiaea linophylla, Leucopogon capitellatus, Leucopogon racemulosus, Melaleuca thymoides* and *Dasypogon bromeliifolius*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Sedimentary deposits within and south of Darling Plateau – slopes and valleys

Ak6 Component vegetation complexes, ***Ds, S7*** and ***S8.***
Lower slopes and depressions in sedimentary terrain south of the Darling Plateau in humid zone. Soils are deep sands and iron podzols. Vegetation ranges from Shrubland to Woodland of *Eucalyptus staeri, Allocasuarina fraseriana, Banksia grandis, Banksia attenuata* and *Nuytsia floribunda.* Shrub and herb storey consists of *Callistemon glaucus, Beaufortia sparsa, Evandra aristata* and *Agonis parviceps* in depressions and *Adenanthos obovatus, Xanthosia rotundifolia, Hakea ruscifolia, Anarthria scabra, Leucopogon australis, Stirlingia latifolia* and *Dasypogon bromeliifolius* on slopes.

Mn5 Component vegetation complexes, ***V7*** and ***V8.***
Broad shallow valleys in sedimentary terrain south of the Darling Plateau in perhumid to humid zones. Soils are sands, gravelly and loamy duplex. Vegetation ranges from Tall Open Forest with *Eucalyptus diversicolor* and *Corymbia calophylla* with a second storey *of Agonis flexuosa, Allocasuarina decussata* in the perhumid zone to Woodland of *Eucalyptus occidentalis* and *Melaleuca cuticularis* in the humid zone. Shrub and herb storey ranges from *Bossiaea linophylla, Leucopogon verticillatus, Pteridium esculentum, Hovea elliptica* under Tall Open Forest to *Agonis parviceps, Evandra aristata, Callistemon glaucus* and *Gahnia trifida* under the woodland.

Sw6 Component vegetation complexes ***f*** and ***t.***
Floors and terraces of rivers in the humid perhumid zone of the south coast and hinter land. Soils are alluvial soils ranging from humus podzols and deep sands to yellow duplex soils. The vegetation ranges from Sedgeland of *Evandra aristata, Anarthria prolifera, Anarthria scabra* on the most severely waterlogged soils through Heath of *Pultenaea reticulata, Adenanthos obovatus, Agonis parviceps, Callistemon glaucus, Beaufortia sparsa* and emergents or Open Woodland of *Melaleuca preissiana, Banksia littoralis, Eucalyptus occidentalis* and *Melaleuca cuticularis* on better drained sites to Woodland of *Eucalyptus marginata* subsp. *marginata, Corymbia calophylla, Allocasuarina fraseriana, Banksia grandis, Banksia attenuata and Eucalyptus staeri* at transition to slopes.

Moderate valley slopes

Wm4 Component vegetation complexes, ***CC2, FH2, FH3, GD2, JP2, WH3, Ya, YE*** and ***Yef.***
Mild to moderate valley slopes with some included swampy floors at the southern margin of the Darling Plateau in the subhumid semi arid zone. Soils are mainly yellow duplexes with sand to sandy loam topsoil. Vegetation ranges from Shrubland of *Melaleuca viminea, Melaleuca incana, Hakea prostrata, Acacia saligna* with emergents of *Eucalyptus rudis* and *Melaleuca preissiana* to Woodland of *Eucalyptus wandoo* and *Corymbia calophylla*, with some *Eucalyptus marginata* subsp. *marginata* and *Eucalyptus astringens* near uplands. Shrub and herb storey of the woodland consists of *Hakea lissocarpha, Macrozamia riedlei, Leucopogon capitellatus, Trymalium ledifolium, Baeckea camphorosmae* and *Lepidosperma squamatum.*

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

SOUTHERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

Moderate valley slopes (continued)

Ig3 Component vegetation complexes, ***Mm*** and ***Pu***.
Low rises on the south eastern Darling Plateau in the subhumid semiarid zones with sandy and gravelly duplex soils derived from bogiron. Dominant vegetation is Woodland of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with an understorey of *Banksia grandis* and shrub and herb storey of *Bossiaea linophylla, Bossiaea ornata, Xanthorrhoea humilis, Macrozamia riedlei, Leucopogon capitellatus, Lepidosperma tenue, Hibbertia commutata* and *Petrophile serruriae*.

WESTERN SUBREGION

South western dunes

Qu8 Component vegetation complex, ***DE5***.
Unstable dunes in perhumid zone, consisting of deep lime-rich sand with low water holding capacity. Vegetation ranges from bare sand with mats of *Carpobrotus* sp., **Arctotheca populnifolia*, through Coastal Complex to Grassland of **Ammophila arenaria* to Heath of *Olearia axillaris* and *Spyridium globulosum*.

Py8 Component vegetation complexes, ***D5, Dr*** and ***Drd.***
Young stabilised sand dunes in perhumid zone, consisting of dark grey calcareous sands over limestone. Vegetation ranges from Shrubland to Low Woodland of Agonis flexuosa, with associated species such as the shrubs *Acacia littorea, Spyridium globulosum, Leucopogon parviflorus, Lobelia tenuior, Rhagodia baccata, Hibbertia cuneiformis* and sedges *Lepidosperma gladiatum, Lepidosperma squamatum* and *Anigozanthos flavidus*.

Po8 Component vegetation complexes, ***D, Dd*** and ***Dd5.***
Old stabilized dunes in perhumid zone, consisting of sandy podzols over pale brown non-calcareous sand. Vegetation ranges from Shrubland of *Agonis parviceps, Leucopogon australis, Hibbertia cuneiformis* with emergents of *Nuytsia floribunda* and *Banksia attenuata* through Woodland *of Agonis flexuosa, Eucalyptus cornuta* and *Eucalyptus megacarpa* to Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata*. On optimum sheltered sites Tall Forest of *Eucalyptus diversicolor*. Associated shrub, climber and herb species in the forest *Hardenbergia comptoniana, Clematis pubescens, Pteridium esculentum, Macrozamia riedlei, Leucopogon capitellatus* and *Leucopogon verticillatus*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

WESTERN SUBREGION (continued)

Ecological vegetation systems (in **bold**) and the vegetation complexes (***in italics and bold***).

Western dunes

Qu7 Component vegetation complexes, ***KB, kBe*** and ***KE***.
Exposed dunes in hyperhumid to humid zones, consisting of lime rich sands with low waterholding capacity. Vegetation mainly Shrubland of *Melaleuca huegelii, Pimelea ferruginea, Olearia axillaris, Spyridium globulosum, Acacia littorea* with sedges *Lepidosperma gladiatum* and *Isolepis nodosa*.

Py7 Component vegetation complexes, ***GE, Ge, KEf, Kf*** and ***Kr.***
Young stabilised dunes of brownish yellow sand overlying limestone. Vegetation ranges from Shrubland of *Spyridium globulosum, Scaevola crassifolia, Rhagodia baccata, Melaleuca huegelii* and *Dryandra sessilis* to Woodland of *Agonis flexuosa* with understorey of *Hibbertia potentilliflora, Hibbertia cuneiformis, Hardenbergia comptoniana, Phyllanthus calycinus, Macrozamia riedlei* and *Xanthorrhoea pressii*.

Ko9 Component vegetation complexes, ***G2, G3, Gk*** and ***Gv***.
Lee side of old stabilized dunes consisting of deep brown sand over limestone at depth. Vegetation mainly Tall Open Forest *of Eucalyptus diversicolor* with admixture of *Corymbia calophylla* in hyperhumid perhumid zones, reduced to Open Forest to Woodland of *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata* and *Eucalyptus cornuta* in humid zone. Second storey of *Agonis flexuosa*. Shrub and herb storey *of Pteridium esculentum, Clematis pubescens, Hardenbergia comptoniana, Hibbertia potentilliflora, Bossiaea linophylla, Podocarpus drouynianus, Chorilaena quercifolia, Acacia alata, Hibbertia grossulariifolia* and *Macrozamia riedlei*.

Estuarine swamps

Sv8 Component vegetation complex, ***Bwy***.
Fringing estuarine flats in perhumid zone consisting of mixed clays, loams and sands. Vegetation ranging from Sedgeland of *Baumea juncea, Baumea vaginalis, Lepyrodia drummondiana, Meeboldina scariosa* through Heath of *Hakea varia* and *Hakea ceratophylla* to Woodland *of Melaleuca cuticularis*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

WESTERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

Swampy depressions and plains

Sw7 Component vegetation complexes, ***Bw, CV, Sw, Swd*** and ***Swi.***
Low lying coastal plain in perhumid zone, subject to seasonal inundation with leached grey sands over ironstone. Vegetation mainly Sedgeland of *Anarthria prolifera, Anarthria scabra, Meeboldina scariosa, Schoenus efoliatus, Phlebocarya ciliata, Lyginia barbata* and Heath of *Adenanthos obovatus, Adenanthos detmoldii, Boronia spathulata, Hakea ceratophylla, Hakea sulcata, Calothamnus lateralis, Hibbertia stellaris, Homalospermum firmum, Philotheca spicata, Agonis parviceps, Agonis linearifolia, Pericalymma ellipticum.* Emergents and Open Woodland of *Nuytsia floribunda, Viminaria juncea, Melaleuca preissiana, Banksia ilicifolia, Banksia littoralis*, stunted *Eucalyptus marginata* subsp. *marginata.*

Sw4 Component vegetation complexes, ***Adw, Aw, Lw*** and ***Qw.***
Shallow gullies and depression in humid zone with seasonally waterlogged sandy duplex soils. Vegetation ranges from Shrubland *of Melaleuca viminea, Melaleuca teretifolia, Hakea varia, Pericalymma ellipticum* with low emergents of *Viminaria denutata* to Woodland *of Eucalyptus rudis, Melaleuca rhaphiophylla* and *Agonis linearifolia.* The components of the understorey include *Gahnia trifida, Baumea juncea, Lepidosperma longitudinale, Lobelia alata* and *Isolepis producta.*

Ac7 Component vegetation complexes, ***Ad, Bd, Cd, Hd, Nd, Sd, Sd2, Td, Wd*** and ***Yd.***
Low sandy rises above coastal plains and plateaux in humid to perhumid zones with deep bleached sands. Vegetation ranges from Low Woodland of *Banksia attenuata, Banksia ilicifolia, Nuytsia floribunda, Agonis flexuosa* to Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Banksia grandis and Xylomelum occidentale.* The shrub and herb storey is composed of *Melaleuca thymoides, Leucopogon reflexus, Leucopogon australis, Petrophile linearis, Calytrix flavescens, Lyginia barbata, Pultenaea reticulata, Agonis parviceps, Xanthorrhoea preissii, Podocarpus drouynianus, Mesomelaena tetragona, Dasypogon bromeliifolius* and *Adenanthos obovatus.*

South western flats

Mk8 Component vegetation complexes, ***B, Ba, Bf*** and ***JA.***
Moderately well drained sub coastal flats and terraces in perhumid zone, with soils ranging from sandy duplexes to alluvial loams. Vegetation ranges from Woodland of *Corymbia calophylla* with *Agonis flexuosa* through Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* to Tall Open Forest of *Eucalyptus diversicolor* on optimum sites. Second storey consists of *Agonis flexuosa, Persoonia longifolia, Hakea oleifolia* and *Xylomelum occidentale.* The associated shrub and herb species are *Hovea elliptica, Pteridium esculentum, Anigozanthos flavidus, Kennedia coccinea, Hakea amplexicaulis, Leucopogon capitellatus, Leucopogon propinquus, Acacia urophylla* and *Bossiaea linophylla.*

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

WESTERN SUBREGION (continued)

Ecological vegeta..on systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

South western flats (continued)

Mb5 Component vegetation complexes, ***AB, AF, Af*** and ***Yf.***
Better drained and more fertile portions of the southern Swan Coastal Plain, with sandy to loamy yellow duplex soils. Dominant vegetation is Woodland to Open Forest of *Corymbia calophylla* with second storey of *Agonis flexuosa, Banksia grandis, Persoonia longifolia, Acacia saligna*, and understorey of *Kingia australis, Pteridium esculentum, Acacia extensa, Acacia pulchella, Brachysema praemorsum, Leucopogon capitellatus, Hypocalymma angustifolium, Billardiera variifolia.*

South western exposed coastal rocky slopes

Qm7 Component vegetation complexes, ***We WE*** and ***WEw***.
Seaward slopes of crystalline plateau in hyperhumid to humid zones with shallow loamy duplex soils or bare rock. Vegetation is reduced to Low Open Woodland of *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* or in extreme cases to Heath or Sedgeland. Shrub and herb species are *Pteridium esculentum, Tremandra stelligera, Tetrarrhena laevis, Acacia alata, Xanthorrhoea preissii, Bossiaea disticha* and *Lepidosperma leptostachyum.*

Ms6 Component vegetation complexes, ***Cr, Mv*** and ***Wr***.
Steep rocky slopes associated with valleys incised into the Margaret River Plateau in the humid perhumid zones. Soils are mainly shallow duplex soils. Vegetation ranges from Lithic Complex, Herbfield through Heath to Woodland of *Corymbia calophylla* with *Agonis flexuosa* and *Banksia grandis*. Shrub and herb storey consists of *Hakea lissocarpha, Hibbertia hypericoides, Gastrolobium spinosum, Calothamnus sanguineus, Hypocalymma, angustifolium, Hemigenia incana, Hakea trifurcata, Dodonaea ceratocarpa, Verticordia plumosa* and *Cryptandra arbutiflora.*

Valleys in south western crystalline plateau

Km9 Component vegetation complexes, ***Cw1, Hw, Wl*** and ***Ww1***.
Mildly to moderately incised valleys in the Margaret River Plateau, with red brown earths, red brown duplex and yellow duplex soils. Vegetation ranges from Tall Shrubland of *Agonis linearifolia, Mirbelia dilatata, Callistachys lanceolata* and *Trymalium floribundum* (on valley floors) to Tall Open Forest of *Eucalyptus diversicolor* with second storey *of Agonis flexuosa, Allocasuarina decussata, Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey species are *Lepidosperma tetraquetrum, Lepidosperma effusum, Agonis linearifolia, Trymalium floribundum* on valley floor and *Chorilaena quercifolia, Acacia urophylla, Bossiaea linophylla, Tremandra stelligera, Pteridium esculentum* and *Leucopogon verticillatus* on valley slopes.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

WESTERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Valleys in south western crystalline plateau

Mm6 Component vegetation complexes, ***Cw2, W2*** and ***Ww2***.
Valleys incised into the Margaret River Plateau in the humid, perhumid zones with soils ranging from yellow duplex soils to red earths. Dominant vegetation is Open Forest of *Corymbia calophylla* with admixture of *Eucalyptus patens* on lower slopes and *Eucalyptus marginata* subsp. *marginata* on upper slopes. The second storey consists of *Hakea lasianthoides, Agonis flexuosa, Banksia grandis* and *Persoonia longifolia*. The understorey components include *Agonis linearifolia, Mirbelia dilatata, Acacia alata, Astartea fascicularis* on the floor and *Pteridium esculentum, Hovea elliptica, Leucopogon verticillatus, Macrozamia riedlei, Logania vaginalis and Opercularia hispidula* on the slopes.

South western crystalline uplands

Jp9 Component vegetation complexes, ***C1*** and ***H.***
Uplands of the Margaret River plateau in hyperhumid, perhumid zones, mainly with gravelly yellow brown duplex soils. Dominant vegetation Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey species are *Leucopogon verticillatus, Leucopogon capitellatus, Pteridium esculentum, Bossiaea linophylla, Bossiaea ornata, Hovea elliptica, Macrozamia riedlei, Hibbertia hypericoides* and *Agonis parviceps*.

Jp6 Component vegetation complexes, ***C2*** and ***M.***
Mildly undulating uplands in humid perhumid zones, with gravelly duplex soils and outcrops of laterite. Dominant vegetation is Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Persoonia longifolia, Banksia grandis, Xylomelum occidentale*. Shrub and herb storey consists of *Xanthorrhoea preissii, Xanthorrhoea gracilis, Adenanthos barbiger, Hakea amplexicaulis, Daviesia incrassata* and *Hakea lissocarpha*.

Jm8 Component vegetation complexes, ***MP*** and *SS*.
Uplands and slopes on basaltic parent material in the perhumid zone of the Blackwood Plateau, with soils ranging from gravelly sandy duplex on uplands to red earths on slopes. Vegetation is Open Forest *of Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*, with second storey of *Banksia grandis* and *Persoonia longifolia*. Shrub and herb components of the understorey are *Leucopogon verticillatus, Pteridium esculentum, Bossiaea linophylla, Hovea trisperma, Macrozamia riedlei, Clematis pubescens, Leucopogon capitellatus, Acacia urophylla* and *Hibbertia amplexicaulis*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

WESTERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

Valleys and depressions in south western plateau

Bk7 Component vegetation complexes, ***BD, CE, JN, Nw, Tw*** and ***Yw***.
Shallow valleys in the humid, perhumid zone of the Blackwood Plateau, predominantly with humus podzols on floors and sandy yellow duplex soils on slopes. Vegetation is mainly Woodland of *Eucalyptus patens, Allocasuarina fraseriana, Agonis flexuosa, Hakea lasianthoides, Eucalyptus marginata* subsp. *marginata, Corymbia calophylla, Melaleuca preissiana, Banksia littoralis*. Shrub and herb species are *Mirbelia dilatata, Agonis linearifolia, Agonis parviceps, Hakea lissocarpha, Podocarpus drouynianus, Acacia divergens, Dasypogon hookeri, Kingia australis* and *Adenanthos obovatus*.

Blackwood sedimentary Plateau – uplands and slopes

Jn5 Component vegetation complexes, ***CSs*** and ***WC***.
Slopes of the Whicher Scarp, with sands, sands over laterite and gravelly yellow duplex soils. Dominant vegetation is Woodland to Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Corymbia haematoxylon, Allocasuarina fraseriana, Banksia grandis, Banksia attenuata, Banksia ilicifolia, Xylomelum occidentale* and *Persoonia elliptica*. The components of the understorey include *Hakea ruscifolia, Stirlingia latifolia, Bossiaea eriocarpa, Adenanthos miesneri, Melaleuca thymoides, Podocarpus drouynianus, Dasypogon bromeliifolius, Mesomelaena tetragona*.

Mn6 Component vegetation complexes, ***BK, JL, RO*** and ***WCv***.
Slopes of valleys moderately to strongly incised into the Blackwood Plateau in the humid perhumid zones, with gravelly or sandy yellow duplex soils. Dominant vegetation is Open Forest of *Corymbia calophylla and Eucalyptus marginata* subsp. *marginata*, with second storey *of Banksia grandis, Persoonia longifolia* and *Xylomelum occidentale*. Shrub and herb storey consists of *Hakea lissocarpha, Macrozamia riedlei, Mesomelaena tetragona, Bossiaea ornata, Podocarpus drouynianus, Bossiaea linophylla, Leucopogon capitellatus* and *Adenanthos barbiger*.

Jg5 Component vegetation complexes, ***BN, GA, KI, N, T, TL*** and ***Y***.
Undulating uplands and upper slopes in the humid-perhumid zones, with yellow duplex and humus podzol soils. Dominant vegetation is Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*, with second storey of *Banksia grandis, Allocasuarina fraseriana, Persoonia longifolia, Xylomelum occidentale*. Shrub and herb storey consists of *Bossiaea ornata, Hovea chorizemifolia, Isopogon sphaerocephalus, Podocarpus drouynianus, Adenanthos obovatus, Leucopogon australis, Lindsaea linearis, Leucopogon verticillatus* and *Dasypogon hookeri*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

WESTERN SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes ***(in italics and bold)***.

Blackwood sedimentary Plateau – uplands and slopes

Fw5 Component vegetation complexes ***DP, LY, PR*** and ***SW***.
Floors and lower slopes of major valleys dissecting the Blackwood Plateau in the humid perhumid zone. The soils are alluvials ranging from sands to loams. Vegetation ranges from Woodland of *Eucalyptus rudis* with *Banksia seminuda* on valley floor to Open Forest of *Corymbia calophylla* and *Eucalyptus patens* with *Agonis flexuosa* on terraces and lower slopes. Shrub and herb species are *Agonis linearifolia, Trymalium floribundum, Astartea fascicularis, Lepidosperma effusum, Hypocalymma angustifolium* on the floor and *Pteridium esculentum, Acacia urophylla, Bossiaea linophylla, Bossiaea ornata* on lower slopes.

CENTRAL SUBREGION

Mild lower slopes and floors of major valleys

Fv5 Component vegetation complexes, ***BLf, BTf, ML*** and ***SP***.
Valley floors and lower slopes in the humid zone of the central Darling Plateau, with alluvial and colluvial soils ranging from sandy loams to clay loams. Vegetation ranges from Woodland of *Eucalyptus rudis* with *Melaleuca rhaphiophylla* on the floors to Open Forest of *Eucalyptus patens* and *Corymbia calophylla* with *Hakea lasianthoides* on lower slopes. Shrub and herb storey consists of *Astartea fascicularis, Lepidosperma squamatum, Lepidosperma tetraquetrum, Agonis linearifolia, Gahnia trifida* on the floor and *Pteridium esculentum, Trymalium floribundum, Chorizema ilicifolium, Leucopogon capitellatus, Leucopogon propinquus, Hibbertia amplexicaulis* and *Hakea lissocarpha* on lower slopes.

Fv4 Component vegetation complexes, ***CP1*** and ***NWf1***.
Valley floors, terraces and lower slopes of the major valleys incised into the subhumid zone of the central Darling Range. Soils range from sandy and loamy alluvials on the floors to red brown earths on slopes. Vegetation ranges from Woodland of *Eucalyptus rudis* with *Melaleuca rhaphiophylla* and *Acacia saligna* on floors to Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* on terraces and lower slopes. Shrub and herb storey ranges from *Melaleuca viminea, Hakea varia* and *Isolepis nodosa* on valley floors to *Macrozamia riedlei, Phyllanthus calycinus, Clematis pubescens, Hibbertia amplexicaulis, Leucopogon capitellatus* on slopes.

Fv3 Component vegetation complexes, ***BR, CP2, GW*** and ***NWf2***.
Valley floor, terraces and lower slopes of major streams in subhumid and semiarid zones of the central Darling Plateau. Soils range from saline wet soils through deep sandy duplexes to brown loamy earth. Vegetation ranges from Woodland of *Eucalyptus rudis* with *Melaleuca rhaphiophylla* frequently affected by salinity to Woodland of *Eucalyptus wandoo, Corymbia calophylla* and *Acacia saligna*. Shrub and herb storey consists *of Astartea fascicularis, Juncus pallidus, Hypocalymma angustifolium* and *Hakea prostrata* on valley floor and *Phyllanthus calycinus, Bossiaea eriocarpa, Brachysema praemorsum* and *Hakea lissocarpha* on slopes.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

CENTRAL SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Mild lower slopes and floors of major valleys (continued)

Cv1 Component vegetation complexes, ***Dk5, Dk5f, Fa4*** and ***Fa5.***
Near level broad depressions and valley floors in the semiarid to arid zones of the central Darling Plateau, with some lunettes. Soils range from solonetz and yellow duplex soils in depressions to deep sands on lunettes. Vegetation ranges from Shrubland through Woodland of *Eucalyptus rudis* and *Casuarina obesa* to Woodland of *Corymbia calophylla, Banksia prionotes* and *Acacia acuminata* on lunettes. Shrub and herb storey consists of *Atriplex pumilioa, *Cyperus tenellus, Harperia lateriflora, Hakea prostrata, Hakea varia, Melaleuca viminea, Salicornia* sp. on depressions, *Jacksonia furcellata, Jacksonia sternbergiana, Conostylis serrulata and Dianella revoluta* on lunettes.

Valleys deeply incised into the central Darling Plateau

Ms5 Component vegetation complexes, ***BL, BT*** and ***Lo.***
Moderate to steep slopes of major valleys in the humid zone of central Darling Plateau with red and yellow earths and duplex soils. Vegetation ranges from Woodland of *Eucalyptus wandoo* to Open Forest *of Corymbia calophylla, Eucalyptus patens* and *Eucalyptus marginata* subsp. *marginata*, with weakly developed second storey of *Banksia grandis* and *Persoonia longifolia.* Shrub and herb storey consists of *Leucopogon verticillatus, Macrozamia riedlei, Hakea lissocarpha, Hibbertia amplexicaulis, Kennedia coccinea, Leucopogon capitellatus, Clematis pubescens, Chorizema ilicifolium, Pteridium esculentum.*

Ms4 Component vegetation complexes, ***DMg*** and ***NWg1.***
Steep rocky slopes of major valleys incised into the subhumid zone of the central Darling Range. Soils range from bare rock to yellow and red brown duplexes with loamy topsoil. Vegetation ranges from Herbfield and Heath through Woodland *of Allocasuarina huegeliana, Acacia acuminata* and *Eucalyptus wandoo* to Open Forest of *Corymbia calophylla.* Shrub and herb storey ranges from *Hakea undulata, Borya sphaerocephala, Darwinia citriodora and Phyllanthus calycinus* near rock to *Macrozamia riedlei, Hakea lissocarpha, Clematis pubescens, Xanthorrhoea preissii, Leucopogon capitellatus* on slopes.

Ds2 Component vegetation complexes, ***Dk3, Fa3*** and ***NWg2.***
Steep valley slopes in semiarid to arid zones of the central Darling Plateau with red brown gravelly duplex soils and shallow skeletal soils. Vegetation ranges from Lithic Complex, Herbfield and Heath through Low Woodland of *Allocasuarina huegeliana, Acacia acuminata* and *Eucalyptus rudis* to Woodland of *Eucalyptus wandoo* and *Eucalyptus astringens.* Shrub and herb storey ranges from *Hakea undulata, Borya sphaerocephala, Cheilanthes austrotenuifolia, Hypocalymma angustifolium* on skeletal soils to *Gastrolobium calycinum, Hakea lissocarpha, Phyllanthus calycinus, Macrozamia riedlei* and *Trymalium ledifolium* on deeper soils.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

CENTRAL SUBREGION (continued)

Ecological vegetation systems **(in bold)** and the vegetation complexes (***in italics and bold***).

Valleys into the central Darling Plateau

Mm4 Component vegetation complexes, ***LK1*** and ***NW1***.
Moderate slopes of valleys incised into the subhumid zone of the central Darling Range. Soils are mainly red brown duplexes and earths and yellow duplexes. Dominant vegetation is Open Forest of *Corymbia calophylla* with *Eucalyptus marginata* subsp. *marginata* near uplands and *Eucalyptus wandoo* and *Eucalyptus rudis* near streamlines. Shrub and herb storey consists of *Macrozamia riedlei, Phyllanthus calycinus, Leucopogon capitellatus, Hibbertia amplexicaulis, Hakea lissocarpha* and *Acacia pulchella.*

Wm2 Component vegetation complexes, ***Dk2, Dk4, Fa2, NW2*** and ***LK2***.
Moderate slopes of valleys in the semiarid to arid zones of the central Darling Plateau with yellow brown duplex soils, less frequently deep leached sand. Dominant vegetation is Woodland of *Eucalyptus wandoo* with second storey of *Acacia acuminata, Acacia microbotrya* and *Hakea prostrata*, with *Eucalyptus rudis* downslope and *Eucalyptus marginata* subsp. *marginata* and *Eucalyptus astringens* upslope. Shrub and herb storey consists of *Allocasuarina humilis, Ptilotus manglesii, Sollya heterophylla, Hakea lissocarpha, Macrozamia riedlei* on duplex soils. Woodland of *Banksia attenuata* and *Eucalyptus marginata* subsp. *marginata* with *Mesomelaena tetragona, Stirlingia latifolia, Phlebocarya ciliata, Petrophile linearis* on sands.

Lateritic Uplands in the central Darling Plateau

Jp4 Component vegetation complex, ***DM1***.
Upper slopes and ridges in the subhumid zone of the central Darling Range with gravelly yellow and red duplex soils. Dominant vegetation is Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* with second storey of *Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey consists of *Dryandra sessilis, Macrozamia riedlei, Bossiaea ornata, Hakea lissocarpha, Hibbertia commutata* and *Leucopogon capitellatus*.

Jp3 Component vegetation complexes, ***DM2*** and ***SD.***
Upper slopes and ridges in the semiarid zone of the central Darling Range with gravelly yellow and red duplex soils. Dominant vegetation is Woodland to Open Forest of *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata* and *Eucalyptus wandoo*, with second storey of large *Dryandra sessilis*. Shrub and herb storey consists of *Macrozamia riedlei, Bossiaea ornata, Hakea lissocarpha, Hibbertia commutata* and *Leucopogon capitellatus*. Also some *Borya sphaerocephala* on granite outcrops.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

CENTRAL SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Lateritic Uplands in the central Darling Plateau (continued)

Lp2 Component vegetation complexes, ***Bo1, Dk1*** and ***Fa1***.
Upper slopes, ridges and minor plateaux in the semiarid arid zones of the central Darling Plateau, with gravelly or loamy duplex soils and outcrops of laterite. Dominant vegetation is Woodland of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with weakly developed second storey of *Persoonia longifolia* and large *Dryandra sessilis*, with enclaves of *Eucalyptus drummondii* mallee and with *Eucalyptus wandoo* and *Eucalyptus astringens* on transition to slopes. Shrub and herb storey consists of *Gastrolobium spinosum, Dryandra armata, Xanthorrhoea preissii, Trymalium ledifolium, Bossiaea ornata, Bossiaea eriocarpa, Hakea lissocarpha, Hibbertia commutata* and *Hovea chorizemifolia*.

Swampy uplands in the central Darling Plateau

Jv4 Component vegetation complex, ***KU1***.
Mildly undulating upland of low rises and swampy depressions in the subhumid zone of the central Darling Range. Soils range from gravelly duplexes on rises to sandy podzols in depressions. Vegetation ranges from Woodland of *Eucalyptus rudis, Eucalyptus decipiens* subsp. *chalara* and *Melaleuca preissiana* in depressions to Woodland of *Eucalyptus marginata* subsp. *marginata, Corymbia calophylla* and *Eucalyptus wandoo* on rises. Second storey is *Acacia saligna* on depressions and *Dryandra sessilis* on rises. Shrub and herb storey consists of *Juncus pallidus, Hakea varia* in depressions and *Macrozamia riedlei, Hakea lissocarpha, Bossiaea ornata and Leucopogon capitellatus* on rises.

Jv3 Component vegetation complex, ***KU2***.
Mildly undulating upland of low rises and swampy depressions of the central Darling Range in the semiarid to arid zone. Soils range from gravelly duplexes on rises to sandy podzols in depressions. Vegetation ranges from Woodland of *Eucalyptus rudis, Eucalyptus decipiens* subsp. chalara and *Melaleuca preissiana* in depressions to Woodland of *Eucalyptus marginata* subsp. *marginata, Corymbia calophylla* and *Eucalyptus wandoo* on rises. Second storey is *Acacia saligna* on depressions and *Dryandra sessilis* on rises. Shrub and herb storey consists *of Juncus pallidus, Hakea varia* and *Melaleuca viminea* in depressions and *Macrozamia riedlei, Hakea lissocarpha, Bossiaea ornata, Brachysema praemorsum* and *Bossiaea eriocarpa* on rises.

Swamps of central Darling Plateau

Gw3 Component vegetation complexes, ***KUw*** and ***QUw***.
Floors of upland depressions in the semiarid zone of the central Darling Range with iron podzols and saline wet soils. Vegetation ranges from Sedgeland of *Baumea articulata* and *Baumea juncea* through Woodland of *Melaleuca preissiana, Melaleuca cuticularis, Eucalyptus rudis, Banksia littoralis* with *Hakea sulcata, Hypocalymma angustifolium, Astartea fascicularis* and *Hakea varia* to Woodland of *Eucalyptus wandoo* with *Baeckea camphorosmae, Gastrolobium calycinum* and *Hakea lissocarpha*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

CENTRAL SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Slopes and valleys in sedimentary deposits of the central Darling Plateau

Ac3 Component vegetation complexes, ***Bo1s, QU*** and ***QUs***.
Mild slopes between uplands and depressions in the semiarid to arid zones of the central Darling Plateau, with deep sands and sandy podzols. Vegetation ranges from Low Woodland of *Banksia attenuata* and *Nuytsia floribunda* to Woodland of *Eucalyptus marginata* subsp. *marginata and Corymbia calophylla* with shrub and herb storey of *Kunzea ericifolia, Patersonia occidentalis, Macrozamia riedlei, Stirlingia latifolia, Calytrix flavescens* and *Allocasuarina humilis*.

NORTHERN REGION

Valleys deeply incised into the northern Darling Plateau

MS5 Component vegetation complex, ***He1.***
Deeply incised, steeply sloping valleys at the western margin of the northerm Darling Plateau, in the humid zone. Soils range from bare rock and skeletal sandy loams to yellow and brown duplex soils. Vegetation ranges from Lithic Complex, Herbfield and Heath to Woodland of *Corymbia calophylla, Eucalyptus rudis, Eucalyptus laeliae* and *Allocasuarina huegeliana*. Shrub and herb storey of *Borya spherocephala, Darwinia citriodora, Grevillea bipinnatifida, Cheilanthes austrotenuifolia, Hakea undulata and Hakea trifurcata* on shallow soils to *Bossiaea aquifolium* subsp. *aquifolium, Hovea elliptica, Pteridium esculentum, Clematis pubescens, Acacia urophylla* and *Macrozamia riedlei* on deeper soils.

WS2 Component vegetation complex, ***He2.***
Deeply incised steeply sloping valleys at the western margin of the northerm Darling Plateau in the subhumid to arid zones. Soils range from bare rock and skeletal gritty loams to yellow and brown duplex soils. Vegetation ranges from Lithic Complex, Herbfield and Heath to Woodland *of Eucalyptus wandoo, Corymbia calophylla* and *Allocasuarina huegeliana*. Shrub and herb storey of *Borya sphaerocephala, Darwinia citriodora, Grevillea bipinnatifida, Cheilanthes austrotenuifolia, Hakea undulata* and *Hakea trifurcata* on shallow soils to *Trymalium ledifolium, Hakea lissocarpha, Grevillea pilulifera, Phyllanthus calycinus* and *Macrozamia riedlei* on deeper soils.

Ds0 Component vegetation complex, ***Bi.***
Steep slopes of major valleys in the arid perarid zones of the northern Darling Plateau, with soils ranging from shallow skeletal soils to red brown earth and duplexes. Vegetation ranges from Herbfield and Heath through Low Woodland of *Acacia acuminata* and *Allocasuarina huegeliana* to Woodland of *Eucalyptus loxophleba* and *Eucalyptus wandoo*, with *Eucalyptus accedens* on transition to uplands. Shrub and herb species are *Dianella revoluta, Stypandra glauca, Cheilanthes austrotenuifolia, Chamaescilla corymbosa* and *Haemodorum paniculatum*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

NORTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Valleys deeply incised into the northern Darling Plateau

Wm1 Component vegetation complex, *Mi.*
Moderately steep slopes of valleys incised into the semiarid perarid zones of the northern Darling Plateau, with soils ranging from skeletal soils to yellow and red duplex soils. Vegetation ranges from Lithic Complex, Herbfield and Heath through Low Woodland of *Allocasuarina huegeliana* and *Acacia acuminata* to Woodland of *Eucalyptus wandoo* with *Eucalyptus astringens* and *Eucalyptus accedens, Eucalyptus marginata* subsp. *thalassica* and *Corymbia calophylla* on transition to uplands. Shrub and herb storey ranges from *Borya sphaerocephala, Hakea undulata, Haemodorum laxum, Cheilanthes austrotenuifolia, Dodonaea viscosa* on shallow soils to *Gastrolobium spinosum, Trymalium ledifolium, Bossiaea eriocarpa, Hibbertia commutata* on deeper soils.

Valleys moderately incised into the northern Darling Plateau

NM6 Component vegetation complex, ***My1***.
Major valleys moderately incised into the humid zone of the northern Darling Plateau, with red brown earth and red and yellow duplex soils. Vegetation ranges from Woodland of *Eucalyptus patens* over *Banksia seminuda, Callistachys lanceolata* and *Agonis flexuosa* on valley floor to Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* with second storey of *Banksia grandis* and *Persoonia longifolia* on slopes. Shrub and herb storey of *Grevillea diversifolia, Trymalium floribundum, Hypocalymma cordifolium, Lepidosperma tetraquetrum* and *Chorizema ilicifolium* on valley floor to *Bossiaea aquifolium* subsp. *aquifolium, Leucopogon verticillatus, Leucopogon capitellatus, Macrozamia riedlei, Acacia urophylla* and *Pteridium esculentum* on slopes.

WM2 Component vegetation complex, **My2.**
Major valleys moderately incised into the subhumid to arid zones of the northern Darling Plateau, with red brown earth and red and yellow duplex soils. Vegetation ranges from Woodland *of Eucalyptus patens, Eucalyptus rudis* with *Melaleuca rhaphiophylla* on valley floor to Woodland of *Eucalyptus wandoo* and *Corymbia calophylla* on slopes. Shrub and herb storey of *Lepidosperma squamatum, Hypocalymma angustifolium, Astartea fascicularis* on valley floor to *Hakea lissocarpha, Diplolaena drummondii, Baeckea camphorosmae, Gastrolobium calycinum, Leucopogon capitellatus* on slopes.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

NORTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Valleys mildly incised into the northern Darling Plateau

Hl6 Component vegetation complexes, ***Yg1*** and ***Yg2***.
Minor valleys shallowly incised into the humid zone of the northern Darling Plateau, with soils ranging from orange earths and humus podzols on valley floor to red and yellow gravelly duplex soils on slopes. Vegetation ranges from Woodland of *Eucalyptus megacarpa, Eucalyptus patens*, with *Banksia littoralis* and tall shrub and sedge storey of *Agonis linearifolia, Lepidosperma tetraquetrum, Astartea fascicularis*, and *Mesomelaena tetragona* and *Gahnia trifida* on valley floor to Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Banksia grandis, Persoonia longifolia* and *Allocasuarina fraseriana* on slopes. Shrub and herb storey under the forest consists of *Grevillea wilsonii, Styphelia tenuiflora, Adenanthos barbiger, Hakea ruscifolia, Lechenaultia biloba, Baeckea camphorosmae and Hakea lissocarpha.*

Wl1 Component vegetation complex, ***Ck.***
Minor valleys mildly to moderately incised into the semiarid perarid zones of the northern Darling Plateau, with mainly yellow and red duplex soils of varying depth. Vegetation mainly Woodland of *Eucalyptus wandoo* with *Eucalyptus rudis* in streamlines and *Eucalyptus accedens* on transition to uplands. Shrub and herb storey consists of *Phyllanthus calycinus, Bossiaea eriocarpa, Bossiaea ornata, Macrozamia riedlei, Trymalium ledifolium, Lasiopetalum cardiophyllum.*

Wl2 Component vegetation complex, ***Pn***.
Minor valleys shallowly incised into the subhumid to arid zones of the northern Darling Plateau, with soils ranging from sandy to gravelly duplexes. Vegetation is primarily Woodland of *Eucalyptus wandoo* and *Corymbia calophylla* with *Eucalyptus rudis* and *Eucalyptus patens* near streamlines and *Eucalyptus accedens* and *Eucalyptus marginata* subsp. *thalassica* on transition to uplands. Shrub and herb storey ranges from shrublands of *Kunzea recurva, Lepidosperma leptostachyum, Hakea varia, Hakea ceratophylla, Melaleuca viminea, Melaleuca incana, Hypocalymma angustifolium* and *Meeboldina scariosa* on valley floors *to Hakea lissocarpha, Macrozamia riedlei, Patersonia rudis* and *Hakea incrassata* on slopes.

Lateritic Uplands of the northern Darling Plateau

JP6 Component vegetation complexes, ***D1*** and ***HR***.
Upland ridges and spurs in the humid zone of the northern Darling Plateau, with gravelly duplex soils and lateritic outcrops. Dominant vegetation is Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Allocasuarina fraseriana, Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey consists of *Adenanthos barbiger, Hovea chorizemifolia, Styphelia tenuiflora* on the sandier soils and *Leucopogon verticillatus, Leucopogon capitellatus, Pteridium esculentum, Clematis pubescens, Hakea lissocarpha* on the loamier soils.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

NORTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

JP4 Component vegetation complex, ***D2***.
Upland ridges and spurs in the subhumid zone of the northern Darling Plateau, with gravelly duplex soils and lateritic outcrops. Dominant vegetation is Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Allocasuarina fraseriana, Banksia grandis* and *Persoonia longifolia*. Shrub and herb storey consists of *Adenanthos barbiger, Lechenaultia biloba, Hakea ruscifolia, Hovea chorizemifolia, Styphelia tenuiflora* on the sandier soils *and Leucopogon propinquus, Leucopogon capitellatus, Hakea lissocarpha* on the loamier soils.

Lateritic Uplands of the northern Darling Plateau

Ip3 Component vegetation complexes, ***D3, D4*** and ***MH***.
Upland ridges and spurs in the semiarid zone of the northern Darling Plateau, with gravelly duplex soils and lateritic outcrops. Dominant vegetation is Woodland to Open Forest of *Eucalyptus marginata* subsp. *thalassica* and *Corymbia calophylla* with weakly developed second storey of *Allocasuarina fraseriana, Banksia grandis* and *Persoonia longifolia*. Some intrusion from the slopes of *Eucalyptus wandoo* and *Eucalyptus accedens*. Shrub and herb storey consists of *Patersonia rudis, Lechenaultia biloba, Hakea ruscifolia, Petrophile serruriae, Styphelia tenuiflora* on the sandier soils and *Gastrolobium calycinum, Leucopogon propinquus, Leucopogon capitellatus, Hakea lissocarpha, Macrozamia riedlei* on the loamier soils.

Vp2 Component vegetation complex, ***Y5***.
Upland ridges and spurs in the semiarid to arid zones of the northern Darling Plateau, with gravelly duplex soils and lateritic outcrops. Dominant vegetation is Woodland of *Eucalyptus marginata* subsp. *thalassica, Corymbia calophylla, Eucalyptus accedens* and *Eucalyptus wandoo*, with weakly developed second storey of tall *Dryandra sessilis*. Some intrusion from the slopes of *Eucalyptus astringens*. Shrub and herb storey consists of *Lechenaultia biloba, Petrophile serruriae, Styphelia tenuiflora* on the sandier soils and *Gastrolobium calycinum, Leucopogon capitellatus, Hakea lissocarpha and Macrozamia riedlei* on the loamier soils.

Vp1 Component vegetation complex, ***Y6***.
Upland ridges and spurs in the semiarid to perarid zones of the northern Darling Plateau, with gravelly duplex soils and lateritic outcrops. Dominant vegetation is Woodland of *Eucalyptus accedens, Eucalyptus wandoo, Corymbia calophylla* and some *Eucalyptus marginata* subsp. *thalassica*. Weakly developed second storey of tall *Dryandra sessilis*. Some intrusion from the slopes of *Eucalyptus astringens*. Shrub and herb storey consists of *Daviesia preissii, Hibbertia commutata, Dryandra bipinnatifida, Leucopogon nutans, Lechenaultia biloba, Petrophile serruriae, Styphelia tenuiflora* on the sandier soils and *Gastrolobium calycinum, Leucopogon capitellatus, Hakea lissocarpha, Trymalium ledifolium, Hakea erinacea* and *Macrozamia riedlei* on the loamier soils.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

NORTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Rocky slopes on northen Darling Plateau

Rs4 Component vegetation complex, ***DS***.
Steep slopes of the northern Darling Scarp in the semiarid to humid zone, with numerous granitic and doleritic outcrops and shallow skeletal soils. Vegetation ranges from Lithic Complex, Herbfield, Heath to Woodland of *Corymbia calophylla, Eucalyptus wandoo, Eucalyptus laeliae* and *Allocasuarina huegeliana*. Common shrub and herb species are *Borya sphaerocephala, Grevillea bipinnatifida, Hakea undulata, Hakea lissocarpha, Trymalium ledifolium, Hakea trifurcata, Calothamnus graniticus*.

Rs3 Component vegetation complex, ***Ce.***
Moderate to steep slopes of monadnocks rising above the northern Darling Plateau in the subhumid to semiarid zones. Soils range from bare rock and skeletal sandy loams through red brown duplex soils to gravelly yellow duplexes. Vegetation ranges from Lithic Complex, Herbfield, Heath through Woodland of *Corymbia calophylla, Eucalyptus wandoo, Eucalyptus laeliae* and *Allocasuarina huegeliana* to Open Forest of *Eucalyptus marginata* subsp. *marginata, Corymbia calophylla* on milder slopes with deep soils. Common shrub and herb species are *Borya sphaerocephala, Grevillea bipinnatifida, Hakea undulata, Hakea lissocarpha, Trymalium ledifolium, Hakea trifurcata* on shallow soils; *Adenanthos barbiger, Grevillea wilsonii, Styphelia tenuiflora* and *Hovea chorizemifolia* on deep gravels.

Mild lower slopes and floors of major valleys in northern Darling Plateau

Ev2 Component vegetation complexes, ***No*** and ***Wi.***
Floors and terraces of major valleys incised into the semiarid to perarid zones of the northern Darling Plateau. Soils represent a range of alluvial materials from loamy sands to clay loams. Vegetation mainly woodland of *Eucalyptus rudis* and *Casuarina obesa* with *Melaleuca rhaphiophylla* with *Eucalyptus wandoo, Eucalyptus loxophleba* and *Acacia acuminata* at transition to uplands. Shrub and herb storey consists *of Astartea fascicularis, Hypocalymma angustifolium, Meeboldina scariosa, Samolus junceus, Halosarcia pergranulata, Frankenia tetrapetala, Isolepis setiformis, Triglochin mucronatum,* Juncus acutus* and *Cotula coronopifolia* on valleys floors, *Gastrolobium calycinum, Hakea lissocarpha, Mesomelaena tetragona* and *Daviesia preissii* on transition to uplands.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

NORTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Uplands within the northern Darling Plateau

Ic6 Component vegetation complexes, ***DB3*** and ***QW.***
Moderate slopes and rises formed on sedimentary deposits in the humid zone of the central Darling Range. Soils are yellow brown gravelly duplexes. Vegetation is Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* with second storey of *Persoonia longifolia and Banksia grandis*, with Woodland of *Eucalyptus rudis* and *Agonis flexuosa* on streamlines. Shrub and herb storey consists of *Leucopogon capitellatus, Hakea lissocarpha, Bossiaea ornata, Bossiaea eriocarpa, Hakea amplexicaulis, Macrozamia riedlei* and *Acacia lateriticola* on slopes, *Agonis linearifolia* and *Grevillea diversifolia* on streamlines.

Ic5 Component vegetation complexes, ***BO, KR*** and ***QWf.***
Mild lower slopes and valleys on sedimentary deposits in the humid zone of the central Darling Range. Soils range from humus podzols through sands to yellow brown duplex. Vegetation ranges from woodland of *Melaleuca preissiana, Banksia littoralis* and *Eucalyptus rudis* in depressions to open forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*, with second storey of *Xylomelum occidentale, Nuytsia floribunda* and *Banksia attenuata* on slopes. Shrub and herb storey ranges *from Melaleuca viminea, Hakea varia, Agonis linearifolia, Astartea fascicularis* in depressions to *Bossiaea eriocarpa, Acacia extensa, Xanthorrhoea preissii, Anigozanthos manglesii, Melaleuca thymoides, Adenanthos meisneri* and *Stirlingia latifolia* on slopes.

Sedimentary uplands within the northern Darling Plateau including Collie and Wilga Basins

JG4 Component vegetation complex, ***WG.***
Undulating uplands in the subhumid zone of the central Darling Plateau, with sandy duplex soils. Dominant vegetation is Woodland to Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*, with weakly developed second storey of *Persoonia longifolia* and *Banksia grandis*. Shrub and herb storey consists of *Bossiaea ornata, Trymalium ledifolium, Lepidosperma tenue, Bossiaea eriocarpa, Adenanthos obovatus, Acacia extensa, Lepidosperma scabrum, Hypocalymma angustifolium, Xanthorrhoea gracilis*.

Jg4 Component vegetation complex, ***CI.***
Mildly undulating uplands on sedimentary material of the Collie Basin in the humid subhumid zones, with gravelly sandy duplex soils with some lateritic outcrop. Vegetation is Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*. Second storey of *Allocasuarina fraseriana, Banksia grandis* and *Xylomelum occidentale*. Shrub and herb storey of *Adenanthos barbiger, Bossiaea ornata, Hovea chorizemifolia, Daviesia incrassata, Hakea lissocarpha, Leucopogon capitellatus*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

NORTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Slopes and valleys in sedimentary deposits within the northern Darling Plateau

Ac4 Component vegetation complex, ***CF.***
Mild valley slopes on the sedimentary material of the Collie Basin in the humid subhumid zones, with deep leached sands. Dominant vegetation is Woodland of *Eucalyptus marginata* subsp. *marginata, Allocasuarina fraseriana, Banksia attenuata, Banksia ilicifolia.* Shrub and herb storey of *Banksia meisneri, Kunzea vestita, Lepidosperma squamatum, Leucopogon glabellus, Bossiaea eriocarpa, Stirlingia latifolia, Schoenus brevifolius, Adenanthos obovatus and Leptocarpus tenax.*

Ac2 Component vegetation complex, ***G.***
Mild sandy slopes on the uplands of the northern Darling Plateau in the humid to arid zones, with deep pale leached soils. Vegetation ranges from Low Open Woodland of *Melaleuca preissiana* and *Banksia littoralis* on lower slopes to Woodland of *Eucalyptus marginata* subsp. (*thalassica* in the NE and *marginata* in the SW), *Banksia attenuata, Banksia menziesii* and *Nuytsia floribunda.* Shrub and herb storey is *Hakea varia, Hakea ceratophylla, Pericalymma ellipticum, Leptocarpus tenax* on lower slopes *and Conospermum stoechadis, Stirlingia latifolia, Petrophile linearis, Scholtzia involucrata, Hibbertia subvaginata, Eremaea pauciflora* and *Patersonia occidentalis* on upper slopes.

Gw4 Component vegetation complex, ***MJ*** and ***SK.***
Shallow valleys in the sedimentary material of the Collie and Wilga Basin in the humid subhumid zones, with humus podzols and deep leached sands. Vegetation ranges from Woodland of *Eucalyptus patens, Melaleuca preissiana* and *Banksia littoralis* on valley floors to *Banksia ilicifolia, Banksia attenuata* and *Xylomelum occidentale* on lower slopes. Shrub and herb storey of *Hakea ceratophylla, Agonis linearifolia, Hypocalymma angustifolium, Pericalymma ellipticum* on floors and *Adenanthos obovatus, Dasypogon bromeliifolius, Meeboldina scariosa, Phlebocarya ciliata, Conostephium pendulum* and *Lysinema ciliatum* on lower slopes.

Swampy depressions

SW3 Component vegetation complex, **S.**
Floors of broad valleys and depressions in the northern Darling Plateau with bleached loamy or sandy duplex soil, seasonally waterlogged. Dominant vegetation is Sedgeland of *Baumea articulata, Meeboldina cana, Meeboldina scariosa,* Shrubland of *Melaleuca lateriflora, Melaleuca viminea, Melaleuca pauciflora, Melaleuca lateritia, Hakea marginata, Hakea varia, Hakea ceratophylla* with emergents of *Actinostrobus pyramidalis, Melaleuca preissiana* and *Banksia littoralis.*

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

NORTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Swampy depressions

Cw0 Component vegetation complex, ***Wn.***
Low lying depression at the interface of the Dandaragan and Darling Plateaux in the perarid zone with leached grey sands over iron organic hardpan. Vegetation ranges from Sedgeland of *Samolus junceus and Meeboldina coangustata*; Halophytic Complex of *Halosarcia pergranulata* and *Halosarcia indica* subsp. *bidens* through Shrubland of *Hypocalymma angustifolium, Pericalymma ellipticum, Melaleuca teretifolia, Kunzea vestita, Regelia ciliata* to Woodland of *Casuarina obesa, Banksia littoralis* and *Melaleuca preissiana.*

SWAN COASTAL PLAIN

Footslopes of the Darling Scarp (Ridge Hill Shelf)

Ic2 Component vegetation complex, ***Fo.***
Footslopes of the Darling Scarp, at the transition to the Swan Coastal Plain, in the form of sandy and gravelly spurs separated by valleys of streams draining the Darling Plateau in the subhumid to arid zones. Vegetation ranges from fringing Woodland of *Eucalyptus rudis and Melaleuca rhaphiophylla* on streamlines, through Woodland of *Allocasuarina fraseriana, Banksia attenuata, Banksia menziesii, Banksia grandis, Xylomelum occidentale, Eucalyptus todtiana* and *Nuytsia floribunda* on sands and Open Woodland to Open Forest of *Eucalyptus marginata* subsp. *elegantella, Corymbia calophylla* and *Eucalyptus wandoo* on loamier or more gravelly soils. The shrub and herb understorey ranges from *Stirlingia latifolia, Petrophile linearis, Bossiaea eriocarpa, Conostephium pendulum* on sands to *Dryandra sessilis, Macrozamia riedlei* and *Mesomelaena tetragona* on gravels.

Well drained alluvial plains

Mb2 Component vegetation complex, ***Gu.***
Better drained and heavier textured portions of the eastern Swan Coastal Plain, in subhumid to semiarid zone with yellow duplex soils. Dominant vegetation is Woodland of *Corymbia calophylla*, with *Eucalyptus wandoo* and *Eucalyptus marginata* subsp. *marginata* as associates. There is a weakly developed second stratum of *Banksia grandis* and tall *Kingia australis*. Shrub and herb stratum is composed of *Xanthorrhoea preissii, Dryandra lindleyana, Hibbertia hypericoides, Synaphaea petiolaris, Mesomelaena tetragona* and *Cyathochaeta avenacea*. In the wetter portions there is Woodland of *Eucalyptus rudis* with understorey species such *as Hakea ceratophylla* and *Pericalymma ellipticum*. There is also restricted occurrence of *Eucalyptus lane-poolei*.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

NORTHERN SUBREGION (continued)

Ecological vegetation systems (**in bold**) and the vegetation complexes (***in italics and bold***).

Depressions west of the Darling Plateau

Cv2 Component vegetation complexes, ***Br, Co*** and ***Yn***.
Depressions and low rises in the subhumid arid zone of north eastern Swan Coastal plain, with wide range of soil from saline and solonetzic soils to deep sands. Vegetation ranges from Shrubland of *Melaleuca teretifolia, Melaleuca hamulosa, Hakea varia, Hakea prostrata* with emergents of *Actinostrobus pyramidalis* through Woodland of *Casuarina obesa* to Woodland of *Banksia attenuata, Eucalyptus todtiana, Banksia ilicifolia, Nuytsia floribunda* and *Corymbia calophylla*. The understorey of the Casuarina Woodland consists of *Cotula coronopifolia, Isolepsis producta* and **Crassula natans*.

Uplands and valleys of the Dandaragan Plateau

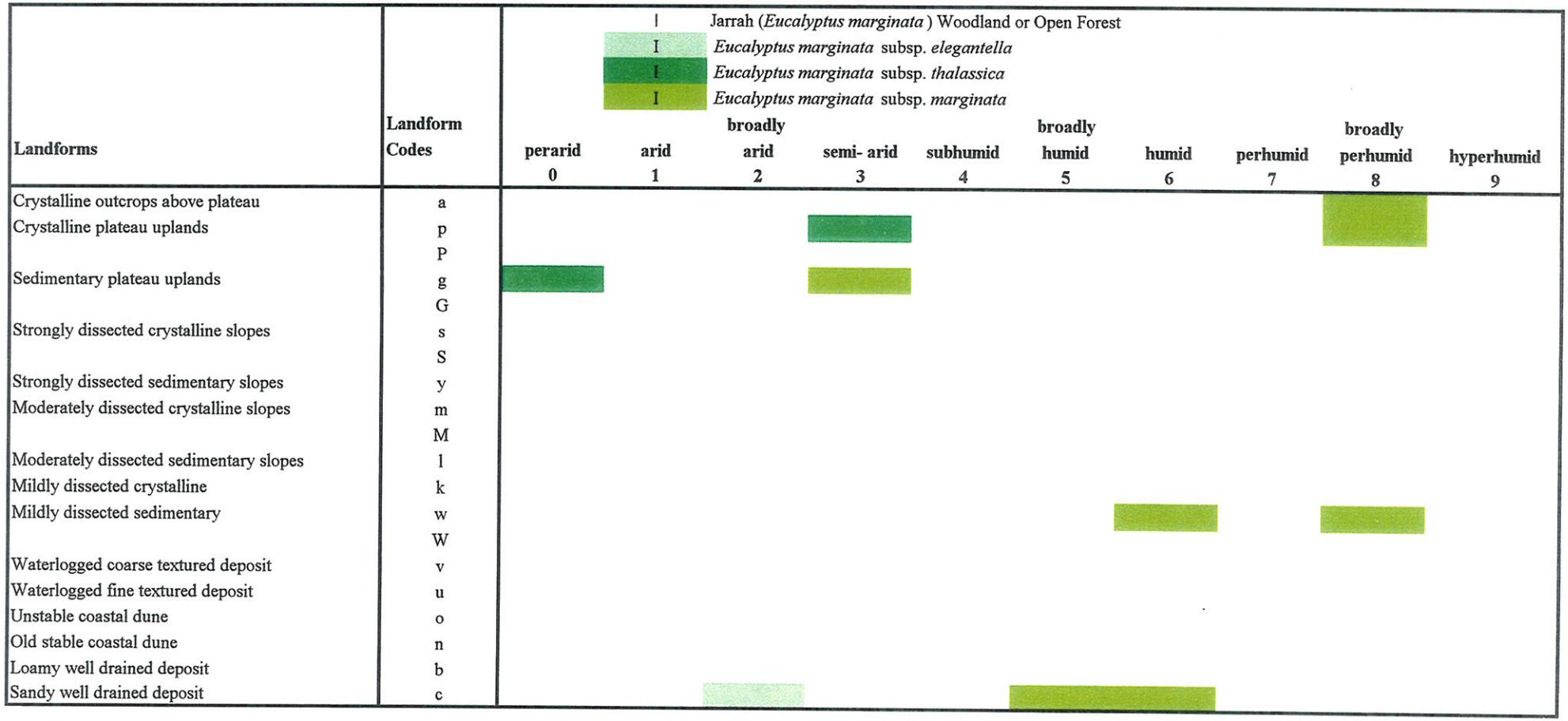
Ano Component vegetation complexes ***Mh*** and ***Re***.
Valleys and escarpments of the Dandaragan Plateau in the arid perarid zone with yellow brown gravelly sands. Dominant vegetation is Low Woodland of *Banksia attenuata, Banksia menziesii, Banksia prionotes* and *Eucalyptus todtiana* with a shrub and herb storey of *Petrophile linearis, Allocasuarina humilis, Mesomelaena pseudostygia, Daviesia gracilis, Conostephium pendulum*. There is an admixture of *Corymbia calophylla* on more fertile sites and woodland of *Eucalyptus rudis* and *Melaleuca rhaphiophylla* along streamlines.

Ig0 Component vegetation complexes, ***Cu, K*** and ***Mb***.
Sandy and gravelly uplands in the arid perarid zone of the Dandaragan Plateau. Dominant vegetation is Woodland of *Corymbia calophylla* with admixture of *Eucalyptus marginata* subsp. *thalassica* and a second storey of *Nuytsia floribunda, Eucalyptus todtiana, Banksia attenuata, Banksia menziesii, Banksia prionotes* and *Banksia ilicifolia*. The shrub and herb understorey consists of *Stirlingia latifolia, Daviesia decurrens, Calothamnus sanguineus, Bossiaea eriocarpa, Petrophile linearis, Leptocarpus tenax, Hakea ruscifolia*.

Lakes and Water

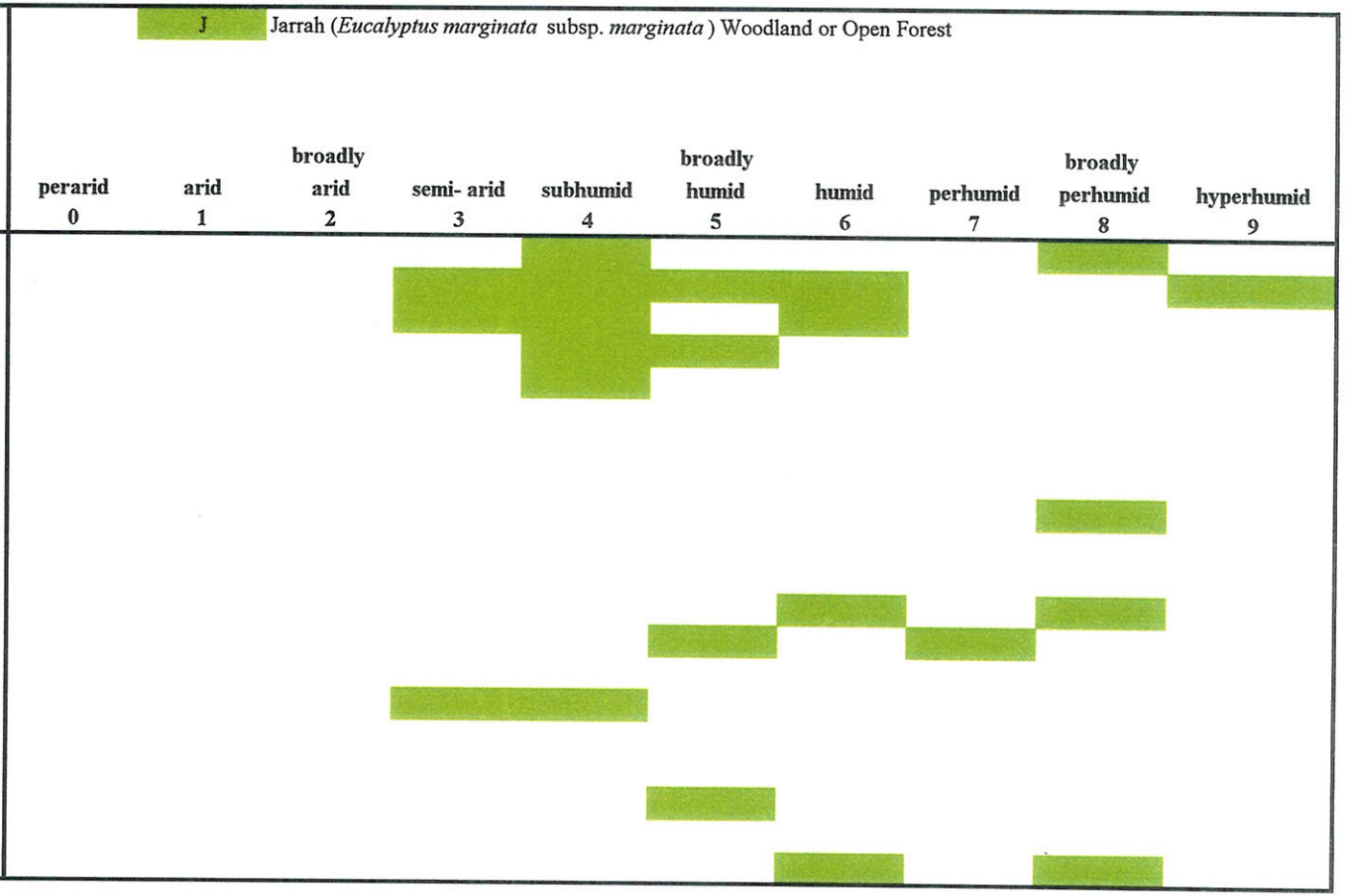
L Component vegetation complexes, Inlet, L, Lake, Water and WATER.
Waterbodies.

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION



APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

Landforms	Landform Codes
Crystalline outcrops above plateau	a
Crystalline plateau uplands	p
	P
Sedimentary plateau uplands	g
	G
Strongly dissected crystalline slopes	s
	S
Strongly dissected sedimentary slopes	y
Moderately dissected crystalline slopes	m
	M
Moderately dissected sedimentary slopes	l
Mildly dissected crystalline	k
Mildly dissected sedimentary	w
	W
Waterlogged coarse textured deposit	v
Waterlogged fine textured deposit	u
Unstable coastal dune	o
Old stable coastal dune	n
Loamy well drained deposit	b
Sandy well drained deposit	c



APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

Landforms	Landform Codes	K Karri (*Eucalyptus diversicolor*) Tall Open Forest T Tingles (*Eucalyptus jacksonii, Eucalyptus guilfoylei*) Tall Open Forest with Karri (*Eucalyptus diversicolor*) and Marri (*Corymbia calophylla*) perarid 0 / arid 1 / broadly arid 2 / semi- arid 3 / subhumid 4 / broadly humid 5 / humid 6 / broadly perhumid 7 / broadly perhumid 8 / hyperhumid 9
Crystalline outcrops above plateau	a	
Crystalline plateau uplands	p	
	P	
Sedimentary plateau uplands	g	
	G	
Strongly dissected crystalline slopes	s	
	S	
Strongly dissected sedimentary slopes	y	
Moderately dissected crystalline slopes	m	
	M	
Moderately dissected sedimentary slopes	l	
Mildly dissected crystalline	k	
Mildly dissected sedimentary	w	
	W	
Waterlogged coarse textured deposit	v	
Waterlogged fine textured deposit	u	
Unstable coastal dune	o	
Old stable coastal dune	n	
Loamy well drained deposit	b	
Sandy well drained deposit	c	

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

Landforms	Landform Codes	W Wandoo (*Eucalyptus wandoo*) Woodland V Powderbark Wandoo (*Eucalyptus accedens*) Woodland perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

Landforms	Landform Codes	C Swamp Sheoak *(Casuarina obesa)* Woodland or Tall Shrubland									
		perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

Landforms	Landform Codes	E Flooded gum (*Eucalyptus rudis*) Woodland with *Casuarina obesa*									
		perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

F Flooded gum (*Eucalyptus rudis*) Woodland with Yarri (*Eucalyptus patens*)

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w						F				
	W										
Waterlogged coarse textured deposit	v				F	F	F				
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

G *Melaleuca preissiana - Banksia littoralis* woodland

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

Landforms	Landform Codes	S Mixed Swamp vegetation (Tall Shrubland, Heath and Sedgeland)
		perarid 0 / arid 1 / broadly arid 2 / semi- arid 3 / subhumid 4 / broadly humid 5 / humid 6 / perhumid 7 / broadly perhumid 8 / hyperhumid 9
Crystalline outcrops above plateau	a	
Crystalline plateau uplands	p	
	P	
Sedimentary plateau uplands	g	
	G	
Strongly dissected crystalline slopes	s	
	S	
Strongly dissected sedimentary slopes	y	
Moderately dissected crystalline slopes	m	
	M	
Moderately dissected sedimentary slopes	l	
Mildly dissected crystalline	k	
Mildly dissected sedimentary	w	
	W	
Waterlogged coarse textured deposit	v	
Waterlogged fine textured deposit	u	
Unstable coastal dune	o	
Old stable coastal dune	n	
Loamy well drained deposit	b	
Sandy well drained deposit	c	

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v				Y						Z
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

Y Swamp yate (*Eucalyptus occidentalis*) Woodland

Z *Melaleuca cuticularis* Low Woodland

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
D Rock Sheoak (*Allocasuarina huegeliana*) Woodland or Low Forest R Rocky Outcrop with Lithic Complex, Herbfields and Heath											
Crystalline outcrops above plateau	a									R	
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s	D			R	R	R		R		
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

H Bullich (*Eucalyptus megacarpa*) Open Forest

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l							H			
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

M Marri (*Corymbia calophylla*) Tall Open Forest to Open Forest

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

N Marri (*Corymbia calophylla*) - Yarri (*Eucalyptus patens*) Open Forest

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	w										
	W										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

A *Banksia attenuata* Woodland
B *Banksia ilicifolia* Woodland

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k							A	B		
Mildly dissected sedimentary	w										
	W									B	
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n	A									
Loamy well drained deposit	b										
Sandy well drained deposit	c			A	A	A			A	A	

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

		P	Peppermint (*Agonis flexuosa*) Woodland
		Q	Coastal Complex, Heath

Landforms	Landform Codes	perarid 0	arid 1	broadly arid 2	semi- arid 3	subhumid 4	broadly humid 5	humid 6	perhumid 7	broadly perhumid 8	hyperhumid 9
Crystalline outcrops above plateau	a										
Crystalline plateau uplands	p										
	P										
Sedimentary plateau uplands	g										
	G										
Strongly dissected crystalline slopes	s										
	S										
Strongly dissected sedimentary slopes	y										
Moderately dissected crystalline slopes	m										
	M										
Moderately dissected sedimentary slopes	l										
Mildly dissected crystalline	k										
Mildly dissected sedimentary	W										
	w										
Waterlogged coarse textured deposit	v										
Waterlogged fine textured deposit	u										
Unstable coastal dune	o										
Old stable coastal dune	n										
Loamy well drained deposit	b										
Sandy well drained deposit	c										

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

The following is an example of an expanded linkage between the site-vegetation types as defined by Havel (1975a and 1975b), the vegetation complexes and the ecological vegetation systems as defined and mapped as part of the vegetation mapping program for the south west forest region of Western Australia.

Title

NM6 - Woodlands to Open Forests of marri - yarri and jarrah on moderate slopes of valleys in the subhumid to perhumid zone of the northern region. The main occurrence is in the humid zone.

Location

Between Collie and Kelmscott.

Contributing Map Polygons

My1.

Climatic Conditions

NE Boundary: R>900 if SE<550; R>1000 if SE<650; R>1100 if SE<750.
SW Boundary: Darling Scarp

Landform Description

Moderate slopes of valleys incised into the Darling Plateau.

Soils

Physical Properties

Range of soil types, but mainly yellow and red duplex soils and earths, moderately water shedding on mid and upper slopes, mildly water gaining on lower slopes and floors, with moderate infiltration and water storage capacity.

Chemical Properties

Moderately fertile to fertile.

Vegetation

Structure and Composition of the Over Storey

Open Forest to Tall Open of marri (*Corymbia calophylla*), yarri (*Eucalyptus patens*), jarrah (*Eucalyptus marginata* subsp. *marginata*). *Eucalyptus rudis* on streamlines. Yarri is especially prominent in the perhumid zone, when it replaces karri (*Eucalyptus diversicolor*) which has not extended north of the Blackwood River.

Second Storey

Banksia grandis and *Persoonia longifolia* on mid and upper slopes, *Banksia littoralis, Callistachys lanceolata, Banksia seminuda* and *Melaleuca rhaphiophylla* on stream lines.

Shrub and Herb Stratum

Hakea lissocarpha, Macrozamia riedlei, Hibbertia hypericoides, Bossiaea linophylla, Astartea fascicularis, Hypocalymma angustifolium, Baeckea camphorosmae, Mesomelaena tetragona, Lepidosperma squamatum, Phyllanthus calycinus, Desmocladus flexuosus, Neurachne alopecuroidea, Leucopogon propinquus, Bossiaea ornata, Trymalium ledifolium, Grevillea diversifolia, Acacia extensa, Pteridium esculentum, Bossiaea aquifolium subsp. *aquifolium, Chorizema ilicifolium, Hypocalymma cordifolium, Leucopogon verticillatus, Leucopogon capitellatus, Acacia urophylla, Lasiopetalum floribundum, Clematis pubescens, Lepidosperma tetraquetrum.*

Havel Land Consultants (1987) described this combination of landform and climate from their surveys of the Canning and North Dandalup valleys. The types encountered by them were S, T, U, R, Q, C, W and transitions between these such as ST, RQ, CQ, WS. The species entering into these site-vegetation types, arranged in sequence from upper slopes to valley floors, are:

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

The following is an example of an expanded linkage between the site-vegetation types as defined by Havel (1975a and 1975b), the vegetation complexes and the ecological vegetation systems as defined and mapped as part of the vegetation mapping program for the south west forest region of Western Australia.

	Site-Vegetation Type						
Species	**S**	**T**	**U**	**R**	**Q**	**W**	**C**
Eucalyptus marginata subsp. *marginata*	+	+		+	/	+	
Corymbia calophylla	+	+	+	+	+	+	
Banksia grandis	+	/					
Persoonia longifolia	+						
Allocasuarina fraseriana	/						
Hovea chorizemifolia	+						
Adenanthos barbiger	+	/		/			
Macrozamia riedlei	+	+	+	+	+		
Phyllanthus calycinus	+	+	/	+	+		
Leucopogon capitellatus	+	+	/	+	+		
Leucopogon propinquus	+	+		+	+		
Acacia preissiana	+	/		/			
Styphelia tenuiflora	+	/		/			
Patersonia rudis subsp. *rudis*	+	/		/			
Lepidosperma squamatum	/			/	/	+	+
Lechenaultia biloba	/			/			
Bossiaea aquifolium subsp. *aquifolium*	/	+					
Lasiopetalum floribundum	/	+			/		
Acacia urophylla	/	+					
Leucopogon verticillatus	/	+	/				
Daviesia decurrens	/						
Pteridium esculentum		+	+		/		
Clematis pubescens		+	+				
Chorizema ilicifolium		/			+		
Eucalyptus patens		/	+		+	+	+
Hakea lissocarpha		/		+	+	+	
Trymalium ledifolium				+	+		
Hibbertia hypericoides				+			
Hibbertia commutata				+			
Dryandra lindleyana				+			

APPENDIX E: ECOLOGICAL VEGETATION SYSTEMS FOR THE SOUTH WEST FOREST REGION

The following is an example of an expanded linkage between the site-vegetation types as defined by Havel (1975a and 1975b), the vegetation complexes and the ecological vegetation systems as defined and mapped as part of the vegetation mapping program for the south west forest region of Western Australia.

	Site-Vegetation Type						
Species	**S**	**T**	**U**	**R**	**Q**	**W**	**C**
Grevillea synapheae				+			
Leptomeria cunninghamii				+			
Hypocalymma angustifolium					+	+	+
Acacia extensa					+		
Trymalium floribundum					+		
Hibbertia rhadinopoda					/		
Mesomelaena tetragona						+	+
Synaphea petiolaris						+	
Meeboldina scariosa ms						/	+
Pericalymma ellipticum						/	
Dampiera alata						/	/
Agonis linearifolia							+
Baeckea camphorosmae							/
In addition to the above species, Havel Land Consultants (1987) also recorded the following species in vegetation types Q, CQ and C which are typical of these combinations of landform and climate.							

Site-vegetation Type Q: *Xanthorrhoea preissii, Xanthorrhoea gracilis, Hibbertia pilosa, Pentapeltis peltigera, Boronia fastigiata, Stylidium amoenum, Tetrarrhena laevis, Hibbertia amplexicaulis, Hibbertia hypericoides, Logania serpyllifolia.*

Site-vegetation Type CQ: *Xanthorrhoea preissii, Acacia pulchella, Acacia divergens, Asterolasia pallida, Billardiera variifolia, Aotus cordifolium, Hypocalymma cordifolium, Gonocarpus benthamii, Dampiera hederacea, Paraserianthes lopthantha* subsp. *lophantha, Conostylis aculeata, Lepidosperma tetraquetrum, Lepidosperma leptostachyum, Xanthosia candida, Banksia seminuda, Anthocercis* sp. (humid zone only)

Site-vegetation Type C: *Melaleuca rhaphiophylla, Acacia alata, Lepidosperma longitudinale, Gahnia decomposita, Callistachys lanceolata, Baumea vaginalis, Thomasia paniculata.*

Griffin (1995) described two residual stands south east of Waroona, consisting of jarrah (*Eucalyptus marginata* subsp. *marginata*) and marri (*Corymbia calophylla*) forest. They occur on steep upper slopes on red brown loamy sand. Their shrub and herb understorey consists of *Acacia latericola, Bossiaea aquifolium* subsp. *aquifolium, Lagenophora huegelii, Lepidosperma leptophyllum, Leucopogon capitellatus, Lomandra micrantha, Macrozamia riedlei, Phyllanthus calycinus, Tetraria octandra and Xanthorrhoea preissii, Acacia pulchella* var. *pulchella, Bossiaea eriocarpa, Dryandra lindleyana, Grevillea wickhamii, Hakea lissocarpha, Hemigenia canescens, Hibbertia hypericoides, Hypocalymma angustifolium, Scaevola calliptera* and *Synaphea gracillima* occurs less consistently. The two stands are representative of the My1 vegetation complex, near its interface with D1 complex.

Appendix F

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Introduction

The following information is extracted from previous detailed ecological studies undertaken in the south west forest region of Western Australia.

Review of Linkages between Vegetation and Landform and Soil Classifications – Havel (1975a and b), Strelein (1988) and Inions (1990)

Strelein's type S is represents lateritic uplands, defined by indicator groups very similar to Havel's groups GRAMED (*Banksia grandis, Hovea chorizemifolia*), FREGRA (*Leucopogon propinquus, Macrozamia riedlei*) and HIGRA (*Pteridium esculentum, Leucopogon verticillatus*), which define Havel's site-vegetation type S, but with some modifications. For instance, the third member of Havel's GRAMED group, *Persoonia longifolia*, is so widespread in the southern jarrah forests, that is has only a negative indicator value. It is only absent from extremely wet (F, A) or dry (M, Y) site types. The FREGRA and HIGRA indicator groups, which are relatively precise indicators of moist and moderately fertile lateritic uplands in the north, are only absent from the more extreme site types (B, F and A), largely due to the higher rainfall and greater degree of dissection in the southern jarrah forest. By contrast, another component of Havel's GRAMED group, *Adenanthos barbiger*, is so rare in the south that it does not feature as an indicator.in Strelein's study

A new indicator group of lateritic gravels, consisting of *Acacia browniana, Acacia myrtifolia, Bossiaea laidlawiana, Crowea angustifolia, Hakea lasianthoides, Petrophile diversifolia, Sphaerolobium medium* and *Xanthorrhoea gracilis*, has been defined by Strelein. It is labelled here SOGRA (southern lateritic gravels), as many, though not all, of its constituents have a strong southern bias in their overall distribution.

There are several other indicators utilised by Strelein which are absent from Havel's classification. Three of them, *Hovea elliptica, Hakea amplexicaulis* and *Patersonia umbrosa* occur on lateritic gravels with loamier and hence more fertile matrix. They are placed in the SOGRAF group, which is also characteristic of type S.

Strelein's site type T is closely related to Havel's T, sharing with it the indicator groups GRAMED, FREGRA and HIGRA. It differs from S in having weaker development of SOGRA. This trend away from indicators of laterite is accentuated in site type Q, in which both SOGRA and GRAMED are replaced by a group of indicators of higher fertility such as *Eucalyptus patens* (Havel's FEHIRA), *Acacia urophylla* (Havel's GRAHIR), *Tremandra stelligera, Clematis pubescens* and *Acacia alata*. They have been brought together under the label SOFER (southern fertile sites), though they are not exclusively southern species.

A very similar set of indicators, but without *Eucalyptus patens*, defines Strelein's type U. Strelein's U and Q differ from Havel's types U and Q in containing *Eucalyptus marginata*. In addition, Strelein's Q lacks *Trymalium floribundum*. The edaphic equivalent of Havel's types U and Q in the cooler, moister south is tall forest of karri (*Eucalyptus diversicolor*) described by Inions (1990).

Strelein's type X differs from his types U and Q in lacking SOFER and containing another set of southern indicators such as *Agonis flexuosa, Anarthria scabra* and *Anigozanthus flavus*, which are indicative of sandier and moister sites than S, T, Q and U. They are labelled SOBROSAN (southern broadly sandy sites).

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Review of Linkages between Vegetation and Landform and Soil Classifications – Havel (1975a and b), Strelein (1988) and Inions (1990)

A type weakly endowed with clear-cut indicators is Strelein's type V, which has a weak to moderate representation of FREGRA, SOBROSAN and SOFER. It also has a strong representation of *Acacia extensa*. Strelein's types X and V appear to be southern equivalents of Havel's W and E, both of which are water gaining lower slopes in lateritic landscape.

Strelein's types K and N are significant natural linkeages with Inions (1990) classification, in that they contain karri (*Eucalyptus diversicolor*) as well as jarrah (*Eucalyptus marginata* subsp *marginata*). The principal indicator group defining them consists of *Acacia pentadenia, Eucalyptus diversicolor, Chorizema ilicifolium* and *Allocasuarina decussata* and is labelled SOFERMO (southern fertile moist). The second major indicator group consists of *Boronia gracilipes, Agonis parviceps* and *Podocarpus drouynianus* (labelled SOSALOM - southern sandy loams, moist). The labels were chosen because of the edaphic preference of the species and the southern bias in their distribution. An exception is *Chorizema ilicifolium*, which extends north where it is part of Havel's FEHIRA (fertile, high rainfall) indicator group with *Trymalium floribundum*. Though *Trymalium floribundum* is a prominent associate of karri on optimum sites, it does not feature in Strelein's classification. Yet another indicator is *Xanthorrhoea preisii*, which is a very widespread species, reaching its strongest dominance on moist sandy flats on the northern Swan Coastal Plain, where it is an indicator of optimum sites for exotic tree plantations (Havel 1968). We have placed it here in the indicator group BROMO (broadly moist).

In addition to SOFERMO and SOSALOM, types K and N are also associated weakly with indicator groups SOGRA, SOFER, and FREGRA. K differs from N in not containing any SOBROSAN, which indicates it is less sandy. Within Strelein's classification K and N are the optimum sites, combining favourable moisture regime with good fertility of the soil.

Site P is a transitional site in that it lacks clear association with any indicator group. It contains some representation of indicator groups SOGRA, SOGRAF, GRAMED, SOSALO and FREGRA. It also contains *Desmocladus fasciculatus* and *Desmocladus flexuosus*, formerly belonging to the genus *Loxocarya*, and *Xanthorrhoea preissii*. We have placed these species, together with *Kingia australis*, *Lepidosperma squamata* (formerly *L. angustata*) and *Acacia extensa* into indicator group BROMO (broadly moist, which is similar to Havel's group of that name in the north. It terms of site, this group is associated with colluvium below lateritic uplands. Strelein's site type P has weak floristic association with Havel's P, which also comes from lateritic colluvium, but in a drier climate.

The trend toward lowland position and water gaining site is accentuated in type R, whose key indicator groups are SOBROSAN, BROMO, SAMORG and SOSAM. The SAMORG (sandy, moist organic soils) group consists of *Adenanthos obovatus, Dasypogon bromeliifolius* and *Leucopogon concinnus*. It is very similar to Havel's SAMORG. The extension of BROMO and SAMORG into, and strong development in the moister south, is readily explainable by the fact that in the north these groups are dependent on the proximity of ground water to the surface. The SOSAM (southern sands, moist) group consist of *Pultanaea reticulata, Thomasia grandiflora, Hakea ruscifolia* and *Melaleuca thymoides*. In type R the last two groups, indicative of sandy colluvium below lateritic uplands, reach their optimum development. Type R is the southern equivalent of Havel's type B. Site type I has a moderate development of the indicator groups

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Review of Linkages between Vegetation and Landform and Soil Classifications – Havel (1975a and b), Strelein (1988) and Inions (1990)

SOGRA, SOGRAF, GRAMED, SOSALOM, BROMO, SAMORG and FREGRA, but lacks any outstanding indicator groups. It is equivalent to Havel's type O, and like it is indicative of slightly heavier textured colluvium within lateritic uplands.

Strelein's type B is defined by the absence of the widespread species of the southern lateritic uplands in indicator groups SOGRA, SOGRAF, GRAMED, HIGRA and FREGRA. It also lacks the widespread tree species marri (*Corymbia calophylla*). It thus represents a significant departure from the norm. It has moderate representation of the groups SOSALOM and SAMORG, indicative of water-gaining sites with sands and sandy loams. This is reinforced by the presence of such other species as *Kingia australis* (BROMO) and *Eucalyptus patens* (SOFER). It is similar to Havel's type D. The trend toward seasonal water logging peaks in Strelein's type F, strongly defined by the absence of the key species of the southern jarrah forest, jarrah (*Eucalyptus marginata* subsp *marginata*), marri (*Corymbia calophylla*) and *Persoonia longifolia*, as well as of the common indicator groups SOGRA, SOGRAF, GRAMED, SOSALOM, HIGRA and FREGRA. It thus represents maximum departure from the norm. Its key indicator group is SOWET with *Anarthria prolifera, Beaufortia sparsa* and *Homalospermum firmum*. Other species present are *Leucopogon australis, Agonis parviceps* and *Dasypogon bromeliaefolius*, all of which also have a bias toward water gaining sites.

The site type is representative of largely treeless swamps, and is the endpoint of the continuum from uplands to swamp in the high rainfall zone. It has no clear equivalent in Havel's classification, being essentially confined to the perhumid southern region, though in topographic position it resembles Havel's type A.

However, the true equivalent of Havel's type A is Strelein's type A, which is primarily developed in the drier eastern inland of the southern jarrah region. It contains *Melaleuca preissiana, Banksia littoralis, Eucalyptus rudis* and *Melaleuca viminea* (indicator group VERWET - very wet sites). The presence of other species such as *Hakea lissocarpha, Astroloma ciliatum, Xanthorhoea preissii, Allocasuarina humilis* and *Eucalyptus marginata* suggests that some lower slopes with better drainage are also included in addition to the flat waterlogged valley floors.

Another inland type is Strelein's type Y, whose primary indicator groups are FREGRA with *Leucopogon propinquus, Macrozamia riedlei* and *Bossiaea linophylla*, and BROMO with *Desmocladus fasciculatus* and *Acacia extensa*. Additional species such as *Trymalium ledifolium, Hypocalymma angustifolium* and *Astroloma ciliatum*, have been lumped into indicator group DRYGRA. Other species present are *Hakea lissocarpha* (BROFER), *Bossiaea ornata* (GRAMED) and *Leucopogon australis* (SOBROSAN). The nearest equivalent type in Havel's classification is W, though some of its indicators, such as *Eucalyptus patens* and *Lepidosperma squamatum* (formerly *L. angustatum*) are absent. It is representative of moderately incised eastern valleys with loamy soils.

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Review of Linkages between Vegetation and Landform and Soil Classifications – Havel (1975a and b), Strelein (1988) and Inions (1990)

It has close affinities with Strelein's type M, which shares with it most of the indicators except the Bossiaea species and *Acacia extensa*, and has such additional species such as *Eucalyptus wandoo, Dryandra bipinnatifida, Dryandra lindleyana* (formerly *D. nivea*) and *Astroloma pallidum*. We have placed these additional species in indicator group DRYGRA, which is broader than Havel's group of that name. Strelein's vegetation type M is a near equivalent of Havel's type M from the dry inland slopes.

The final of Strelein's types, Z, shares many indicators with Y and M. It differs chiefly in the absence of *Eucalyptus wandoo, Dryandra lindleyana* and *Hypocalymma angustifolium*. It is a near equivalent of Havel's type Z of eastern dry slopes, but differs from it in having *Leucopogon verticillatus*, confined in the north is to higher rainfall zone.

Review of Linkages between Vegetation and Landform and Soil Classifications - Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

The primary subdivision of Mattiske Consulting Pty Ltd (1996) survey of the Scott Coastal Plain was based structure of the vegetation:

1 woodland to open forest
2 low open woodland
3 open heath
4 sedgeland .

The secondary subdivision was based on edaphic differences within the structure classes. Within the woodland-open forest class the edaphic subdivisions were:

1.1 drier open woodland
1.2. open forest –woodland
1.3. seasonally moist open forest-woodland
1.4. to 1.6 moist to wet open forest
1.7. woodland on sandy loams
1.8. open forest on southern sandy dunes
1.9. open forest on deep sandy loams.

Similarly, the low open woodlands were subdivided as follows:

2.1. low open woodland, sedgeland and heath on dunes
2.2. low woodland-open forest on dunes
2.3. to 2.5 seasonally swampy low open woodland
2.6. to 2.7 seasonally wet swamps.

Similar pattern was followed for heath and sedgelands.

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Review of Linkages between Vegetation and Landform and Soil Classifications - Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

The data set of Mattiske Consulting Pty Ltd (1996) consists of a large number of species, as there was a requirement to cover the diversity of species in the studies. In reviewing the data set, the floristic patterns did not coincide with the primary subdivision based on structure of the vegetation. Rather, they approximated more closely the secondary subdivisions based on edaphic criteria. By applying the Braun-Blanquet methodology, as modified for Australian conditions by Bridgewater (1981), and utilising the species/site relationships described by Havel (1975 a&b), McCutcheon (1978, 1980) and Strelein (1988), a continuum from well drained sites, mainly carrying woodlands and open forest, to seasonally inundated swamps, was developed.

Within this overall continuum, there are several well-defined floristic groupings. At the dry end of the continuum there were several group of species largely confined to uplands. The smallest group is that defining community 1.7, that is the SOGRAF group of *Eucalyptus diversicolor, Hovea elliptica* and *Podocarpus drouynianus* The next group, present on 1.1,1.2, 1.6, 1.8, 1.9 and 2.2, consists of upland species with preference for well drained sands and sandy gravels. The linkage to McCutcheon's study is through his indicator groups LOSAN (*Hakea lissocarpha* and *Xanthorrhoea gracilis*) and GRAMED (*Bossiaea ornata, Persoonia longifolia* and *Hovea chorizemifolia*). The GRAMED label has been retained.

A closely related group, extending on to communities 1.3, 1.4, 1.5 and 4.2 of moister and slightly more fertile sites, has links to both Strelein and Havel (1975 a&b) through *Leucopogon verticillatus* (Strelein's HIGRA), *Banksia grandis* (McCutcheon's and Strelein's GRAMED) and *Macrozamia riedlei* and *Leucopogon capitellatus* (McCutcheon's and Strelein's FREGRA). The presence of these

groups indicates laterisation of the soils and higher proportion of colloidal iron in the soils than in the previous group. The FREGRA label has been retained.

Another group with a narrow range, restricted to communities 1.2, 2.1 and 2.2, consists of *Gompholobium scabrum, Adenanthos meissnerii, Banksia attenuata, Calytrix flavescens* and *Gompholobium confertum*, all species with known links to sandy soils of low fertility. The clearest link with McCutcheon's study was *Banksia attenuata* of SANLEA, followed by *Adenanthos meissnerii* of MOSAN. The SANLEA label has been retained.

The progress toward moister sites commences in the next group, whose range extends into communities 3.2, 4.5, 4.6, 2.5, 2.3 and 2.4, all of which are described as seasonally moist or seasonally swampy.

The linkage to McCutcheon is through *Dasypogon bromeliifolius* of SAMORG and *Daviesia decurrens* of SANGRA. The linkage to Strelein is through *Agonis flexuosa* of SOBROSAN, *Hakea ruscifolia* of SOSAM, *Lepidosperma squamatum* and *Kingia australis* of BROMO and *Dasypogon bromeliifolius* of SAMORG, most of which are associated with moderately moist sites. The group has been labelled SCOBROMO (Scott Plain broadly moist).

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Review of Linkages between Vegetation and Landform and Soil Classifications - Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

The next group has a similar range of communities, but is absent from communities 1.7, 1.8, 1.9 and 1.6. Its linkage is through Banksia ilicifolia (McCutcheon's MOSAN), *Petrophile linearis* (McCutcheon's SANLEA), *Acacia browniana* and *Allocasuarina fraseriana* (McCutcheon's SANGRA). These species and species groups are indicative of moist sands and sandy gravels. It has been labelled SCOMOSAN (Scott Plain moist sands).

The species group occurring in a still narrower range of communities, that is mainly 4.3, 3.2 and 2.5, consists of species mostly discovered and named relatively recently, such as *Restio serialis* (ms), *Darwinia ferricola* (ms), *Grevillea manglesioides* and *Dryandra nivea* subsp *uliginosa*, which are associated with shallow soils over ferruginous B horizon (hardpan). It has been labelled it IRONPAN. Other as yet unnamed species (*Pimelea* sp and *Calothamnus* sp) also fall into this group.

The next species group has a much broader range, occurring in most communities except on those that tend to be frequently flooded, namely 2.6, 2.7 and 2.8. This group, containing such species as *Eucalyptus marginata* subsp *marginata, Anarthria prolifera, Xanthorrhoea preissii* and *Acacia pulchella* subsp *pulchella*, therefore has only negative indicator value. In Strelein's classification *Eucalyptus marginata* subsp *marginata* is also a negative indicator only absent from extreme swamps, *Xanthorrhoea preissii* is included in the broad indicator group BROMO, *Acacia pulchella* is included in the broad indicator group BROFER, but *Anarthria prolifera* belongs to indicator group SOWET of wet sites. This group has been labelled BROGRA.

The broadness of range is also true of a similar group, which is also absent from 1.7, 3.3 and 4.4. This group is linked to Strelein's group SOBROSAN through *Anarthria scabra, Anigozanthus flavidus* and *Leucopogon australis*, to SOSAM and to McCutcheon's group MOSAN through *Melaleuca thymoides*. The SOBROSAN label has been retained.

Yet another group of broad range species has linkage to McCutcheon's group BROWET through *Lyginia barbata*, and *Agonis parviceps*. It has further linkage to McCutcheon through *Adenanthos obovatus* of SAMORG, *Mesomelaena tetragona* of BROMO and *Pultanaea reticulata* of VERWET. It also has a linkage to Strelein through *Agonis parviceps* of SOSALOM, *Adenanthos obovatus* of SAMORG, *Pultanaea reticulata* of SOSAM and *Bossiaea linophylla* of FREGRA. With the exception of the last one, these species are associated with moist sandy sites. The group is only absent from the extremes of Mattiske communities, namely 1.7,1.8 and 1.9 at the dry and 2.6, 2.7 and 2.8 at the wet end of the continuum. The BROWET label has been retained.

The species group with the broadest occurrence across Mattiske's communities is that containing *Melaleuca preissiana, Astartea fascicularis* and *Banksia littoralis* (McCutcheon's and Strelein's VERWET) and *Meeboldiana scariosa* (McCutcheon's BROWET). It is only consistently absent from community 1.7, yet the species containing it are considered to be indicators of wet sites by both Havel and McCutcheon, as indicated by the mnemonic labels VERWET and BROWET. It is indicative of the low-lying, poorly drained topography and high rainfall of the Scott Coastal Plain, where adequately drained sites are an exception rather than the rule. The VERWET label has been retained.

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There are two species groups with an even stronger bias toward poorly drained sites, expressed in the absence from adequately drained sites, that is communities 1.1, 1.2, 1.7, 1.8 and 1.9.

One of these groups is also absent from communities 2.6, 2.7 and 2.8,which tend to be seasonally flooded. Its chief affinity is with Strelein's group SOWET, through *Beaufortia sparsa, Evandra aristata* and *Homalospermum firmum*. It also contain *Calothamnus lateralis* subsp *lateralis*, identified by Havel (1968) to be the indicator of extremely wet sites on the Northern Swan Coastal Plain, and *Lepidosperma tetraquetrum* of the riparian zone of the northern jarrah forest (Havel 1975 a). The SOWET label has been retained.

However the group with the greatest tolerance to waterlogging and flooding is that containing *Hakea ceratophylla* (McCutcheon's VERWET), *Melaleuca rhaphiophylla, Melaleuca cuticularis, Baumea juncea, Baumea vaginalis* and *Meeboldina* (formerly *Leptocarpus*) *coangustatus*. It's primary occurrence is in seasonally flooded communities 2.6, 2.7 and 2.8, with which few other species can cope. The group has no common species with Strelein's classification, being wetter than his SOWET and VERWET groups, but has a counterpart in Wardell-Johnson *et al.* (1995) of the south coast, which is yet to be discussed. It has been labelled FREQWET (frequently wet).

Review of Linkages between Vegetation and Landform and Soil Classifications – Gibson (1997), Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

Gibson 97's community 13, described as wet scrub and woodland, has links with Mattiske in *Dasypogon bromeliifolius, Lepidosperma squamatum* and *Agonis flexuosa* of Mattiske's SCOBROMO, *Bossiaea rufa* of SCOMOSAN, *Anarthria scabra* of SOBROSAN, *Anarthria prolifera* of BROGRA and *Adenanthos obovatus* of BROWET, suggesting moist, organically enriched sands.

Gibson 97's community 14, described as *Banksia ilicifolia* woodland, has links with Mattiske in some of the indicators of community 13, but especially in *Banksia ilicifolia* and *Lysinema ciliatum* of Mattiske's SCOMOSAN, *Andersonia caerula* of SCOBROMO, *Eucalyptus marginata* subsp *marginata* of BROGRA, *Melaleuca thymoides* and *Anarthria scabra* of SOBROSAN, *Pimelia longiflora* subsp *longiflora, Phlebocarya ciliata* and *Lyginia barbata* of BROWET, suggesting moist leached sands.

Gibson 97's community 15, described as *Banksia attenuata* woodlands, has links with Mattiske in *Banksia attenuata* of Mattiske's SANLEA, *Lepidosperma squamatum* of SCOBROMO and *Melaleuca thymoides* of SOBROSAN. This suggest leached sands drier than 14.

Gibson 97's community 20, described as *Hakea linearis* wet flats, has links with Mattiske in *Hakea linearis* of BROWET, *Agonis parviceps* of SAMORG, and *Xanthorrhoea preissii* of BROGRA. These species have broad ecological amplitudes within Mattiske's data set.

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Gibson 97's community 22, described as ironstone communities, has links with Mattiske in *Melaleuca preissiana* and *Hakea varia* of BROWET and *Calothamnus lateralis* of SOWET. These are indicative of impeded drainage and seasonal waterlogging.

Gibson 97's community 23 has links with Mattiske in *Baumea juncea, Baumea vaginalis, Melaleuca rhaphiophylla* and *Hakea ceratophylla* of FREQWET, *Astartea fascicularis* and *Meeboldina scariosa* of VERWET, *Patersonia occidentalis* of SOBROSAN, and *Hakea varia* of BROWET. These are indicative of waterlogged sites.

Gibson 97's community 26, described as western shallow wetlands, has links with Mattiske in *Baumea vaginalis* of FREQWET, *Hakea linearis* of BROWET and *Meeboldina scariosa* of VERWET. These are indicative of waterlogged sites.

Gibson 97's community 27, described as moderately deeply inundated sedgelands, has links with Mattiske in *Meeboldina scariosa* of VERWET and *Baumea vaginalis* of FREQWET, indicative of waterlogged sites.

Gibson 97's community 28, described as very deeply inundated wetlands, has links with Mattiske in *Agonis juniperina* and *Melaleuca rhaphiophylla* of FREQWET and *Meeboldina scariosa* of VERWET, indicative of seasonally inundated sites.

Gibson 97's community 29, described as heathy sedgelands, has links with Mattiske in *Astartea fascicularis* of VERWET, *Evandra aristata, Homalospermum firmum* and *Beaufortia sparsa* of SOWET, *Agonis parviceps* and *Adenanthos obovatus* of BROWET and *Anarthria prolifera* and *Acacia hastulata* of BROGRA. Most of these are indicative of waterlogged conditions, but less acute than in community 28.

Gibson 97's community 30, described as *Melaleuca thymoides* wet heaths, has links with Mattiske in *Andersonia caerula* of SCOBROMO, *Lyginia barbata* and *Kunzea recurva* of BROWET, *Melaleuca thymoides* of SOBROSAN, *Xanthorrhoea preissii* of BROGRA and *Hibbertia stellaris* of SOWET. These indicate sandier soils and less waterlogging than in community 29.

Review of Linkages between Vegetation and Landform and Soil Classifications – Gibson (1994, 1997), Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

Gibson 94's community type 1a, described as *Eucalyptus marginata-Corymbia haematoxylon* woodland has linkage to Mattiske in *Eucalyptus marginata* subsp *marginata* and *Xanthorrhoea preissii* of BROGRA, *Hovea chorizemifolia, Billardiera variifolia, Logania serpyllifolia, Xanthorrhoea gracilis, Gompholobium knightianum* and *Gompholobium polymorphum* of GRAMED, *Desmocladus fasciculatus, Patersonia umbrosa* forma *xanthina* of BROWET, *Gompholobium confertum* and *Hibbertia hypericoides* of FREGRA, *Hakea amplexicaulis, Xylomelum occidentale* of SCOBROMO and *Patersonia occidentalis* of SOBROSAN.

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Gibson 94's community type 1b, described as *Corymbia calophylla* woodland on heavy soils has linkage to Mattiske in *Corymbia calophylla, Gompholobium confertum* and *Hibberta hypericoides* of FREGRA, *Mesomelaena tetragona* and *Adenanthos obovatus* of BROWET, *Eucalyptus marginata* subsp *marginata, Acacia extensa* and *Xanthorrhoea preissii* of BROGRA, *Billardiera variifolia* and *Gompholobium polymorphum* of GRAMED, *Patersonia umbrosa* forma *xanthina* of BROWET and *Kingia australis* and *Lepidosperma squamatum* of SCOBROMO.

Gibson 94's community type 2, described as southern wet shrublands, has linkage to Mattiske in *Hakea ceratophylla* of FREQWET, *Astartea fascicularis* of VERWET *Calothamnus lateralis* subsp *lateralis* of SOWET, *Xanthorrhoea preissii* of BROGRA, *Lyginia barbata, Hakea varia, Pericalymma ellipticum, Mesomelaena tetragona* and *Hakea sulcata* of BROWET and *Kingia australis* of SCOBROMO.

Gibson 94's community type 3a, described as *Corymbia calophylla-Kingia australis* woodland on heavy soils, has linkage to Mattiske in *Corymbia calophylla*, of FREGRA, *Kingia australis* of SCOBROMO, *Hakea ceratophylla* of FREQWET, *Xanthorrhoea preissii* of BROGRA, *Pericalymma ellipticum* and *Mesomelaena tetragona* of BROWET and *Patersonia occidentalis* of SOBROSAN.

Gibson 94's community type 3b, described as *Corymbia calophylla-Eucalyptus marginata* woodland on sandy clay soils, has linkage to Mattiske in *Eucalyptus marginata* subsp *marginata* and *Xanthorrhoea preissii* of BROGRA, *Gompholobium marginatum* of GRAMED, *Eriostemon spicatus* of SOBROSAN, *Lepidosprema squamatum* of SCOBROMO and *Corymbia calophylla* and *Hibberta hypericoides* of FREGRA.

Gibson 94's community type 3c, described as *Corymbia calophylla-Xanthorrhoea preissii* woodlands and shrublands, has linkage to Mattiske in *Corymbia calophylla* of FREGRA, *Xanthorrhoea preissii* of BROGRA, *Gompholobium marginatum* of GRAMED, *Mesomelaena tetragona* of BROWET, *Cyathochaeta avenacea* of VERWET and *Meeboldina flexuosa* of SOBROSAN .

Gibson 94's community type 4, described as *Melaleuca preissiana* damplands, has linkage to Mattiske in *Melaleuca preissiana* of VERWET, *Astartea fascicularis* of VERWET, *Dasypogon bromeliifolius* of SCOBROMO, *Xanthorrhoea preissii* of BROGRA, *Phlebocarya ciliata, Lyginia barbata, Adenanthos obovatus, Pericalymma ellipticum* and *Mesomelaena tetragona* of BROWET.

Gibson 94's community type 9, described as dense shrublands on clay flats, has linkage to Mattiske in *Astartea fascicularis* and *Cyathochaeta avenacea* of VERWET, *Hakea varia* of BROWET and *Leptocarpus coangustatus* of FREQWET.

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Review of Linkages between Vegetation and Landform and Soil Classifications – Inions (1990), Gibson (1994, 1997), Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

Inion's has described 13 community types within the karri forest.

One such community type is Ednie-Brown (No 1), characterised by sandy soils with low phosphate levels. The species of high fidelity, equivalent to Havel's (1975 a) and Strelein's indicator species, are *Persoonia longifolia* and *Banksia grandis* in the second storey, *Macrozamia riedlei, Boronia gracilipes, Hibbertia cunninghamii, Podocarpus drouynianus, Conospermum caerulum, Lomandra nigricans, Lomandra integra* and *Ricinocarpos glaucus* in the shrub and herb storey and *Eucalyptus patens* in the overstorey. Some of these feature in Strelein's indicator groups such as SOSALOM (*Boronia gracilipes, Eucalyptus patens* and *Podocarpus drouynianus*), GRAMED (*Banksia grandis* and *Persoonia longifolia*) and FREGRA (*Macrozamia riedlei*). On basis of these indicator groups the affinity of this type is with Strelein's types K and N, which do contain some karri. The remaining species have not been picked up as indicators by either Strelein or Havel, possibly because some of them (*Ricinocarpus* and *Lomandra* spp) have wide edaphic and climatic tolerances. *Hibbertia cunninghamii, Conospermum caerulum, Lomandra nigricans, Lomandra integra* and *Ricinocarpos glaucus* have been put in a new species group labelled INFEKA (infertile karri sites).

Inion's second community type, Lane-Poole (No 2), is weakly defined in terms of indicator species, the only ones identified being *Boronia gracilipes* (Strelein's SOSALOM) and *Acacia pentadenia* (Strelein's SOFERMO), *Crowea angustifolia* (Strelein's SOGRA) and *Ricinocarpos glaucus*. On basis of these, it is also similar to Strelein's types K and N. Lane-Poole is more favourable than Ednie-Brown in terms more summer rainfall and higher phosphate, which is reflected in the presence of *Acacia pentadenia* and in the absence of the GRAMED indicators. The combination of *Acacia pentadenia* and *Crowea angustifolia* has been named the SOFERMO species group.

The Kessel community group (No3), which is described as occurring on gravely yellow or brown duplex soils in the south, is defined by *Chorizema ilicifolium* of SOFERMO group, *Pteridium esculentum* of HIGRA and *Hibbertia commutata, Macrozamia riedlei, Lasiopetalum floribundum* and *Leucopogon propinquus* of the FREGRA group. This places it between Strelein's jarrah types K and T. It is richer in phosphate than Lane-Poole and markedly richer than Ednie-Brown. The last species, *Paraserianthes lophantha,* has not been recognised as indicator in other studies. It has a considerable edaphic range and is a pioneer species, but is included here in FREGRA.

The Stoate community group (No 4) occurs on brown duplex soils. In the moister south it extends on to the slopes of hills, but in the drier centre it is concentrated on lower slopes and valley floors. It is relatively low in phoshate. Of its main indicators only one, *Acacia pentadenia*, is used by Strelein and has been placed by us in the SOFERMO group. *Chorilaena quercifolia, Eucalyptus guilfoylei* and *Lepidosperma effusum* are largely confined to karri sites. They are included in the SOLOAM (southern loams) group. *Lomandra nigricans* is a widespread species with wide edaphic tolerance. This community type also has weak links with Strelein's types K and N.

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Review of Linkages between Vegetation and Landform and Soil Classifications – Inions (1990), Gibson (1994, 1997), Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

The Harris community group (No 5) is described as forest-heathland ecotone. It has the highest summer rainfall and lowest phoshate. It shares some indicators (*Acacia pentadenia, Lepidosperma effusum*) with Stoate, but has a set of unique indicators such as *Acacia divergens, Dampiera hederacea, Hibbertia cuneiformis, Hibbertia furfuracea, Scaevola microphylla* and *Pimelea clavata*. These have not been used by Strelein, but are known to be associated with sandier and more acidic soils of the older dunes. We have labelled this indicator group HEATHECO (heath ecotone). Those also used by Strelein are *Agonis flexuosa* (SOBROSAN) and *Allocasuarina decussata* (SOFERMO). Three species used by Strelein, *Agonis parviceps*, *Patersonia umbrosa* and *Leptomeria cunninghamii* which are here confined to Harris community group, have been also included in HEATECO. This community group is difficult to relate to Strelein's types, other than that it is somewhere near Strelein's K, N and B, and that it is an ecotone rather than a well-defined community or a type.

The Wallace community type (No 6) is described a occurring on moist but well-drained sites with low phosphate and moderate acidity. The indicators identified by Inions include *Crowea angustifolia* var. *dentata* and *Chorizema ilicifolium* (SOFERMO), *Lepidosperma effusum* (SOLOAM) and *Anigozanthus flavidus* (SOBROSAN). *Eucalyptus jacksonii* does not feature in Strelein's classification. The community has an affinity with Strelein's types K and N.

The Stewart community type (No 7) is distinguished from the those already described by coming from the drier northeast subject to summer drought, compensated for by higher phosphate. It has jarrah (*Eucalyptus marginata* subsp. *marginata*) as a canopy component. Its indicators include *Leucopogon capitellatus* of Havel's (1975a) FREGRA, *Bossiaea linophylla* of Strelein's FREGRA, *Hakea amplexicaulis, Acacia browniana* and *Acacia myrtifolia* of SOGRA, *Clematis pubescens* of Strelein's SOFER, *Leucopogon australis* of SOBROSAN and *Kennedia coccinea* of Havel's BROFER. In addition it has a number of specific indicators such as *Logania serpyllifolia, Tremandra diffusa, Hybanthus debilissimus* and *Billardiera variifolia*, labelled DRYKA (dry karri). This community type has affinity with Strelein's types Q and U. *Leucopogon australis* is included in Inions' SOGRA, *Kennedia coccinea* in SOFER and *Eucalyptus marginata* and *Bossiaea linophylla* in DRYKA.

The Beggs community type (No 8) occurs on well drained, fertile upland sites in drier north and has as its faithful species *Bossiaea laidlawiana* of Strelein's SOGRA, *Hovea elliptica* of SOGRAF, *Leucopogon verticillatus* and *Pteridium esculentum* of HIGRA, *Tremandra stelligera* of SOFER, *Acacia pulchella* of BROFER, *Banksia grandis* of GRAMED and *Leucopogon australis* of SOSALOM. We have also placed tree additional species, namely *Corymbia* (formerly *Eucalyptus*) *calophylla*, which is a component of the canopy, and *Lomandra drummondii* and *Opercularia hispidula*, perennial herbs, in the HIGRA group. On basis of Inions' data *Hovea elliptica* and *Leucopogon australis* are included in SOGRA and *Acacia pulchella* in HIGRA. The indicators place this community type close to Strelein's type T.

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The McNamara community type (No 9) occurs in the dry northeast and has high average phosphate levels. Its faithful species (indicators) are *Acacia urophylla* of Strelein's SOFER, *Leucopogon verticillatus* of HIGRA, *Hibbertia amplexicaulis* of SOGRA, *Banksia grandis* of GRAMED. Together they match the site description of moderately fertile upland sites with admixture of lateritic gravel. There is also a group of species not utilised by Strelein, consisting of *Helichrysum ramosum, Hibbertia commutata, Logania vaginalis, Hardenbergia comptoniana, Orthrosanthus laxus* and *Orthrosanthus multiflorus*, which has been labelled NOREKA (northeastern karri). Many of these are common species of the jarrah forest. This community is close to Strelein's types T or U.

The Shea community type (No 10) occurs in northern areas with high but seasonal rainfall, on fertile but gravelly upland sites. The faithful species are *Bossiaea laidlawiana* of Strelein's SOGRA, *Tremandra stelligera* and *Acacia urophylla* of SOFER and *Chorilaena quercifolia*, which was not used by Strelein but is common in high rainfall karri forest. The community is close to Strelein's types Q and U. *Chorilaena quercifolia*, together with *Eucalyptus guilfoleyi* and *Lepidosperma effusum*, has been placed in the SOLOAM species group.

The Havel community type (No 11) occurs on moist sandy loams on streamlines in northern range of karri with high but seasonal rainfall. The soils are low in phosphate but have high cation exchange capacity. The indicator species are Hovea elliptica of SOGRA, *Chorilaena quercifolium* and *Lepidosperma effusum* of SOLOAM, and a specific group of *Chorizema diversifolium, Logania vaginalis, Opercularia volubilis* and *Veronica plebeia*, which has been labelled SOVAL (southern valleys). This community type has no close connection with any of Strelein's types, which generally do not descend into the deeply dissected valleys of the high rainfall zone.

The White community type (No12) occurs on moist but freely drained sites in the north, with relatively fertile soils. Its faithful species are *Pteridium esculentum* of Strelein's and Inions' HIGRA, *Callistachys* (formerly Oxylobium) *lanceolata* of DRYKA, *Amperea ericoides* of NOREKA, *Hibbertia grossulariifolia* of SOFER and *Hibbertia commutata* of FREGRA. *Hibbertia commutata* is a widespread species of the jarrah forest, whereas *Hibbertia grossulariifolia* has a largely a southern distribution. The White community type has no close connection with any of Strelein's types.

Inions (1990) also describes Annels community type (No 13), which differs from White in higher phosphate values. However, as the characteristic species given by him are the same as for White, Annels will be only considered as a subset of White.

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Review of Linkages between Vegetation and Landform and Soil Classifications – Wardell-Johnson et al. (1995), Inions (1990), Gibson (1994, 1997), Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

Wardell-Johnson *et al.*'s (1995) species group No1 consists of 90 species which are absent only from sub-types 37-38 and 42-44, that is from forest types dominated by karri (*Eucalyptus diversicolor*) or tingles (*Eucalyptus brevistylis, E. jacksonii, E. guilfoylei*). It is virtually equivalent to all of Strelein's indicator groups of the jarrah forest combined. It contains species of such divergent ecological preferences as *Cheilanthes austrotenuifolia* of the rocky outcrops; *Banksia grandis, Bossiaea ornata* and *Hovea chorizemifolia* of the lateritic uplands, *Olearia pauciflora* of the costal dunes and *Kingia australis* and *Leucopogon australis* of moist sandy sites.

Species group No 2 is somewhat more compact group of 48 species with a bias toward swampy and sandy sites in subtypes 1-8,10-13, 18-20, 21-24. It has only sporadic occurrence in 25-40 and is largely absent in karri types 42-40. It still contains species of quite diverging ecological preferences such as *Gahnia trifida* and *Agonis juniperina* of swamps and *Pimelia longifolia* and *Allocasuarina fraseriana* of drier sands or sandy gravels.

Species group No 3 consists of 23 species, whose most consistent shared quality appears to be relative rarity, eg. *Eucalyptus virginia, Lasiopetalum cordifolium* and *Lambertia uniflora*. They occur mainly but not exclusively in subtypes 5-9, that is forest –shrubland ecotone.

Species group No 4 consists of 29 species centred on subtype 37-40 and 42-43, that is the species of forests dominated by karri and the tingles. In addition to these tree species (*Eucalyptus diversicolor, E. brevistylis, E. jacksonii, E. guilfoylei*) it contains their key associates such as *Acacia pentadenia, Acacia urophylla, Allocasuarina decussata, Thomasia quercifolia, Chorilaena quercifolia, Lasiopetalum floribundum, Pteridium esculentum, Trymalium floribundum, Tremandra stelligera* and *Clematis pubescens*. It has some less predictable inclusions such as *Eucalyptus rudis* and *Ricinocarpus glaucus*, but essentially it is a sound group.

By contrast, species group No 5 of 62 species, whilst having some species with common ecological preferences, such *Eucalyptus occidentalis, Eucalyptus decipiens* subsp *chalara, Hibbertia stellaris* and *Melaleuca cuticularis* of depressions with saline influences, also contains others whose affinity with these is difficult to see, such as *Dodonea aptera* and *Melaleuca diosmifolia* of rocky outcrops, *Cephalotus follicularis* and *Xyris flexifolia* of peaty swamps and *Eucalyptus calcicola* and *Exocarpus sparteus* of lime-rich dunes. The members of the group occur in subtypes 12-13, 16-20, 21-25 and 33-36, which also have little in common.

Species group No 6 of 44 species occurs sporadically in subtypes 1, 3 and 4 and contains such species as *Eucalyptus staeri*, which suggests linkage with sandy sites in the southeast, but most of its members appear to be rather uncommon species about whose ecological preferences and associations little is known.

Species group No 7 of 30 species occurs on subtypes 21, 24, 30-36 and 40-41, most of which occur in lower rainfall, but it contains species with widely divergent edaphic preferences such as *Hakea undulata, Dodonea ceratophylla, Daviesia horrida* and *Dryandra armata* of shallow, stony sites as well as species with bias toward moist sites such as *Baeckea camphorosmae* and *Hypocalymma angustifolium.*

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Species group No 8 of 15 species largely consist of exotic weed species, presumably from disturbed sites. It occurs sporadically on subtypes 24-36, and strongly on subtype 31, which is described as rock outcrop. The indigenous species of subtype 31 have been mostly allocated to other groups.

Indicator group No 9 of six species comes from subtype 34, described as *Eucalyptus patens* woodland on clay-loam soil. It consists of two unidentified grasses, an exotic weed, two herbs and a dwarf shrub. There are other species present in this swamp subtype, including small trees and tall shrubs, but these have been allocated to other species groups.

Species group No 10 consists of 12 species and is associated with subtype 33, which is described as being associated with rock outcrops and shallow soils in lower rainfall. This is supported by the occurrence within it of such species as *Astroloma ciliatum, Stirlingia tenuifolia* and *Glyschrocaryon aureum* var *aureum*. The remaining species appear to be relatively uncommon ones.

Species group No 11 is a large group of 67 species, the majority of which are species of coastal dunes such as *Acacia cochlearis, Acacia littoralis, Spyridium globulosum, Muehlenbeckia adpressa, Pimelea ferruginea, Senecio lautus* and *Rhagodia baccata*. This is borne up by the association of this group with subtypes10-17, and in particular 14 to 16, all of which come from coastal dunes. However, some members of the group, such as *Agonis flexuosa, Hardenbergia comptoniana, Phyllanthus calycinus, Hakea prostrata, Chorizema ilicifolia* and *Dryandra sessilis*, have much wider ecological range and extend on to inland subtypes.

Species group No 12 of 15 species is associated with subtype 36, one of two only subtypes with *Eucalyptus wandoo*, which is essentially a species of drier inland and of heavier textured and more fertile soils. It also has an association with rock outcrop and shallow soils through such species as *Borya sphaerocephala* and *Darwinia citriodora*.

Species group No 13 consists of 11 species, half of which are exotic weeds, and is associated with subtype 30, which consists of one plot. The plot is a woodland of *Eucalyptus cornuta*, and is obviously strongly disturbed.

As an alterntative, a matrix of 44 community subtypes by 381 species with 50% or higher constancy on at least one subtype, has been re-ordered using Bridgewater's (1981) methodology. It produced 42 indigenous and 1 exotic species groups. The matrix is listed below:

The comparison of the Wardell-Johnson *et al.* (1995) classification with other near-by classifications proved a major task. It can be summarised as follows:

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In the case of Strelein's (1988), the comparison is governed by the fact that Strelein concentrated his work on the forest of *Eucalyptus marginata* subsp *marginata*, and did not specifically sample more extreme sites. He has only limited counterpart of WJ 95's more extreme sandy sites, characterised by the species sets EXSAN and DRYSAN. Only one species, *Melaleuca thymoides* of DRYSAN, also occurs among Strelein's indicators, where it is placed into SOSAM (southern sands, moist). The more widely ranging species groups of WJ 95, such as BROGRA, contains several species also identified as indicators by Strelein. Two of these, *Eucalyptus marginata* subsp *marginata* and *Persoonia longifolia*, have only negative value in Strelein's classification, in that they are only absent from the most extreme sites. Another two have been placed in broad indicator groups, namely *Xanthorrhoea preissii* in BROMO (broadly moist) and *Anarthria scabra* in SOBROSAN (southern broadly sandy).

There is close correspondence between the two classifications in *Adenanthos obovatus* and *Dasypogon bromeliifolius*, which are place in both classifications in SAMORG (sandy, moist, organic enriched). The broader group of WJ 95's also contains species which in the more detailed classification of Strelein are placed into other groups, such as *Anarthria prolifera* of SOWET (southern wet), *Pultanaea reticulata* of SOSAM (southern sandy moist) and *Agonis parviceps* of SOSALOM (southern sandy loams). The MOFES group of WJ 95 shares with Strelein *Acacia myrtifolia* of SOGRA (southern gravels) and *Patersonia umbrosa* of SOGRAF (southern gravels, fertile)

The BROMOF group of WJ 95 shares *Agonis flexuosa* and *Anigozanthus flavidus* with Strelein's SOBROSAN group. Both SOBROSAN and BROMOF are broad southern groups consisting of species from sandy moist soils of moderate fertility.

The SOHUMP has one match with Strelein's group GRAMED in *Leptomeria cunninghamii*.

Similarly, the SOMOL group has one match with Strelein's BROMO in *Kingia australis*. Strelein did not use the other important member of the BROMO group of Havel (1975), *Mesomelaena tetragona*, which also features prominently in the SOMOL group.

The MOLGRA group, similar to SOMOL but with a broader range, shares *Lepidosperma squamatum* with Strelein's BROMO, *Leucopogon australis* with SOBROSAN, *Leucopogon propinquus* with FREGRA and *Corymbia calophylla*, which in Strelein's classification is so widespread as to have only a negative indicator value.

The sand dune species groups DUSAN, BRODUN and DUNON include several species of relatively broad edaphic range, which are shared with Strelein, such as *Desmocladus fasciculatus* of BROMO, *Bossiaea linophylla* of FREGRA and *Acacia pulchella* of BROFER. One additional species, *Banksia littoralis* of VERWET, is an unlikely match as it normally occurs in swamps. The many species characteristic of sand dunes which were recorded by WJ 95 have no match in Strelein as he did not sample sand dunes.

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There is a strong match between WJ 95 and Strelein in *Homalospermum firmum* and *Beaufortia sparsa* of the SOWET group of freshwater swamps. Other prominent swamp species are *Melaleuca preissii* of WJ 95 SANPEAT and Strelein's VERWET, and *Eucalyptus patens* of WJ 95's WETLOAM and Strelein's SOFERMO. The majority of swamps species are represented in WJ 95 only.

There are relatively few matches with Strelein for the WJ 95 groups covering rocky sites, such as MEDROC, LOWROC and DRYVAL. Those species recorded by both WJ 95 and Strelein are not rock specialists, but generalists which extend on to rocks, such as *Trymalium ledifolium, Astroloma pallidum, Hypocalymma angustifolium* and *Eucalyptus wandoo* of Strelein's DRYGRA. The same is true of *Hakea lissocarpha* of WJ 95's DRYLOG and Strelein's BROFER The many rock specialists recorded by WJ 95 have no counterpart in Strelein as he did not sample rock outcrops.

The closest correspondence between Wardell-Johnson *et al.* (1995) and Strelein (1988) is on uplands, as this is where Strelein's sampling was centred. The matches are particularly strong in WJ 95 species groups SOGRAF and SOGRAM, characteristic of uplands with lateritic gravely soils. These contain *Crowea angustifolia* var *platyphylla, Xanthorrhoea gracilis, Sphaerolobium medium* and *Petrophile diversifolia* of Strelein's SOGRA, *Macrozamia riedlei* of FREGRA.and *Banksia grandis* and *Hovea chorizemifolia* of Strelein's GRAMED.

There is also good correspondence between WJ 95 groups SOFER and SOFREG, indicative of loamier and more fertile sites, and Strelein's groups SOFERMO with *Allocasuarina decussata, Lasiopetalum floribundum* and *Eucalyptus diversifolia*, HIGRA with *Pteridium esculentum* and *Leucopogon verticillatus* and SOFER with *Tremandra stelligera* and *Clematis pubescens*. In addition, they also contain *Hovea elliptica* of Strelein's SOGRAF.

The final group of WJ 95, EXKAR, which defines pure forest of *Eucalyptus diversifolia* with floristically simple understorey, has no counterpart in Strelein's classification. This is reflected in just one weak match involving *Acacia alata* of Streleins' SOFER.

As could be expected, the main match between Wardell-Johnson *et al.* (1995) and Inions (1990b) is for species groups associated with the karri forest:
The HILOG species group of WJ 95 matches Inions' SOLOAM in *Chorilaena quercifolia* and *Eucalyptus guilfoylei* and SOFERMO in *Eucalyptus jacksonii* and *Acacia pentadenia*. Additional species matches for HILOG are *Opercularia volubilis* of Inions' SOVAL and *Dampiera hederacea* of HEATECO.

The SOFER species group of WJ 95 matches Inions' SOFERMO in *Allocasuarina decussata* and in addition has *Hovea elliptica* of SOGRA, *Leucopogon verticillatus* of HIGRA, *Billardiera variifolia* of DRYKA and *Lasiopetalum floribundum* of FREGRA.

The SOFREG species group of WJ 95 matches Inions' SOFER in *Tremandra stelligera* and *Clematic pubescens* and in addition also has *Pteridium esculentum* of HIGRA. It is the group containing *Eucalyptus diversicolor*, which is universally distributed in Inions' classification.

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The EXKAR species group of WJ 95,which defines the purest karri forest with the floristically simplest understorey, has only one match in *Hibbertia furfuracea* of Inions' HEATECO.

The SOGRAM and SOGRAF species groups of WJ 95 have matches with *Boronia gracilipes* and *Podocarpus drouynianus* of SOSALOM, *Banksia grandis* of GRAMED, *Acacia divergens* of HEATECO, *Logania serpyllifolia* and *Tremandra diffusa* of DRYKA and *Lomandra drummondii* of HIGRA. Most of these species are essentially species of the jarrah rather than karri forest and define the karri-jarrah transition or the edaphically marginal sites for karri.

Many other of WJ 95 species groups which are essentially associated with jarrah rather than karri forest define sub-optimal karri types of Inions and match their associated indicator species groups such as INFEKA, DRYKA and NOREKA. These include the BROGRA group of WJ 95 with *Eucalyptus marginata, Persoonia longifolia* and *Agonis parviceps*, BROMOF group with *Leucopogon capitellatus, Opercularia hispidula, Agonis flexuosa* and *Anigozanthus flavidus*, MOLGRA group with *Leucopogon australis, Leucopogon propinquus* and *Corymbia calophylla* and DUSAN group of *Lepidosperma effusum* and *Acacia pulchella*.

There is considerable linkage between Wardell-Johnson (1995) and Gibson (1997).

Gibson's community 2 has links with WJ 95 in *Acacia littorea* and *Olearia axillaris* of BRODUN, *Spyridium globulosum* of DUNON, *Isolepsis nodosa* of DUSAN, *Leucopogon parviflorus* of LIMDUN, *Rhagodia baccata* of WEDUN, and *Lepidosperma squamatum* of MOLGRA.

Gibson's community 4, described as community on skeletal limestone, has as its characteristic species *Hibbertia grossulariifolia* of WEDUN, *Desmocladus flexuosus* of DUSAN, *Agonis flexuosa* of BROMOF, *Lysinema ciliatum, Lepidosperma gladiatum, Phyllanthus calycinus* and *Acacia littorea* of BRODUN.

Gibson's community 5, described as herb-rich Agonis forests and heaths, has links with WJ 95 in *Leucopogon parviflorus, Dryandra sessilis* var *sessilis* and *Logania vaginalis* of LIMDUN, *Senecio lautus* and *Rhodanthe citrina* of DUNON, *Desmocladus flexuosus* of DUSAN and *Hakea prostrata* of DRYDUN.

Gibson's community 7, described as coastal Agonis forests and heaths, has links with WJ 95 in *Agonis flexuosa* of BROMOF, *Acacia littorea, Phyllanthus calycinus* and *Olearia axillaris* of BRODUN, *Spyridium globulosum* of DUNON, *Leucopogon parviflorus* of LIMDUN, *Rhagodia baccata, Hardenbergia comptoniana* and *Hibbertia grossulariifolia* of WEDUN, *Lepidosperma squamatum* of MOLGRA, *Desmocladus flexuosus* of DUSAN, but especially in *Hibbertia cuneiformis* of DRYDUN, *Clematis pubescens* of SOFREQ and *Macrozamia riedlei* of SOGRAF.

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Gibson's community 8, described as inland Agonis forest and heath, has links with WJ 95 in *Agonis flexuosa, Anigozanthus flavidus* and *Opercularia hispidula* of BROMOF, *Lepidosperma gladiatum* and *Pimelia rosea* of BRODUN, *Hakea oleifolia* of DUNON, *Leucopogon propinquus* of MOLGRA, *Hibbertia grossulariifolia* and *Muehlenbergia adpressa* of WEDUN and *Desmocladus flexuosus* of DUSAN.

Gibson's community 9, described as western *Jacksonia horrida* heath and woodland, is linked with WJ 95 in the common dune species shared by the communities described above, but has in addition *Rhodanthe citrina, Lobelia tenuior* and *Senecio lautus* of DUNON and *Logania serpyllifolia* subsp *angustifolia* of SOGRAM and *Sollya heterophylla* of DUSAN.

Gibson's community 10, described as eastern *Jacksonia horrida* heath and woodland, has links to WJ 95 in the strong development of *Patersonia occidentalis. Bossiaea linophylla, Anarthria prolifera* of SAMORG, *Andersonia caerula* of BROGRA, *Lyginia barbata* and *Melaleuca thymoides* of DRYSAN, *Adenanthos cuneatus* of WEDUN, *Lysinema ciliatum* and *Velleia trinervis* of BRODUN and *Allocasuarina humilis* of LOWROC. The presence of these species suggests longer leaching and less fertile acid soils.

Gibson's community 11, described as Agonis – Banksia – Eucalyptus heathland and woodland has links with WJ 95 in *Olearia axillaris, Phyllanthus calycinus, Conostylis aculeata* subsp *aculeata* and *Pimelia rosea* of BRODUN, *Spyridium globulosum* of DUNON and *Leucopogon parviflorus* of LIMDUN. *Agonis flexuosa* of BROMOF, *Hibbertia grossulariifolia* and *Hardenbergia comptoniana* of WEDUN.

Gibson's community 13, described as wet scrub and woodland, has links with WJ95 in *Agonis flexuosa* and *Opercularia hispidula* var *pauciflora* of BROMOF, *Anarthria prolifera, Dasypogon bromeliifolius* and *Adenanthos obovatus* of SAMORG, *Bossiaea rufa* of EXSAN and *Lepidosperma squamatum* of MOLGRA, suggesting moist, leached and organically enriched sands.

Gibson's community 14, described as *Banksia ilicifolia* has links with WJ95 in some of the indicators of community 13, but especially *Pimelia longiflora* subsp *longiflora* of EXSAN, *Lyginia barbata* and *Melaleuca thymoides* of DRYSAN and *Eucalyptus marginata* subsp *marginata, Anarthria scabra* and *Andersonia caerula* of BROGRA, suggesting leached sands.

Gibson's community 15, described as *Banksia attenuata* woodlands, has links with WJ95 in *Lepidosperma squamatum* of MOLGRA, *Melaleuca thymoides* of DRYSAN. This suggest dry, leached sands.

Gibson's community 20, described as *Hakea linearis* wet flats, has links with WJ 95 in *Acacia hastulata* of FLADUN, *Agonis parviceps* of SAMORG, *Boronia magastigma* of LOSWAM, *Xanthorrhoea preissii* of BROGRA and *Melaleuca pauciflora* of WETCLAY. These are indicative of heavier textured soils than community 15 and impeded drainage.

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Gibson's community 22, described as ironstone communities, has links with WJ 95 in *Melaleuca preissiana* of SANPEAT, *Hakea varia* of WETLOAM and *Melaleuca pauciflora* of WETCLAY. These are also indicative of impeded drainage and seasonal waterlogging.

Gibson's community 23 has links with WJ 95 in *Baumea juncea* of WETROC, *Hakea ceratophylla* of WETCLAY, *Astartea fascicularis* of SOWET, *Patersonia occidentalis* of MOLGRA, *Melaleuca densa* and *Meeboldina scariosa* of LOSWAM, *Melaleuca rhaphiophylla* and *Hakea varia* of WETLOAM. These are indicative of waterlogged site and heavier-textured soils.

Gibson's community 26, described as western shallow wetlands, has links with WJ 95 in *Melaleuca pauciflora* of WETCLAY and *Melaleuca incana* subsp *incana* of HEADLAND.

Gibson's community 27, described as moderately deeply inundated sedgelands, has links with WJ 95 in *Astartea fascicularis* of SOWET and *Meeboldina scariosa* of LOSWAM.

Gibson's community 28, described as very deeply inundated wetlands, has links with WJ 95 in *Agonis juniperina* of SOWET and *Meeboldina scariosa* of LOSWAM and *Melaleuca rhaphiophylla* of WETLOAM.

Gibson's community 29, described as heathy sedgelands, has links with WJ 95 in *Astartea fascicularis, Evandra aristata, Homalospermum firmum* and *Beaufortia sparsa* of SOWET, *Anarthria prolifera* of BROGRA, *Acacia hastulata* of FLADUN, *Agonis parviceps, Dasypogon bromeliifolius* and *Adenanthos obovatus* of SAMORG, *Diaspasis filifolia, Xyris lanata* and *Gymnoschoenus anceps* of SANPEAT. These are indicative of wet, organically enriched sites.

Gibson's community 30, described as *Melaleuca thymoides* wet heaths, has links with WJ 95 in *Andersonia caerula, Lyginia barbata* and *Melaleuca thymoides* of DRYSAN, *Kunzea recurva* of SOHUMP, *Xanthorrhoea preissii* of BROGRA and *Hibbertia stellaris* of WETCLAY, *Gymnoschoenus anceps* of SANPEAT. These are indicative of less wet and more sandy sites than Gibson's 29.

The higher level linkage between Wardell-Johnson *et al.* (1995) and other classification.

One of the more extreme community types within Wardell-Johnson *et al.*'s (1995) classification is community type 1. It is composed of plots situated on extreme sandy sites, with a high degree of leaching and infertility. It is primarily defined by the species groups EXSAN and DRYSAN, in fact the EXSAN group occurs on this type alone. Of the species with fidelity in excess of 50 %, four also occur in other classifications:

> *Pimelea longiflora* subsp *longiflora* is also a key characteristic species in the PIMLONG group of Wardell-Johnson *et al.* (1989), and also occurs in Gibson's (1997) community group 14, *Bossiaea rufa* also occurs as characteristic species of Gibson's (1997) community group 13. *Daviesia decurrens* is also a member of Havel's (1975 a) indicator group DRYSAG. *Leucopogon glabellus* is also a member of McCutcheon's (1978) group MOSAN.

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Although *Banksia attenuata* does not reach the 50% fidelity criterion in community type 1, it is often the structurally dominant tree species of this type and of Gibson's (1997) community groups 14 and 15. It is a common associate of *Daviesia decurrens*. The remaining species of the EXSAN group, namely *Petrophile longifolia,* and *Hypocalymma strictum,* do not feature in the other classifications, but that does not necessarily mean that they are absent in the areas covered by them.

The species group DRYSAN is mainly, but not exclusively, confined to Wardell-Johnson *et al.*'s (1995) community types 1 and 2. Of its component species, three also occur in other classifications:

> *Lyginia barbata* is also a member of Wardell-Johnson *et al.* (1989) PIMLONG group and is a characteristic species of Gibson's (1997) community groups 10, 14 and 30. *Melaleuca thymoides* is member of SOSAM group of Wardell-Johnson *et al.* (1989) and Strelein's (1988) and is a characteristic species of Gibson's (1997) community groups 10, 14, 15 and 30. *Allocasuarina fraseriana* is a characteristic tree species in Wardell-Johnson *et al.* (1989) and Havel's (1975) SANGRA group. *Hakea ruscifolia* is a member of the SOSAM group of Strelein (1988) and DRYSAG group of Havel (1975). Although *Banksia ilicifolia* does not reach the 50% fidelity criterion in community type 2, it is often the structurally dominant tree species of this type and of Gibson's (1997) community groups 14. The DRYSAN group is indicative of less extreme sandy sites than EXSAN.

The next species group, BROGRA, has much greater ecological amplitude than either EXSAN or DRYSAN, extending across Wardell-Johnson *et al.* (1995) community subtypes 1 to 10, absent from community subtypes 11 to 17 (coastal dunes), 18 to 25 (swamps) and 26 to 30 (rock outcrops). It reappears in community subtype 31 and 39-41 (lateritic uplands), but is again absent from subtypes 42 to 44 (karri forest), and is thus essentially composed of species of the jarrah forest, including jarrah itself. The component species are common in other classifications. *Eucalyptus marginata* subsp *marginata* occurs in Gibson's (1997) community groups 14, as do *Anarthria scabra* and *Andersonia caerula*. *Eucalyptus marginata* subsp *marginata* also enters into the DRYKA species group of Inions and Wardell-Johnson *et al.* (1989), and is so prevalent in Strelein's classification of southern jarrah as to have only a negative indicator value (NEGIN), that is, it is only absent from the most extreme sites. The same is also true of *Persoonia longifolia*. In Havel's classification of northern jarrah *Eucalyptus marginata* fits into a category of its own (JARRAH), which also has a very wide ecological amplitude. *Persoonia longifolia* is a key species of ecological species group GRAMED in Inions(1990) and Gibson's (1997) community groups 14, as is *Agonis hypericifolia*. Another species of very wide amplitude is *Xanthorrhoea preissii*, which is included in Inions(1990) and Wardell-Johnson *et al.* (1989) species group BROMO and Gibson's (1997) community groups 20 and 30. *Lindsaea linearis* is a member of Wardell-Johnson *et al.*'s (1989) species group JACFUR. The BROGRA species group is thus essentially a ecological species group of broad amplitude covering the jarrah forest on coarse grained and infertile soils, such as sands and sandy gravels. The full details of the higher level linkage process are given in Wardell-Johnson (1995).

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It is paralleled in many aspects by the SAMORG species group, whose main components, *Dasypogon bromeliifolius* and *Adenanthos obovatus*, co-occur on moist sites with sandy, humus enriched soils throughout the Jarrah and Warren bioregions, and form the basis of the SAMORG species group in most of the classifications (Wardell-Johnson *et al.*, 1989; Strelein, 1985; Havel, 1975a). They also co-occur in Gibson's (1997) community groups 13 and 29, as does *Anarthria prolifera*. However, *Anarthria prolifera* falls into Wardell-Johnson *et al.*'s, 1989 and Strelein's species group SOWET. Another member of the group, *Agonis parviceps*, occurs in Gibson's (1997) community groups 20 and 29 and fits into Strelein's SOSAM species group. *Pultanaea reticulata* is a member of Wardell-Johnson *et al.*'s (1989) and Strelein's species group SOSAM. The difference between BROGRA and SAMORG lies in a slight shift in edaphic moisture balance, in that the SAMORG group does occur to a limited degree in the swamps (community types 11 to 17) and is less consistent on lateritic uplands (community types 39 to 41). There is considerable overlap between SAMORG and SOSAM.

The MOFES ecological species group, has, by comparison with BROGRA and SAMORG, much narrower ecological amplitude. It is strongly developed in Wardell-Johnson *et al.* (1995) community type 2, and occurs partially in types 5, 7, 26, 27 and 28. Its component species are only shared to a minor degree and inconsistently with other classification:

> *Xanthosia rotundifolia* also occurs in Wardell-Johnson *et al.*'s, 1989 PIMLONG species group and *Burchardia congesta* (formerly B. umbellata) in AGOSH. Strelein's (1988) and Inions' classifications (1990a&b) share with MOFES *Patersonia umbrosa* var *umbrosa* and *Acacia myrtifolia*.

The BROMOF species group has ecological amplitude comparable to BROGRA and SAMORG. It resembles MOFES in being best developed in community type 2, but differs from it in being strongly developed on community types 10,11, 12, 14, 15 and 16 of the coastal dunes, as well being moderately well represented on community types 27 to 30 of the rocky outcrops and types 35, 38, 39 and 40 of the uplands. Its component species have strong linkages to other classifications:

> *Leucopogon capitellatus* is linked with species group DRYKA of Wardell-Johnson *et al.* (1989) and Inions (1990) and FREGRA of Havel (1975). *Opercularia hispidula* var *pauciflora* and *Agonis flexuosa* are characteristic of Gibson's (1997) community groups 4, 8 and 13. *Agonis flexuosa* and *Anigozanthus flavidus* are also members of Strelein's and Inions' species group SOBROSAN. The group is indicative of older dune systems, rocky outcrops and inland uplands, with soils of better fertility than those considered so far.

It is difficult to assess the significance of the small species group SOHUMP, centred on the community type 3. There is only a weak linkage to other classifications, mainly through *Leptomeria cunninghamii*, which is characteristic of Gibson's (1997) community group 30 and is also a member of Strelein's and Inions' species group GRAMED.

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Review of Linkages between Vegetation and Landform and Soil Classifications - Wardell-Johnson et al. (1995), Inions (1990), Gibson (1994, 1997), Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

The SOMOL is primarily centred on Wardell-Johnson *et al.* (1995) community types 4, 5, 6 and 7. Its key members have strong linkages to other classifications:

> *Mesomelaena tetragona* is linked to Wardell-Johnson *et al.*'s (1989) and Havel's (1975) species group BROMO. *Kingia australis* is linked to Strelein's (1988) and Havel's (1975) species group BROMO. *Evandra aristata* is a characteristic species of Gibson's (1997) community group 29 and is a member of Strelein's (1988) SOWET species group.

The BROMO groups reflect moist but not excessively wet sites. SOWET is somewhat wetter.

The MOLGRA species group has two main foci, namely in Wardell-Johnson *et al.* (1995) community types 5,7 and 8, and in 30, 31, 34, 40 and 41 respectively, but occurs at lower level in other groups, being only completely absent from extreme sandy sites (1-3) and from the karri forest (42-44). Its members have strong linkages to other classifications:

> *Leucopogon australis* is a member of the SOBROSAN species group in the classifications of Wardell-Johnson *et al.* (1989) and Strelein.

Leucopogon propinquus is a characteristic species of Gibson's (1997) community groups 8 and 11, and is also a member of Strelein's, Inions' and Havel's (1975) species group FREGRA.

Corymbia calophylla has such a broad ecological amplitude that in the classifications of Strelein and Havel it is considered as a negative indicator, that is, absent only from extreme sites. It is a component of the forest overstorey over much of the Jarrah and Warren bioregions.

Patersonia occidentalis is a characteristic species of Gibson's (1997) community groups 10 and 23 and is a member of Wardell-Johnson *et al.*'s (1989) species group BROMO.

Lepidosperma squamatum is a characteristic species of Gibson's (1997) community groups 2, 7,13 and 15 and is a member of Strelein's and Havel's species group BROMO.

The MOLGRA species group thus consists of common species with broad ecological amplitudes, which are components of many community types. It is suspected that in order to occur in so many community types, and to be able to co-exists with a prominent component of the forest overstorey such as *Corymbia calophylla*, these species must have a good capacity to tolerate competition. This is in strong contrast to the species of the EXSAN and DRYSAN species groups, for which the key prerequisite for membership would be the capacity to tolerate low fertility and poor moisture retention of the soil. The compensation for these environmental constraints is presumably a lower level of competition, as in Wardell-Johnson *et al.* (1995) community type 1 and 2, to which EXSAN and DRYSAN species groups are confined, the SOMOL and MOLGRA species groups are absent.

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The NAPODS species group is loosely held together by co-occurrence in Wardell-Johnson *et al.* (1995) community groups 6, 7, 8 and 9. Most of its component species do not occur in other classifications other than that of Wardell-Johnson *et al.* (1989), within which they are linked to species groups JACFUR (*Eutaxia obovata*), AGOSH (*Stylidium scandens*) and AGBOS (*Bossiaea webbii*), which suggests that the group is centred on the south coast. The only exception is *Nuytsia floribunda*, an arborescent root parasite that Havel (1975) placed in his SANLEA species group.

The DUSAN species group, which is loosely centred on Wardell-Johnson *et al.* (1995) community groups 8 to 17 and 27 to 31, also has only weak links to other classifications. The main link is through *Desmocladus flexuosus* to Gibson's (1997) community groups 2, 4, 5, 7 and 8, through

Isolepis nodosa to 2 and through *Sollya heterophylla* to 9. This suggests association with coastal dunes. However two other species have broader links, namely *Lepidosperma effusum*, which is also a member of Inions' SOLOAM and *Acacia pulchella*, which is a member of Strelein's BROFER.

The FLADUN species group is centred on Wardell-Johnson *et al.* (1995) community group 10 and has links with Gibson's (1997) community groups of the coastal dunes and swamps, namely through *Acacia hastulata* (20, 29 and 30) and through *Adenanthos cuneatus* (10). However, the component species are not restricted to the coastal zone, occurring sporadically in other ecological settings.

The association with coastal dunes is much stronger in the case of the BRODUN species group, which is largely centred on Wardell-Johnson *et al.* (1995) community groups 10 to 12 and 14 to 17, that is coastal dunes of various ages and hence of varying degree of leaching. This species group mainly has linkages with Gibson's (1997). These include *Acacia littorea* (Gibson's community groups 2, 4 and 7), *Bossiaea linophylla* (10), *Conostylis aculeata* subsp *aculeata* (5, 11), *Lepidosperma gladiatum* (4, 8), *Lysinema ciliatum* (4, 10), *Olearia axillaris* (2, 7,11, 25), *Phyllanthus calycinus* (4, 7, 11), *Pimelia rosea* (8, 11) and *Velleia trinervis* (10). There are also linkages with Wardell-Johnson *et al.* (1989), to species group DASBROM through *Lysinema ciliatum* and *Velleia trinervis*, and to species group ALIT through *Acacia littorea*. Two species have linkage to non-coastal species groups, namely *Bossiaea linophylla* to Inions' and Strelein's FREGRA, and *Phyllanthus calycinus* to Havel's (1975) FREGRA. The latter linkages suggest better drainage, weaker leaching and hence better fertility than the FLADUN species group.

The DUNON species group has a very similar ecological amplitude to the BRODUN species group, except in so far that it is absent from Wardell-Johnson *et al.* (1995) community group 10. This species group also mainly has linkages with Gibson's (1997). These include *Spyridium globulosum* (Gibson's community groups 2, 11, 7) *Rhodanthe citrina* (5, 9), *Hakea oleifolia* (8), *Senecio lautus* subsp *maritimus* (5, 9, 25) and *Lobelia tenuior* (5, 9). There are also links to Wardell-Johnson *et al.*'s(1989), species group BANLIT through *Banksia littoralis*, and ALIT through *Senecio lautus* subsp *maritimus*. *Banksia littoralis* is also a member of the VERWET group of Strelein and Havel, however, there is no true ecological linkeage, as these groups are linked with inland swamps and *Banksia littoralis* is the only shared species.

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Review of Linkages between Vegetation and Landform and Soil Classifications - Wardell-Johnson et al. (1989, 1995), Inions (1990), Gibson (1994, 1997), Mattiske Consulting Pty Ltd (1996), Havel (1975a and b), Strelein (1988) and McCutcheon (1978, 1980)

Wardell-Johnson *et al.* (1989) define twelve community types, and list characteristic species for them. The first of these, defined as Pimelia longiflora heathland community, occurs on damp sites with shallow sandy soils and has the following characteristic species, given here with corresponding Strelein groups in brackets: *Adenathos obovatus* (SAMORG), *Agonis hypercifolia* (BROMO), *Allocasuarina fraseriana* (Havel's SANGRA), *Lyginia barbata, Xanthosia rotundifolia* and *Pimelia longiflora*. We have labelled the last three species as the PIMLONG group. This community type has affinity with Strelein's site groups R and I.

The community group 2, defined a *Agonis parviceps* shrubland community, occurs within granitic terrain on shallow pale sand over yellow brown mottled clay, and has as characteristic species *Agonis parviceps* and *Desmocladus* (formerly *Loxocarya*) *flexuosa* (BROMO), *Anarthria prolifera* and *Beaufortia sparsa* (SOWET) and *Anarthria scabra* (SOBROSAN), *Stylidium scandens, Thysanotus pauciflorus* and *Burchardia umbellata*. We have labelled the last three species as the AGOSH (Agonis shrubland) group.

Eucalyptus marginata subsp. *marginata*, also listed by Wardell-Johnson *et al.* (1989), is not useful in Strelein's classification because its commonness in the jarrah forest. On structure and composition this community type is close to Strelein's type F.

Wardell-Johnson *et al.*'s (1989) community type 3, described as *Beaufortia sparsa* plain on humus and peaty podzols, approaches Streleins F even more closely. It is defined by *Acacia myrtifolia* (SOGRA), *Adenanthos obovatus* and *Dasypogon bromeliifolius* (SAMORG), *Anarthria scabra* and *Melaleuca thymoides* (SOBROSAN), *Anarthria prolifera, Beaufortia sparsa* and *Homalospermum firmum* (SOWET). *Leucopogon capitellatus* (Havel's FREGRA), *Corymbia* (formerly *Eucalyptus*) *ficifolia* and *Mesomelaena tetragona* (Havel's BROMO) have not been used by Strelein as indicators. The presence of *Leucopogon capitellatus* and *Eucalyptus marginata* subsp. *marginata* suggests that even this community type is not as extreme as Strelein's type F, which lacks *Eucalyptus marginata*.

Community type 4, described as an ecotone between *Agonis parviceps* shrubland and *Bossiaea webbii* forest, occurs on gravely yellow duplex soils. Its characteristic species are *Agonis hypericifolia* (Strelein's GRAMED) and *Agonis parviceps* (SOSALOM), *Persoonia longifolia* (Havel's GRAMED), *Kunzea recurva* and *Bossiaea webbii*. The last two species have no counterpart in Strelein, and have been labelled AGBOS (Agonis-Bossiaea ecotone). This community type has some links with Strelein's type P, but is sufficiently distinct to be considered a separate type.

Community type 5 is also described as an ecotone between *Agonis parviceps* shrubland and forest, but a forest with a different understorey, dominated by *Acacia browniana*. It is described as varying in both underlying edaphic conditions (podzols or sands or gravels over clay) and in structure (heathland to open forest). The characteristic species defined by Wardell-Johnson *et al.* (1989) are *Agonis parviceps* (Strelein's SOSALOM), *Acacia browniana* (Strelein's SOGRA), *Leucopogon australis* (Strelein's SOBROSAN), *Bossiaea webbii* (AGBOS), *Burchardia umbellata* and *Stylidium scandens* (AGOSH), *Pimelea longiflora* and *Xanthosia rotundifolia* (PIMLONG). On the basis of these, the affinity of this community type is with Strelein's types P, R and I.

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Community type 6 is described as *Dasypogon bromeliifolius* heath and shrubland on deep leached sands and podzols. Its characteristic species shared with other classifications are *Acacia myrtifolia* (Strelein's SOGRA), *Acacia pentadenia* (Streleins's SOFERMO), *Dasypogon bromeliifolius* (Strelein's SAMORG), *Amperea ercoides* (Inions' NOREKA), *Anarthria scabra* (Strelein's SOBROSAN), *Melaleuca thymoides* (Strelein's SOSAM), *Desmocladus* (formerly *Loxocarya*) *flexuosa* (Strelein's BROMO). There is also a new group of three species not referred to previously, namely *Jacksonia furcellata, Lysinema ciliatum* and *Velleia trinervis*, which we have labelled DASBROM. On the basis of the indicators it has affinities with Strelein's type R, though it is quite distinct.

Community type 7 is described as *Allocasuarina fraseriana* forest community, occurring on humus podzols developed on deep sands. Its characteristic species are *Allocasuarina fraseriana* (Havel's SANGRA), *Acacia myrtifolia* (Strelein's SOGRA), *Agonis hypericifolia* (Strelein's GRAMED, *Leucopogon australis* (Strelein's SOBROSAN), *Leucopogon verticillatus* (Havel's and Strelein's HIGRA), *Pimelea longiflora, Lyginia barbata* and *Xanthosia rotundifolia* (PIMLONG), *Burchardia umbellata* (AGOSH), and *Mesomelaena pseudostygia* (formerly *M. stygia*). The last species has only been used on the northern Swan Coastal Plain as an indicator of weakly leached sands by Havel (1968). This community type is similar but not identical to Strelein's type R.

The next community type (No 8) differs sharply from all preceding ones by being tall open forest of *Eucalyptus diversicolor* on light brown gravely duplex soils or red or yellow earths in hilly terrain. It is superior to all preceding types in terms of edaphic conditions, being relatively fertile and well drained. Its characteristic species are *Acacia browniana* (Strelein's SOGRA), *Leucopogon verticillatus* (Strelein's HIGRA), *Acacia pentadenia, Eucalyptus jacksonii* and *Allocasuarina decussata* (Inions' and Streleins's SOFERMO), *Chorilaena quercifolia* and *Lepidosperma effusum* (Inions' SOLOAM) and *Hibbertia furfuracea* (Inions' HEATHECO). The type is thus closest to Inions' community types 4 (Stoate), 5 (Harris) and 6 (Wallace). It has also affinities with Strelein's types K, N, Q and U.

Community type 9, described as *Acacia littorea* dune community is associated with relatively recent, weakly leached calcareous sands in form of steeply sloping dunes. It characteristic species are *Agonis flexuosa* (Strelein's and Inions' SOBROSAN), *Desmocladus* (formerly *Loxocarya*) *flexuosa* (Strelein's BROMO), *Acacia littorea, Isotropis cuneifolia* and *Senecio lautus*. We have put the last three species in a new indicator group ALIT. This community type has no affinities with Strelein's or Inions' classifications, occurring only on coastal dunes.

Community type 10, described as *Banksia littoralis* interdune community, is associated with podzols on siliceous sands in interdune plains and swamps of older dunes. Its structure ranges from heath to open forest. The characteristic species are: *Amperea ericoides* (Inions' NOREKA), *Anarthria scabra* (Strelein's SOBROSAN), *Melaleuca thymoides* and *Pultanaea reticulata* (Strelein's SOSAM), *Desmocladus* (formerly *Loxocarya*) *flexuosa* (Strelein's BROMO), *Agonis flexuosa* (Strelein's and Inions' SOBROSAN), *Allocasuarina fraseriana* (Havel's SANGRA), *Acacia littorea* (ALIT), *Banksia littoralis* (Havel and Strelein's VERWET) and *Patersonia occidentalis*.

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The last species has been placed into BROMO. This community type has affinities with Strelein's type R.

Community type 11 is described as *Jacksonia furcellata* dune community, associated with podzols overlying calcareous sands in older dune systems. Its characteristic species are *Agonis flexuosa* (Strelein's and Inions' SOBROSAN), *Pultanaea reticulata* and *Patersonia occidentalis* (Strelein's SOSAM), *Senecio lautus* (ALIT), *Agonis parviceps* (Strelein's SOSALOM), *Jacksonia furcellata* and *Vellea trinervis* (DASBROM). There is a small group of new species, which includes *Lindsaea linearis* and *Eutaxia obovata*, which we have labelled JACFUR. Being a coastal type, this community type has no clear equivalents in Inions' or Strelein's classifications.

Community type 12 is described as *Allocasuarina humilis* dune community, associated with podzols overlying siliceous sands in older dune systems with smooth outlines. Its characteristic species are *Agonis flexuosa* (Strelein's and Inions' SOBROSAN), *Allocasuarina fraseriana* (Havel's SANGRA), *Amperea ericoides* (Inions' NOREKA), *Isotropis cuneifolia* (ALIT), *Eutaxia obovata* (JACFUR), *Lepidosperma effusum* (Inions' and Strelein's SOSALOM), *Desmocladus* (formerly *Loxocarya*) *flexuosa* and *Patersonia occidentalis* (Strelein's BROMO), *Logania serpyllifolia* and *Leucopogon capitellatus* (Inions' DRYKA). There are two new characteristic species, *Allocasuarina humilis* and *Hakea prostrata*, which we have labelled ALHUM. Being a coastal type, this community type has no clear equivalents in Inions' and Strelein's classifications.

There are, however, linkages between Wardell-Johnson *et al.*'s (1989) types 9-12, all of which occur on coastal dunes. The differences between them mainly arise out of the degree of leaching, which is to a degree is influenced by topographic position but is primarily determined by the age of the dunes.

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Species	Havel 1975a		Mattiske 1991	Havel 1999 Water Authority	Havel 1985 Water Authority	Ecologia 1994	Loneragan 1978	Griffin 1992	Heddle & Marchant 1983
Agonis linearifolia	WETAL	C	A1-3, B, C						
Trymalium floribundum	FEHIRA	Q		Y, AY, L					
Acacia alata			B		24HCq				
Acacia extensa	FERMO	W	A3,B,C,D,J,P,S1-3						
Eucalyptus patens	FERMO	A,W,U,Q		L					
Hypocalymma angustifolium	FERMO	A,D,E,W,Q,Y,L	A1-3,B,C,D,J,P,S1-2	Y,D,AX,AY	24HCq, 21HHu	5		27	WMW
Dianella revoluta			S1, S2				mV3, pmV1,pmV2	38	
Corymbia calophylla	MARRI	B,D,W,T,U,R,Q,S	A1,A2,B,D,J,P,S1-3	Z,H,S,Y,D,SP,ST		2	Mv2,T1,T2,T3,T4,T5,T6	5,35,40,41	WMW, JMOF
Bossiaea ornata	MARRI		B, D, J, P, S1, S2	H		1, 2	pV1,mV2		
Dryandra lindleyana	MARRI		B, D, J, S1, S2			1, 3	pV1,mV2	40, 41	
Xanthorrhoea preissii	MARRI		A2,A3,B,D,J,P,S1-3	D,Z,H,P,SP,S,ST,M,Y,L,AY,G3	19JMr	3,2,1,4	pmV1,pmV2,V3	40, 41	
Tetraria capillaris			B, J, P, S1-2		19JMr				
Acacia stenoptera			A2, C			5			
Gastrolobium calycinum	DRYFER	Z,M,Y		G3, Y		3		29	
Hibbertia hypericoides			D, P, S1, S2			2		5, 40	
Dampiera linearis			C, D, J, P, S1			2, 4			
Baeckea camphorosmae	BROFEM	E,Y	A1-2,B,D,J,P,S1-3	D,Y,AY,A				9	
Dampiera alata	BROFEM	D,E,Y			11W	1, 3, 5			
Lepidosperma tenue			B,D,J,S1-3			1,2,3,4			
Allocasuarina humilis	DRINF	R	J,S3			4, 5		2,4,7,10	H
Eucalyptus accedens						2	T2, T3	34, 35	
Dryandra armata						4			WMW, H
Leptospermum erubescens						4		7	
Leucopogon verticillatus	HIGRA	T,S		ST	19JSd				
Pteridium esculentum	HIGRA	U,T,Q		D,ST					
Clematis pubescens		Q,T,U	S2	Z, ST	19JSd				

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Species	Havel 1975a		Mattiske 1991	Havel 1999 Water Authority	Havel 1985 Water Authority	Ecologia 1994	Loneragan 1978	Griffin 1992	Heddle & Marchant 1983
									JMOF
Leucopogon capitellatus	FREGRA	(Q,U) Z,S,R	D, S1, S2	Z,S,ST					JMOF
Leucopogon propinquus	FREGRA	(Q,T,S) R,Z	D, P, S1, S2	P					WMW, JHOF
Macrozamia riedlei	FREGRA	Z,S,T,U,R,Q,M	B, D, S1, S2, J, P	D,Z,S,ST,M,V	19JMr	1	mV2		RSLW
Phyllanthus calycinus	FREGRA	(M,T,Z) S,Q,R		D,Z,P,Y	19JHl			7	
Trymalium ledifolium	FREGRA	(H,P,Z) R	D, S2	Z,P,SP,M,L	11W				
Lechenaultia biloba			B, D, J, P, S1, S2	P	19JLc	1, 2, 4	pV1		
Lasiopetalum cardiophyllum				P, SP	19JLc				
Acacia urophylla	GRAHIR	S,T,Q		ST					
Lasiopetalum floribundum	GRAHIR	(Z,P,H) S,T	B, D, J, S1, S2	P					
Senecio leucoglossus				SP, S, ST	19Bg				
Eucalyptus marginata	JARRAH	B,E,F,J,H,P,Z,S,T,R	A1,A2,B,D,J,P,S1-3	D,Z,H,P,SP,S,ST		2	Mv2, T3,T4,T5,T6	35, 40	JMOF
Hibbertia commutata	JARRAH		P, S1, S2			1	pmV1,pmV2,mV3	43	HT
Xanthorrhoea gracilis	JARRAH		D,J,P,S1-3						
Acacia celastrifolia				M, SP, S, ST	19Bg				
Adenanthos barbigera	GRAMED	(R,J) S,P							JMOF
Banksia grandis	GRAMED	(S,T) P	D, B, S1, S2	SP, S, ST	19Bg		T4,T5,T6		JMOF
Hovea chorizemifoila	GRAMED	(R) P,S,T	B, D, P, S1, S2	H, P, SP, S			pV1, mV2		
Persoonia longifolia	GRAMED	(S) P	B, D, J, P, S1, S2	S, ST			T4,T5,T6		JMOF
Daviesia preissii			B, D, J, P, S1, S2	SP, H			pV1		
Eucalyptus wandoo	WANDOO	M,L,Y		M, Y, L, AY, G3	11W	1,2,3,4,5,6	mV1,T1,T3	35,43,44	WMW
Acacia pulchella			A2,A3,B,D,J,P,S1,S2			1, 3	mV1		
Gompholobium marginatum			J		11W	3			
Acacia nervosa			S1, S2		11W	5			
Hakea lissocarpha	BROFER	W,R,Q,M,L,Y	B, D, J, S1, S2	Z, M, D, Y, L	19JHl	1, 2, 3	pV2		WMW, JMOF
Kennedia coccinea	BROFER	T,Q	B, D, J						
Astroloma pallidum			D, S1, S2			3			

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Havel 1975a		Mattiske 1991	Havel 1999 Water Authority	Havel 1985 Water Authority	Ecologia 1994	Loneragan 1978	Griffin 1992	Heddle & Marchant 1983
Calothamnus quadrifidus					21AAh			27	
Cheilanthes austrotenuifolia					24HCq			38	RSLW, HB
Borya sphaerocephala	GRANITE	G			24HCq	3, 4		14	HB
Grevillea bipinnatifida	GRANITE	G			21AAh,24HCq				HT
Hakea undulata	GRANITE	G		G3, G4	21HHu,21AAh			9	WMW, HT
Hakea trifurcata	GRANITE	G		G4		4			WMW, HT
Eucalyptus laeliae	GRANITE	G							WMW
Allocasuarina huegeliana	GRANITE	G			21AAh			38	RSLW
Hakea incrassata					21HHu			33	HT
Allocasuarina fraseriana	SANGRA	(S,J) P	B, D, J, P, S1-3	P, SP, S, ST	19JLc		T4, T6		JMOF
Acacia browniana			D, J, S1, S2						
Patersonia rudis	DRYGRA	(E,S,R,M) H,P,Z	B, J, P, S1						
Styphelia tenuiflora	DRYGRA	(J,S,R) H,P,Z	D, J, P, S1, S2	AX,Z,H,P,SP,S,ST,Y,L					
Petrophile striata		H	S1	H, P, SP, S	19Ps		pmV1,pmV2,pV3		
Daviesia decurrens	DRYSAG	(B,E,P,S) J,H	D, J, P, S1, S2	H		2	pV1, pV2		
Hakea ruscifolia	DRYSAG	(E,H,P)J	J, P, S1			2			
Bossiaea eriocarpa			B, C, D, J, P, S1-3			3		27, 40	
Banksia attenuata	SANLEA	J	B, J, P, S1					*2*	
Conospermum stoechadis	SANLEA	B,J						*2*	
Nuytsia floribunda	SANLEA	J,H	A1-2,B,C,D,J,P,S1-2						WMW
Patersonia occidentalis	SANLEA	(B,E,F,Y) B	B, J, P				pV1		
Dasypogon bromeliifolius	SAMORG	(A) B	A2,B,D,C,J,P,S1-3						
Adenanthos obovata	SAMORG	A,B	A1-2,B,C,D,J,P,S1						
Kingia australis	BROMO	E,D	D						
Mesomelaena tetragona	BROMO	A,B,D,E,C,J,H	A2-3,B,C,D,J,P,S1-2			5			
Synaphaea petiolaris	BROMO	(A,B,D,H) E,W	B,J,P,S1,S2						
Lepidosperma squamatum	BROMO	(A) B,D,E,W,P,H	A2,B,D,J,P,S1,S2			2	pV1	40	
Desmocladus fasciculatus			A1-3,B,D,J,P,S1-3			5			

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Havel 1975a		Mattiske 1991	Havel 1999 Water Authority	Havel 1985 Water Authority	Ecologia 1994	Loneragan 1978	Griffin 1992	Heddle & Marchant 1983
Meeboldina scariosa	BROWET	A,B,D,E,C	A1-3, B, C, D, J,						
Pericalymma ellipticum	BROWET	(E,W) A,D	A1-2,B,C,D,J,P,S1						
Hakea prostrata			A3, D	AY, L				27	
Banksia littoralis	VERWET	(C) A	A1-3, C						
Hakea ceratophylla	VERWET	(E) A	A1-3, B, C						
Hakea varia	VERWET	A	A1-3, C	AY, A				15, 16	
Melaleuca preissiana	VERWET	A	A1-3, B, C	A	23HDc				
Astartea fascicularis	VERWET	A,C	A1-3, B, C		23HDc				
Adenanthos cygnorum			A1, B, D, J		23HDc			27	
Eucalyptus rudis			A2	AY, AX					
Melaleuca lateritia			A1-2, C	A		6			
Melaleuca viminea			A1-3, C	A					
Melaleuca incana				A, AX				15	
Meeboldina coangustatus			A1-3, C	A					
Isolepis nodosa				A				20	

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Mattiske 1996	Gibson 1997	McCutcheon 1978, 1980	Strelein 1988	Havel 1975a	Gibson 1994	Havel 1968
Eucalyptus diversicolor	SOGRAF			K, N			
Hovea elliptica	SOGRAF			S,T,Q,U,V,X,N,I			
Podocarpus drouynianus	SOGRAF			T,K,N,P,R,I,B			
Bossiaea ornata	GRAMED		G	S, T, P, Z, Y	MARRI		
Gompholobium knightianum	GRAMED					1a	
Gompholobium marginatum	GRAMED					3c	
Gompholobium polymorphum	GRAMED					1a, 1b	
Gompholobium tomentosum	GRAMED					20a+c, 21a+b+c, 23a, 29b	
Persoonia longifolia	GRAMED		G	S,T,K,Q,U,V,X,N,P,R,I, B,Z	P. S		
Hovea chorizemifolia	GRAMED		G	S, T, P, R, I	P, S, T, Q	1a	
Billardiera variifolia	GRAMED					1a	
Hakea lissocarpha	GRAMED		G, F, E		D,E,W,Z,S,T,U,R,Q, M,L,Y		
Logania serpyllifolia	GRAMED	10, 13					
Adenanthos barbiger			G, F		J, P, S, R		
Adenanthos meisneri	SANLEA		C, A				
Banksia attenuata	SANLEA	15	A		J	20a+b, 21b+c, 23a+b	
Calytrix flavescens	SANLEA					21b, 23b	
Hibbertia vaginata			C, A			20b, 21b	
Leucopogon glabellus		15	C, A				
Stirlingia latifolia			C, A, D		F, J, H	20a+b+c, 21b, 23b	E
Sphaerolobium medium				S, P, I	B, E, J, H		

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Mattiske 1996	Gibson 1997	McCutcheon 1978, 1980	Strelein 1988	Havel 1975a	Gibson 1994	Havel 1968
Dryandra lindleyana				M	MARRI		
Banksia grandis	FREGRA			P,R,I,S,T,K,Q,X,N	P, S, T		
Corymbia calophylla	FREGRA			S,T,K,Q,U,V,X,N,P,R,I,Z,M,Y	A,B,D,E,W,J,P,Z,S,T,U,R,Q	1b, 3a, 3b, 3c	I
Hibbertia hypericoides	FREGRA	30				1a+b, 20a+b+c, 21a+b, 23a+b, 25	C
Macrozamia riedlei	FREGRA	7		T,Q,U,V,X,P,R,Z,Y	S,T,V,R,Q,M,L	21a, 25	
Leucopogon verticillatus	FREGRA		G, F	S,T,K,Q,U,V,P,R,I,Z	S, T		
Leucopogon capitellatus	FREGRA				Z, S, T, R, Q		
Phyllanthus calycinus		4, 7, 11			Z, S, T, R, Q, M	25, 29b	
Trymalium ledifolium				Z, M, Y	H, P, S, R		A
Leucopogon propinquus		8		T,Q,U,V,X,P,R,Z,Y	P, S, T, R, Q	25	
Agonis flexuosa	SCOBROMO	4, 5, 7, 8, 13		V, X, N, R			
Hakea ruscifolia	SCOBROMO	10		V, R	E, H, J, P	20b	
Xylomelum occidentale	SCOBROMO					1a	
Dasypogon bromeliifolius	SCOBROMO	13, 29	E, D, C, A	X, R, F	A, B	, 20b+c, 21a+b+c, 22, 23a+b	H-I
Andersonia caerulea	SCOBROMO	10, 14, 30					
Daviesia decurrens	SCOBROMO		G, F		B, E, J, H, P, S		
Desmocladus flexuosus	SCOBROMO	4, 5, 7, 8, 13		P, R, M		20a, 21a, 29b	
Lepidosperma squamatum	SCOBROMO	4,5,7,13,14,15		R	A,B,D,E,W,C,J,H,P,Z,S,Q,R,Y	1a+b, 3b, 21a+b, 23a, 29b	
Jacksonia horrida	SCOBROMO	9, 10, 13					
Kingia australis	SCOBROMO		F, D, C	M, Y	D, E	2, 3a	
Acacia preissiana			G		H, P, S, Z		
Styphelia tenuiflora			G		J,H,P,S,Z,R		
Synaphea petiolaris					A,B,D,E,W,H	2	

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Mattiske 1996	Gibson 1997	McCutcheon 1978, 1980	Strelein 1988	Havel 1975a	Gibson 1994	Havel 1968
Petrophile linearis	SCOMOSAN		A			20a+b+c, 21a+b+c, 22, 23a+b	
Chorizema ilicifolium	SCOMOSAN			K, N	Q, T, U		
Banksia ilicifolia	SCOMOSAN	14	C, A			22	I-J
Acacia browniana	SCOMOSAN		G, F, E	S, T, K, X, N, P, I			
Lysinema ciliatum	SCOMOSAN	10, 14				21b	
Allocasuarina fraseriana	SCOMOSAN		G, F, E		J, P, S		
Jacksonia furcellata	SCOMOSAN					14	
Olearia axillaris	SCOMOSAN	2, 5, 11				29b	
Verticordia densiflora	IRONPAN					10a	
Anarthria prolifera	BROGRA	29		R, F			
Eucalyptus marginata	BROGRA	14		S,T,K,Q,U,V,X,N,P,R,I,B,Z,M,Y,A	B,D,E,W,F,J,H,P,Z,S,T,R,Q,M	1a, 1b, 3, 20b	I
Xanthorrhoea preissii	BROGRA	20, 29, 30		Q,X,N,R,I,B,Z,M,A		1b, 2, 3a+b+c, 4, 20b, 23a	H, I, J
Acacia pulchella var. pulchella	BROGRA			S, T, U, X, A, M		3c, 14, 23b	
Acacia hastulata	BORGRA	20, 29, 30					
Acacia extensa	SOBROSAN			V, R, Y	W	1b, 21b	
Anarthria scabra	SOBROSAN			X, N			
Anigozanthos flavidus	SOBROSAN	8		X, R			
Patersonia occidentalis	SOBROSAN	10, 23				20c, 21b, 21c, 22, 23b	
Melaleuca thymoides	SOBROSAN	10, 14, 15, 30	D, C, A	R		21b	
Leucopogon australis	SOBROSAN		D, F, E, G	V,N,P,R,I,B,F,Y			
Philotheca spicata	SOBROSAN					3a, 20a+c, 21a+b, 23a+b	

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Mattiske 1996	Gibson 1997	McCutcheon 1978, 1980	Strelein 1988	Havel 1975a	Gibson 1994	Havel 1968
Bossiaea linophylla	BROWET	8, 10, 13		S,T,Q,U,V,X,O,R,I,Y			
Phlebocarya ciliata	BROWET	14, 30				4, 21a, 21b, 22, 23a	
Nuytsia floribunda	BROWET				F, J		
Adenanthos obovatus	BROWET	13, 29, 30	D, E, C	S, R, I, B	A, B	4	
Mesomelaena tetragona	BROWET		F, D, C		A,B,D,E,W,C,F,J,H, Y	1b, 2, 3a, 3b, 3c, 20b	
Lyginia barbata	BROWET	10, 14, 30	E, D, F, A			2, 4, 20a+c, 21a+b+c, 22, 23b	
Hakea linearis	BROWET	20, 26					
Acacia myrtifolia	BROWET			S, N, R, I			
Agonis parviceps	BROWET	20, 29, 30	F,E,D,C,D,A	S,K,N,P,R,I,B,F			
Pericalymma ellipticum	BROWET	29	F, E, D, C		A, D, E, W	2, 3, 4, 5, 10a, 10b	K
Cotula coronopifolia	BROWET					15	
Hakea varia	BROWET	22			A	2, 9, 10a, 13	
Hakea sulcata	BROWET					2, 10a	
Kunzea recurva	BROWET	30					
Pimelea longiflora	BROWET	14					
Pultenaea reticulata	BROWET		D, C	R, B			J
Melaleuca preissiana	BROWET	22	D, C	A	A	4, 14	J-K
Cyathochaeta avenacea	VERWET					3c, 9	
Pteridium esculentum	VERWET			X,N,S,T,K,Q,U,V	T, V, Q		
Astartea fascicularis	VERWET	20,23,27,29,30			A, C	2, 9, 11, 12	K
Meeboldina scariosa	VERWET	20,23,26,27,28	E, D, C, A		A,B,D,E,W,C,F,J,Y		
Banksia littoralis	VERWET		D, C	A	A, C		J-K
Agonis linearifolia	VERWET	20	F, E, D		C		
Viminaria juncea	VERWET					8, 10a, 10b	
Eucalyptus megacarpa			F, E		C		
Grevillea diversifolia		23			C		

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Mattiske 1996	Gibson 1997	McCutcheon 1978, 1980	Strelein 1988	Havel 1975a	Gibson 1994	Havel 1968
Calothamnus lateralis subsp. lateralis	SOWET	22				2	K
Hibbertia stellaris	SOWET	30					
Velleia trinervis	SOWET	10					
Beaufortia sparsa	SOWET	29		F			
Evandra aristata	SOWET	20, 29, 30					
Homalospermum firmum	SOWET	20, 29, 30		F			
Eucalyptus patens	WETLOAM		E	Q, F	A,D,W,C,T,U,Q,L		
Hypocalymma angustifolium			F, D	M, Y	A,B,D,E,W,C,R,Q,M ,L,Y	1b, 3c, 4, 6	J
Baeckea camphorosmae					P, E, J, H, M, Y	20b	
Agonis juniperina	FREQWET	28					
Baumea articulata	FREQWET					12	
Triglochin procerum	FREQWET					13, 15, 17	
Leptocarpus tenax	FREQWET					2	
Melaleuca rhaphiophylla	FREQWET	23, 28				13, 14, 15, 17	
Melaleuca cuticularis	FREQWET	23					
Baumea juncea	FREQWET	23				17	
Hakea ceratophylla	FREQWET		D, C		A, E	2	
Baumea vaginalis	FREQWET	26, 27, 28				14	
Meeboldina coangustatus	FREQWET					9	

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Wardell-Johnson 1995	Wardell-Johnson 1989	Gibson 1997	Inions 1990	Strelein 1988	Christensen 1980	Havel 1975
Pimelea longiflora subsp. *longiflora*	EXSAN	1, 5, 7	14				
Daviesia decurrens	EXSAN						J, H, B, E, P, S
Bossiaea rufa	EXSAN		13				
Banksia attenuata	EXSAN		15				J
Lyginia barbata	DRYSAN	1, 7	10, 14, 30				
Melaleuca thymoides	DRYSAN	3, 6, 10	10, 14, 15, 30		R		
Allocasuarina fraseriana	DRYSAN	1, 7, 10,12					P, S, J
Banksia ilicifolia	DRYSAN		14				
Hakea ruscifolia	DRYSAN		10		R		J, H, P
Lindsaea linearis	BROGRA	11					
Agonis hypericifolia	BROGRA	1, 4, 7			T, S, P, R, I		
Xanthorrhoea preissii	BROGRA	11	20, 30		A, B, I, M, P, R	+C2	MARRI
Eucalyptus marginata	BROGRA	2, 3	14	7	B,A,Y,M,Z,Q,U,X,V,T ,S,R,I,R,N	-C1	B,E,F,H,J,P,S,T,R, Z
Persoonia longifolia	BROGRA	4		1, 8, 9	Q,U,X,V,T,S,[,R,I	-C2	S, P
Anarthria scabra	BROGRA	2, 3, 6	14				
Andersonia caerulea	BROGRA		10, 14				
Adenanthos obovatus	SAMORG	1, 3, 10	13, 29		B, I, R, S		A, B
Dasypogon bromeliifolius	SAMORG	3, 6	13, 29		F, R, X		A, B
Anarthria prolifera	SAMORG	2, 3	10, 13, 29		F, R		
Pultenaea reticulata	SAMORG	7, 10, 11			F, R		
Agonis parviceps	SAMORG	2, 4, 5, 11	20, 29		B, F, I, K, N, P, R, S		

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Species	Wardell-Johnson 1995	Wardell-Johnson 1989	Gibson 1997	Inions 1990	Strelein 1988	Christensen 1980	Havel 1975
Xanthosia rotundifolia	MOFES	1, 5, 7					
Burchardia umbellata	MOFES	2, 4, 5, 7					
Acacia myrtifolia	MOFES	3, 6, 7		7	I, N, R, S		
Lomandra nigricans	MOFES			1			
Patersonia umbrosa var. *umbrosa*	MOFES			5	P, Q, S, T, U, V		
Acacia browniana		5, 8		7	I, K, N, P, S, T, X		
Bossiaea laidlawiana				8, 10	P, S, T		
Leucopogon propinquus	MOLGRA		8, 11	3	Q,U,S,V,T,P,R,Y,M,Z		R, Z, Q, Z
Corymbia calophylla	MOLGRA				Q,U,X,V,T,S,P,R,I,K,N,Y,M,Z	-C1	B,D,W,T,Q,U,R,S
Patersonia occidentalis	MOLGRA	10, 11, 12	10, 23				B, E, F, Y
Lepidosperma squamatum	MOLGRA		2, 7, 13, 15		R		A,B,D,E,H,R,W
Leucopogon australis	MOLGRA	5, 7		7, 8	V, P, R, I, N, F, B, U		
Nuytsia floribunda	NAPODS						J, H
Eutaxia obovata	NAPODS	11, 12					
Stylidium scandens	NAPODS	2, 5					
Bossiaea webbii	NAPODS	4, 5					
Desmocladus flexuosus	DUSAN	6, 9, 10, 11, 1	2, 4, 5, 7, 8		P, R		
Lepidosperma effusum	DUSAN	8, 12		4, 5, 6, 11			
Sollya heterophylla	DUSAN		9				
Isolepis nodosa	DUSAN		2				

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Species	Wardell-Johnson 1995	Wardell-Johnson 1989	Gibson 1997	Inions 1990	Strelein 1988	Christensen 1980	Havel 1975
Acacia hastulata	FLADUN		20, 29, 30				
Adenanthos cuneatus	FLADUN		10				
Leucopogon capitellatus	BROMOF	3, 12		7		-C1	Q, R, S, U, Z
Opercularia hispidula var. *pauciflora*	BROMOF		4, 8, 13				
Agonis flexuosa	BROMOF	9, 10, 11, 12	4, 5, 7, 8, 13	5	X, V, R, N		
Anigozanthos flavidus	BROMOF		8	6	X, R		
Kunzea recurva	SOHUMP	4, 11	30				
Leptomeria cunninghamii	SOHUMP		30	GRAMED	B, I, P, S, T, Z	-C1	
Mesomelaena tetragona	SOMOL	3					A,B,D,E,C,J,H
Kingia australis	SOMOL				S, R, I, N, B		E, D
Evandra aristata	SOMOL		29				
Acacia extensa					R, V, Y		W
Hakea undulata	LOWROC					+C3	G
Astroloma pallidum	LOWROC				M, Z	-C1, +C2	

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Species	Wardell-Johnson 1995	Wardell-Johnson 1989	Gibson 1997	Inions 1990	Strelein 1988	Christensen 1980	Havel 1975
Amperea ericoides		6, 10, 12		9, 12			
Dampiera alata	DRYVAL						D, E, Y
Hibbertia amplexicaulis	DRYVAL			9			
Hypocalymma angustifolium	DRYVAL				Y, M	+C1, +C2	A,D,E,Y,W,L,Q
Baeckea camphorosmae	DRYVAL					+C3	E, Y
Eucalyptus wandoo	DRYVAL				M	+C1, +C2	M, L, Y
Dryandra bipinnatifida	DRYVAL				M, Z		
Trymalium ledifolium	DRYVAL				Y, M, Z	+C2	R, H, P, Z
Astroloma ciliatum	DRYVAL				A, Y, M, Z	-C1, +C2	
Acacia pulchella	DRYLOG				U, T, X, M, Z	+C2	W, R, Q
Dryandra armata	DRYLOG					+C3	
Hakea lissocarpha	DRYLOG				U, P, A, Y, M, Z	-C1,. +C2	W,R,Q,M,L,Y
Hibbertia commutata	DRYLOG			3, 9, 12			JARRAH
Crowea angustifolia var. *platyphylla*	SOGRAF			2, 6	S, K		
Acacia divergens	SOGRAF			5			
Boronia gracilipes	SOGRAF			1, 2	I, K, N, S		
Macrozamia riedlei	SOGRAF		7	1, 3	Q,U,X,V,T,S,P,R,I,K,N ,B,Y,M,Z	-C1	Z,S,T,U,R,Q,M
Lomandra drummondii	SOGRAF			8			
Xanthorrhoea gracilis	SOGRAF				T, S, R, P, I		JARRAH

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Species	Wardell-Johnson 1995	Wardell-Johnson 1989	Gibson 1997	Inions 1990	Strelein 1988	Christensen 1980	Havel 1975
Sphaerolobium medium	SOGRAM				S, P, I		B, E, J, H
Banksia grandis	SOGRAM			1, 8, 9	Q,X,T,S,P,R,I,K,N		P, S, T
Hakea amplexicaulis	SOGRAM				Q, U, V, T, S, P, I	-C2, +C4	
Hovea chorizemifolia	SOGRAM				T, S, P, R, I		P, S, T, R
Desmocladus fasciculatus	SOGRAM				S, P, R, O, A, Y, M, Z		
Petrophile diversifolia	SOGRAM				S, I, K		
Podocarpus drouynianus	SOGRAM			1	T, S, P, R, I, K, N, B		
Logania serpyllifolia	SOGRAM	12	9	7			
Styphelia tenuiflora	SOGRAM						H, P, Z
Tremandra diffusa	SOGRAM			7			
Bossiaea ornata	SOGRAM				T, S, P, Y, Z		MARRI
Chorilaena quercifolia	HILOG	8		4, 10, 11			
Eucalyptus jacksonii	HILOG	8		6			
Dampiera hederacea	HILOG			5			
Trymalium floribundum	HILOG						Q
Opercularia volubilis	HILOG			SOVAL			
Acacia pentadenia	HILOG	8		SOFERMO			
Chorizema ilicifolium					K, N		Q
Allocasuarina decussata	SOFER	8			K, N		
Billardiera variifolia	SOFER			7			
Hovea elliptica	SOFER			7	Q, Y, X, V, T, S, I, N	-C2	
Lasiopetalum floribundum	SOFER			3	K		H, P, S, T, Z
Leucopogon verticillatus	SOFER	7, 8		8, 9	, U, V, B, P, R, I, K, Z	-C1, -C2	S, T
Acacia urophylla					Q, U, V		S, T, Q

APPENDIX F: REVIEW OF LINKAGES BETWEEN VEGETATION AND LANDFORM AND SOIL CLASSIFICATIONS FOR THE SOUTH WEST FOREST REGION

Species	Wardell-Johnson 1995	Wardell-Johnson 1989	Gibson 1997	Inions 1990	Strelein 1988	Christensen 1980	Havel 1975
Tremandra stelligera	SOFREG			8, 10	Q, U		
Pteridium esculentum	SOFREG			3, 8	Q, U, X, V, T, S, K, N	-C2	U, T, Q
Clematis pubescens	SOFREG		7		Q, U, V, T	-C2	
Eucalyptus diversicolor	SOFREG	8			K, N		
Hibbertia furfuracea	EXKAR	8					
Acacia littorea	BRODUN	9, 10	2, 4, 7				
Bossiaea linophylla	BRODUN		10	7	Q,U,X,V,T,S,P,R,I,Y	-C2	
Conostylis aculeata subsp. *aculeata*	BRODUN		11, 15				
Lepidosperma gladiatum	BRODUN		4, 8				
Lysinema ciliatum	BRODUN	6	4, 10				
Olearia axillaris	BRODUN		2, 7, 11, 25				
Phyllanthus calycinus	BRODUN		4, 7, 11			+C4	M,Q,R,S,T,Z
Pimelea rosea	BRODUN		8, 11				
Velleia trinervis	BRODUN	6, 11	10				
Allocasuarina humilis	LOWROC	12	10, 15		A	-C4	R
Spyridium globulosum	DUNON		2, 7, 11				
Rhodanthe citrina	DUNON		5, 9				
Hakea oleifolia	DUNON		8				
Banksia littoralis	DUNON	10			A	-C4	A, C
Senecio lautus subsp. *maritimus*	DUNON	9, 11	5, 9, 25				
Lobelia tenuior	DUNON		5, 9				

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Species	Wardell-Johnson 1995	Wardell-Johnson 1989	Gibson 1997	Inions 1990	Strelein 1988	Christensen 1980	Havel 1975
Hibbertia grossulariifolia	WEDUN		4, 7, 8	7, 12			
Hardenbergia comptoniana	WEDUN		7	9			
Muehlenbeckia adpressa	WEDUN		2, 8				
Rhagodia baccata	WEDUN		2, 7				
Hibbertia cuneiformis	DRYDUN		7	4			
Hakea prostrata	DRYDUN	12	5			+C1	
Isotropis cuneifolia	DRYDUN	9, 12					
Jacksonia aff. *furcellata* (GWJ 1411)	DRYDUN	6, 11					
Leucopogon parviflorus	LIMDUN		2, 5, 7				
Logania vaginalis	LIMDUN		5				
Dryandra sessilis var. *sessilis*	LIMDUN		5				
Melaleuca incana	HEADLAND		26				
Agonis linearifolia	SOWET						C
Homalospermum firmum	SOWET	3	29		F		
Beaufortia sparsa	SOWET	2, 3	29		F		
Astartea fascicularis	SOWET		23, 27, 29			+C1, -C4	A, C
Agonis juniperina	SOWET		28				
Diaspasis filifolia	SANPEAT		29				
Xyris lanata	SANPEAT		29				
Gymnoschoenus anceps	SANPEAT		29, 30				
Melaleuca preissiana	SANPEAT		22		A	+C1, -C4	A

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Species	Wardell-Johnson 1995	Wardell-Johnson 1989	Gibson 1997	Inions 1990	Strelein 1988	Christensen 1980	Havel 1975
Boronia megastigma	LOSWAM		20				
Meeboldina scariosa	LOSWAM		27, 28				A,B,C,D,E,F,J,W,Y
Eucalyptus patens	WETLOAM			1	Q		A, Q, U, N
Hakea varia	WETLOAM		22, 23				A, Q, U, N
Melaleuca rhaphiophylla	WETLOAM		23, 28				
Lepidosperma tetraquetrum	WETLOAM						C
Hakea ceratophylla	WETCLAY		23				A, E
Hibbertia stellaris	WETCLAY		30				
Melaleuca pauciflora	WETCLAY		20, 22, 26				
Baumea juncea	WETROC		23				
Synaphea petiolaris subsp. *petiolaris*	HIROC						A, B, D, E, H, W
Ricinocarpus glaucus	HIROC			1, 2			
Veronica plebeia	YATEFLAT			11			
Dryandra lindleyana	BRODRY				M	+C1, +C2	MARRI
Gompholobium ovatum	BRODRY				I,R,S		
Trymalium ledifolium var. *ledifolium*	MEDROC				Y,M,Z	+C2	H, P, R, Z